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Spurring Dairy Buffalo Development in the Philippines through Cooperatives, Negotiations, and Networks

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Abstract

The paper aimed to analyze the roles and implications of cooperatives, negotiations and networks in the implementation of the National Impact Zone (NIZ) Program for dairy buffalo development in the Philippines. It detailed how the program evolved from a series of negotiations involving the Philippine Carabao Center (PCC), cooperatives, individual farmers, local officials and other stakeholders. Through successful negotiations, several actors were enlisted until a network of relations shaped up. Negotiations and networks anchored on the cooperatives and as facilitated or managed by the intermediaries (mainly the NIZ Management Staff and field technicians from the PCC), have resulted in integrative agreements regarding adoption of particular innovations, marketing strategies, and policy implementation. Continuous improvement and sustainability of the NIZ Program depends on the effective management of its network. Strategic alliance with other actors or private groups to help in the business aspect of the NIZ operations is also recommended.

Key words: dairy buffalo, negotiation, cooperatives, network, script, interface instrument.

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Introduction

For many years, the growth of the dairy industry in the Philippines has been sluggish. From 2003 to 2008, local milk production (in terms of liquid milk equivalent) averaged only 12.53 million liters a year (NDA, 2009). Growth rates have also been erratic during the same period. Meanwhile, the local consumption or actual demand has been steadily increasing from 1.5 billion liters in 2003 to 1.72 billion liters in 2008. This implies that the rest of the local milk supply, equivalent to 99%, is provided by importation (mainly from New Zealand, United States, and Australia) at an annual average volume of 1.79 billion liters (or an annual average value of \$626 M) over a five-year period.

While the national government has continuously adopted a “stop-gap” measure, it also recognizes that developing the local dairy sector is a more sustainable and empowering approach for Filipinos. Thus, current government initiatives are anchored on multi-pronged strategies that include massive herd build-up, provision of support to post-production infrastructure, establishment of market linkages, human resource development, and deployment of livestock research and development instruments.

The Philippine water buffalo or *carabao* is a key instrument in these initiatives, by providing a population base for reproductive purposes. While cattle is the traditional animal for dairying, water buffalo has the advantage of subsisting better under a tropical climate. From the 1980s until early 1990s, however, the carabao population has been declining (reaching a low of 2.56 million) due to indiscriminate slaughter of local stocks for meat. To address this concern, the government allowed the increased importation of buffalo meat. The creation of the Philippine Carabao Center (PCC) in 1992 as an attached agency of the Department of Agriculture has also proved instrumental in this respect. As a result, the carabao population has gradually increased starting 1995 and as of January 1, 2008, it is estimated to be at 3.34 million (BAS, 2008).

To fast track the dairy buffalo development efforts in the country, the PCC conceptualized the National Impact Zone (NIZ) Program. The program has achieved moderate success since its launch in 1998. Along the way, it has also encountered many challenges, most of which were ‘socio-cultural’ in manifestations. This paper aims to examine the dynamics of the latter by revisiting the NIZ Program’s evolution and analysing the significant roles and implications of farmers’ cooperatives, negotiations and networks in its continuous development.

The National Impact Zone

The concept of an 'impact zone' involves putting together in a compact area, preferably one or few adjoining village(s), all ingredients necessary towards a sustainable buffalo-based enterprise development. Since the PCC has 13 regional centers, each center is expected to assist in the development of one impact zone (referred to as 'regional impact zone'). The NIZ serves as the national template for this endeavour and thus operates on a relatively bigger scale covering the whole province of Nueva Ecija.

Nueva Ecija is located in Central Luzon. Its first town (Gapan City) is about 96 km north of Manila, the capital city of the Philippines. The province has vast areas devoted to rice and relay crops such as onions, garlic, and vegetables. Raising water buffalos is also popular because of the draught power for ploughing, harrowing, and carrying of farm products that these animals provide especially in traditional and upland rain-fed farms. The province was chosen as the NIZ for various reasons. Foremost, it is situated near the commercial markets for dairy products. Likewise, the province is home to many farmers' cooperatives and to the PCC National Headquarters, which is based at the Science City of Muñoz, one of the five cities in Nueva Ecija.

Producing a buffalo with close to a purebred dairy bloodline can be achieved through crossbreeding of native carabaos with a superior dairy buffalo breed. This is pursued through the PCC's artificial insemination and natural mating (via bull loan) programs. However, it will take approximately 25 years of successive backcrossing to produce dairy-type animals. Clearly, the farmers cannot wait that long. This prompted PCC to introduce purebred dairy buffalos, originally procured from Bulgaria, in the NIZ. A Bulgarian buffalo can produce up to ten liters of milk a day compared with a native carabao's daily milk yield of one to two liters.

The NIZ template is anchored on the PCC's 'dairy buffalo module', which offers a Bulgarian buffalo to a qualified smallholder-farmer (i.e., marginal farmer owning or tending less than five hectares of land) who must be a member of a primary cooperative. Pre-existing agricultural cooperatives were chosen to facilitate the organizational aspect of the program.

The module is obtained as a 'soft loan' for a period of five years i.e., for every buffalo cow loaned out, one offspring-calf is given to the PCC in return. Prior to the awarding of the loan, the farmers must participate in social and technical trainings conducted by the PCC, free of charge. They must also commit to providing 0.1 ha forage area, an appropriate animal shed, and contribution to the 'guarantee fund', an alternative to animal insurance.

Evolution of the NIZ Network

The NIZ Program can be thought of as a ‘network’ that evolved from several ‘stages’ or a series of ‘negotiations’ involving a wide range of actors. A ‘network’ represents “patterned lines of interpersonal contacts connecting individuals in a system” (Rogers, 2002: 334). It requires a form of ‘investment’ in establishing and maintaining links or relationships (Barrett, 2004). On the other hand, ‘negotiation’ is a joint decision-making process, combining “the conflicting points of view into a single decision” (Zartman, 1978: 70). In that sense, ‘collaboration’ is an aim or an outcome of negotiation.

The stages that led to the network-like character of the NIZ Program are listed below, followed by a discussion of each stage.

- Initiation and Consultations with Local Governments
- Consultations with Cooperatives
- Creating Awareness among Farmers
- Consolidation and Activation
- External Involvement
- Federating the Cooperatives
- Operationalizing and Maintaining the Network

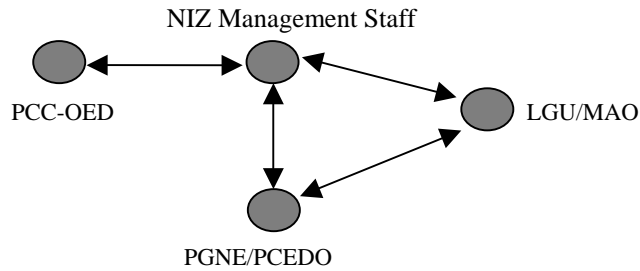
Initiation and Consultations with Local Governments

In November 1998, the PCC Office of the Executive Director (PCC-OED) created a small group, called here the NIZ Management Staff, to lay the foundation for the program (Figure 1). This group initially paid a courtesy call on the Provincial Government of Nueva Ecija (PGNE) to discuss the program’s rationale. A Memorandum of Agreement was then formalized between the provincial governor and the PCC’s Executive Director, declaring the province of Nueva Ecija as the NIZ. Thereafter, the PGNE, through its Provincial Cooperative and Entrepreneurship Development Office (PCEDO), collaborated with the NIZ Management Staff to generate awareness in municipalities by paying courtesy calls on the local government units (LGUs), headed by mayors, and conducting orientation dialogues with the municipal agricultural offices (MAOs).

Consultations with Cooperatives

The MAOs assisted the NIZ Management Staff and PCEDO in identifying active farmers’ cooperatives in their villages and in conducting orientation dialogues with cooperative officials (Figure 2). The latter identified prospective farmer-participants in the program and helped organize a two-day Social Preparation Training, which was designed and facilitated by the NIZ Management Staff. From this point on, PCEDO and MAOs no longer played an active role.

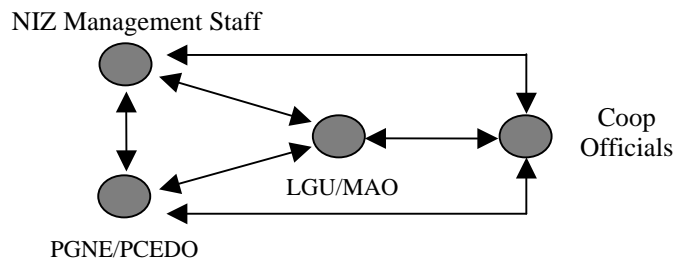
Figure 1 Initiation and Consultations with Local Governments



Key:

- LGU Local Government Unit
- MAO Municipal Agricultural Office
- PCC-OED Philippine Carabao Center-Office of the Executive Director
- PGNE Provincial Government of Nueva Ecija
- PCEDO Provincial Cooperative and Entrepreneurship Development Office

Figure 2 Consultations with Cooperatives



Key:

- LGU Local Government Unit
- MAO Municipal Agricultural Office
- PCEDO Provincial Cooperative and Entrepreneurship Development Office
- PGNE Provincial Government of Nueva Ecija

Creating Awareness among Farmers

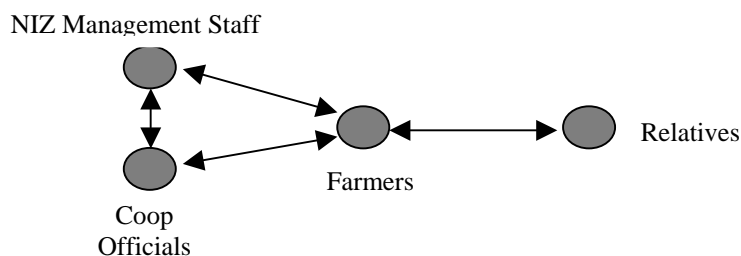
The Social Preparation Training sessions aimed to develop a sense of awareness, preparedness, and co-ownership among farmers in relation to the technical and

social requirements and implications of the dairy buffalo module. These sessions were often conducted in the villages and hosted by the mother cooperative(s) of participating farmers.

During these sessions, the character of the network was shaped by negotiations between the farmers and the NIZ Management Staff. The central issue was the farmers' contribution to the 'guarantee fund', which originally required that each farmer contributes an amount of Php2,000 annually until each one of them gives to the PCC a buffalo calf that is 16 to 18 months old. Many farmers asked why a guarantee fund was needed if the government really wanted to help them. To address this concern and as part of the 'leveling-off' process, the NIZ Management Staff often emphasized that "the dairy buffalo module is not intended for the poorest of the poor but for those farmers who can commit themselves to providing their counterpart resources for the project" (Baltazar, 2003).

Prior to deciding to participate in the dairy buffalo module under the NIZ Program, some farmers consulted with close associates e.g., relatives or cooperative chairs (Figure 3). This indicates that farmers tend to mobilize their personal communication network before deciding on a particular economic activity. During the last day of the Social Preparation Training sessions, those who were keen to join the program were asked to write and sign their declaration of support and commitment to the project.

Figure 3 Creating Awareness among Farmers

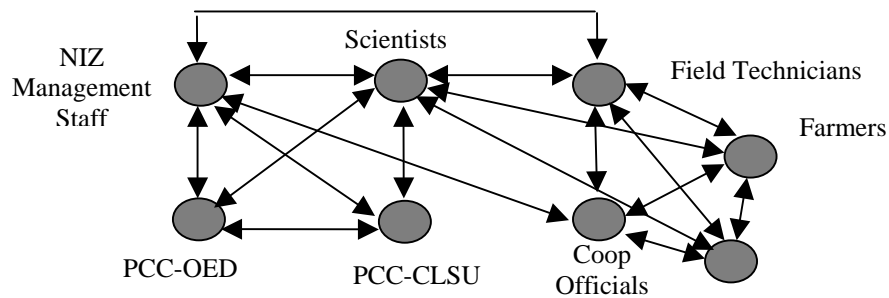


Consolidation and Activation of the Network

The network was consolidated and activated by the Technical Training sessions held at the PCC headquarters. The NIZ Management Staff arranged with scientists at PCC-OED and PCC-Central Luzon State University or PCC-CLSU (a regional center of PCC, which is also based at the Science City of Muñoz) about who would deliver lectures (Figure 4). Thereafter, the NIZ Management Staff coordinated with the cooperative officials, scientists, and field technicians regarding the session schedules. The cooperative officials informed the individual farmer-cooperative

members about their participation. Many cooperative officials also applied for a dairy buffalo module and participated, too.

Fig. 4 Consolidation and Activation of the Network



Key:

- PCC-CLSU Philippine Carabao Center-Central Luzon State University
- PCC-OED Philippine Carabao Center-Office of the Executive Director

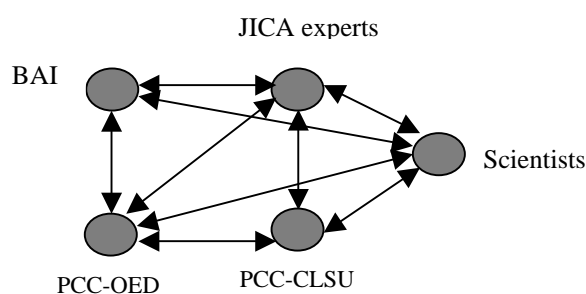
The field technicians primarily served as facilitators in the initial training sessions. Later on, they became resource speakers themselves and mediated between the farmers and the scientists during open forum and individual consultations. Subsequently, the field technicians have become ‘proxies’ for the scientists in ‘field negotiations’, during which integrative agreements were reached as regards performance of certain innovations (see later section). They have directly coordinated with cooperative officials about the schedules of subsequent training sessions at the PCC. The PCC (through its scientists) also trained and developed vet aides i.e. farmer-members of cooperatives, which now assist the field technicians in providing animal health services in the NIZ.

External Involvement

During the early years of the NIZ Program, the PCC-OED collaborated with the Bureau of Animal Industry (BAI) and the Japan International Cooperation Agency (JICA) in the Water Buffalo and Beef Cattle Improvement Project, which complemented the NIZ Program (Figure 5). The PCC-OED’s Gene Pool farm and the PCC-CLSU’s semen processing laboratory are two of the three sites identified under the project, which worked on animal breeding and selection, semen processing and artificial insemination, and feeds and feeding. Thus, Japanese

scientists interacted closely with PCC scientists, who then infused their lectures during the Technical Training sessions with innovations developed by the project. Through the same collaboration, the PCC has also acquired modern equipment in milk quality testing, semen processing, and forage production.

Figure 5 External Involvement



Key:

- BAI Bureau of Animal Industry
- JICA Japan International Cooperation Agency
- PCC-CLSU Philippine Carabao Center-Central Luzon State University
- PCC-OED Philippine Carabao Center-Office of the Executive Director

Federating the Primary Cooperatives

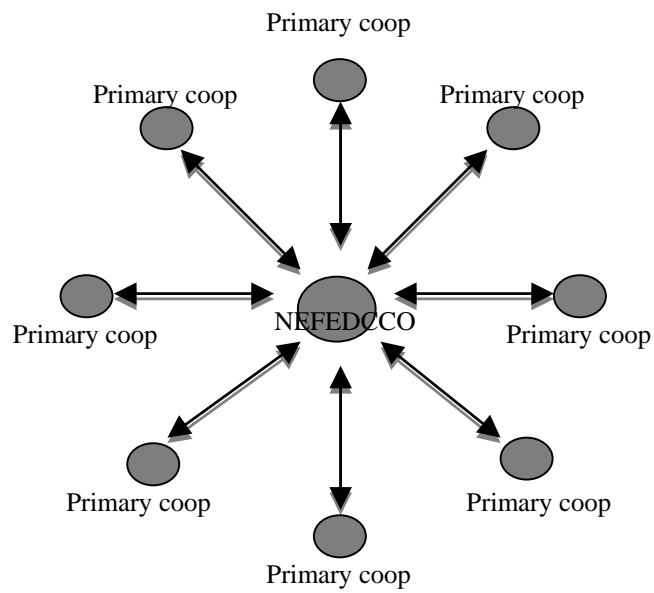
When the buffalos started producing milk in the early 2000s, each cooperative was selling milk on its own and at times was competing with each other for the same market. Realizing this, the NIZ Management Staff and field technicians (called here as ‘NIZ team’) negotiated with the chairs of five primary cooperatives a way to ‘cluster’ their cooperatives to pool milk and establish a common marketing scheme in late 2001. Subsequently, 14 other cooperatives joined the cluster and they federated into Nueva Ecija Federation of Dairy Carabao Cooperatives (NEFEDCCO) in May 2002 (Figure 6). As of December 2008, the federation has grown to a membership of 26 cooperatives. Thus, NEFEDCCO can be considered as a distinct network itself, being comprised by the 26 primary cooperatives, which elect officials to its board of directors.

Operationalizing and Maintaining the Network

The NIZ Management Staff subsequently helped to operationalize the network by assisting negotiations between the NEFEDCCO, cooperative officials, financial institutions, other government agencies, and private groups about marketing

arrangements and other postproduction assistance (Figure 7). Foremost of which resulted in linkages with private markets in Metro Manila and other areas that have since become regular outlets for their milk products. Linkages with other government agencies e.g., National Dairy Authority, PGNE, and participating

Figure 6 Federating the Primary Cooperatives

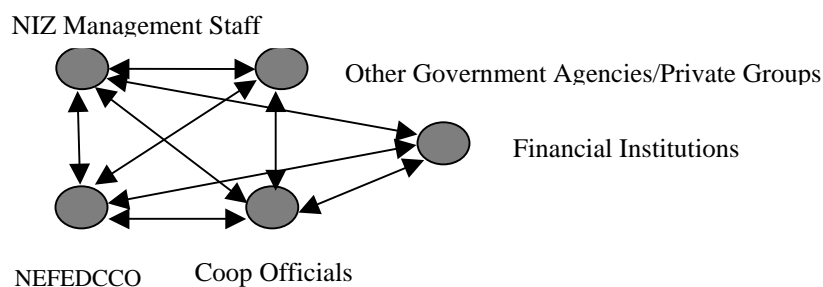


Key:

NEFEDCCO Nueva Ecija Federation of Dairy Carabaos Cooperative

LGUs also facilitate the financing of the Milk Feeding Program intended for malnourished schoolchildren in Nueva Ecija and other areas. It has since become one of the important avenues for the marketing of processed milk products from NEFEDCCO. Such linking roles by the NIZ Management Staff indicate how they spanned the “structural holes” (Burt, 1992) in the NIZ network.

Figure 7 Operationalizing and Maintaining the Network



Key:

NEFEDCCO Nueva Ecija Federation of Dairy Carabaos Cooperative

Two other types of negotiations sustained the network. First, at representative level, is on the boards of directors of the primary cooperatives and NEFEDCCO. Two members of NIZ Management Staff sit as ex-officio members of these boards. Frequent topics for discussion include guarantee fund payments by farmers and upholding the policy that prohibits farmers from transferring, selling or disposing of dairy buffalos without written approval from the PCC.

The second type of negotiation is collective in character. All key actors in the NIZ network converge during the annual one-day Farmer’s Forum held at the PCC headquarters. This follows a ‘question-and-answer’ format, in which farmers ask questions, make clarifications, and raise relevant issues. The PCC scientists or top management, as appropriate, provide answers or suggest solutions for further discussion while the NIZ Management Staff act as moderators or facilitators. Key topics for discussion in the past have included guarantee fund payments, milk marketing, and animal health matters and the result has been a set of integrative solutions and agreements.

Network Management

The possible problematic situations at the various nodal interactions in the NIZ Program, viewed here as one big network, necessitate that an actor has to manage such interactions. While this study supports the earlier view (Klijn and Teisman, 1997) that there is no central or single actor in charge of ‘network management’, it

appears that the NIZ Management Staff, particularly the NIZ Program Coordinator, assumes much of this responsibility.

To illustrate, the NIZ network was ‘activated’ when actors who comprise a ‘network of intermediaries’ have set multiple “obligatory passage points” (Star and Griesemer, 1989; Callon, 1986) i.e., conditions for enlisting and translating the key actors e.g., farmers and scientists, in the NIZ Program. These are represented by the broad requirements under the dairy buffalo module, which became more detailed and formalized when finally inscribed in the form of a loan contract. The latter served as an ‘interface instrument’, which helped in stabilizing the network of actors involved in the program by providing a common reference or ‘script’. A ‘script’ in this sense refers to “standard operating procedures” (Dougherty, 2002), the rules and conventions, or the distinctive patterns of cultural behavior or practices (Silvasti, 2003) that became internalized by the actors. They serve as cognitive tools or “mental maps” that guide the actors on how to act or behave in particular situations (Wiederman, 2005).

Network management has also been manifested in the ways the NIZ Management Staff mediate, coordinate, and facilitate the interaction among several actors in the NIZ Program. Such activities, which are centered on managing the interactions of actors in a network, go beyond the “boundary management” concept (Cash *et al.*, 2003) in considering not one but multiple interfaces. Instead, it is consistent with the “game management” concept in networks as earlier articulated by Kickert and Koppenjan (1997).

“Network structuring”, which involves institutional modifications, was also manifested when policy changes were effected following the field observations by the NIZ team and feedbacks from the farmers. This is illustrated by the revision of the old loan contract under the dairy buffalo module. The new Memorandum of Agreement is encompassing, as it requires all parties i.e., the PCC, the farmer-cooperator, the municipal mayor, and the cooperative chair as signatories in a single legal document. Thus, the new Memorandum of Agreement serves as a major interface instrument that endeavours not simply to unify but to transform the scripts of all key actors in the NIZ Program. In other words, it facilitates the evolution of a “collective script” (Pruitt, 1995) that now guides or informs the frames of reference of participating actors.

Outcomes of Negotiations and Networks

Successful negotiations and ensuing linkages among actors have resulted in integrative agreements and other beneficial outcomes. These include the adoption of innovations by farmers, increased buffalo inventory, milk production, and

income as well as empowerment, collaboration and complementation among actors.

Adoption of “Negotiated” Innovations

In communicating the innovations on dairy buffalo production, the center of gravity of the NIZ network lies on the link between the farmers and the PCC scientists, as mediated by the PCC field technicians (Figure 8). This is evident during the conduct of Technical Trainings wherein the field technicians facilitate an ‘open forum’ between the two actors. They also accompany the farmers to the offices of the scientists during individual consultations. More importantly, the field technicians serve as the ‘proxies’ of the scientists in the field where most negotiations with the farmers about particular innovations take place. Two examples of these ‘negotiated innovations’ are presented below.

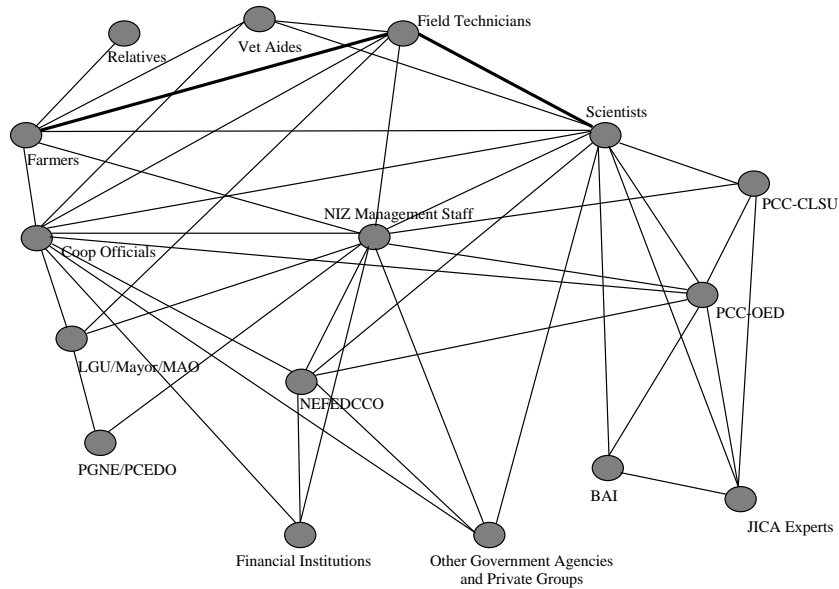
Feeding Management. The script of the scientists requires keeping the dairy buffalo under complete confinement and feeding it with improved grasses, a practice called ‘zero grazing’. Instead of doing this intensive feeding system, the field technicians discovered that farmers were practicing semi-intensive feeding i.e., letting the buffalos graze on a communal pasture at certain times of the day and then bringing them to shelter for hand feeding with mixed forages (native grasses, weeds, shrubs, and rice straw). The field technicians let the farmers continue this practice, in return for their agreement that the buffalo be dewormed regularly, as it can be infested with helminths while grazing. Farmers have to sacrifice a little for this. They need to pay for the anthelmintics. There is also a three-day withdrawal period for the buffalo’s milk, for safety reasons. Since this deprives them of income from milk for three days, a few farmers refused the deworming of their buffalos, but the majority recognized its long-term benefits and agreed to do so once every three months.

Reproduction Management. Proper and early detection of heat or estrus, i.e. a period when animals are sexually receptive, facilitates reproduction management. In-heat buffalos are bred via artificial insemination by a skilled technician. However, adoption of artificial insemination is only about 65%. Other farmers prefer natural mating as it has a relatively higher success rate. Recognizing the advantages and disadvantages of both approaches, the field technicians negotiated with the farmers a revised arrangement whereby they utilize artificial insemination first but if the buffalos do not get pregnant after three successive inseminations, they will use a bull for natural mating. To increase efficiency, they also agreed to establish a ‘night corral’, wherein a breeding bull and female buffalos are put together overnight. This practice has resulted in a high conception rate.

Increased Buffalo Inventory, Milk Production and Income

An objective measure of negotiation outcomes is expressed through the production and economic performances of the NIZ Program since its launch in 1998. In terms of animal inventory, the total number of buffalos has increased from an initial stock of 1,000 (distributed to farmers from 1998 to 2002) to 2,894 as of December 2006 (Table 1). Female calves are managed as replacement or fresh stocks for loan to new farmer-cooperators. Male calves are raised as breeding bulls and made available via the PCC's Bull Loan Program. Those that do not qualify for breeding purposes are managed and marketed for meat.

Figure 8 A Simplified Representation of the NIZ network and its Center of Gravity in Communicating Innovations Highlighted



- Key:**
- BAI Bureau of Animal Industry
 - JICA Japan International Cooperation Agency
 - LGU Local Government Unit
 - MAO Municipal Agricultural Office
 - NEFEDCCO Nueva Ecija Federation of Dairy Carabaos Cooperative
 - PCC-CLSU Philippine Carabao Center-Central Luzon State University
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 - PCEDO Provincial Cooperative and Entrepreneurship Development Office
 - PGNE Provincial Government of Nueva Ecija

Table 1. Buffalo inventory at the NIZ (as of December 2006)

Particulars	Number of Head
Original female buffalos loaned out to farmers	1,000
<i>Mortality</i>	<i>(260)</i>
Subtotal	740
Calves produced	2,634
Male	1,369
Female	1,265
<i>Mortality</i>	<i>(480)</i>
Subtotal	2,154
TOTAL	2,894

Source: Del Rosario *et al.* (2007)

Annual milk production from participating cooperatives has also increased from 873 kg in 2000 to 318,820 kg in 2006 (Table 2). Raw milk was sold to NEFEDCCO for centralized processing and marketing. This has generated income for both the individual farmers and the primary cooperatives.

Table 2. Annual milk production and income of farmers and cooperatives in the NIZ

Particulars	2000	2001	2002	2003	2004	2005	2006
Milk Production (kg)	873	17,530	117,579	249,296	322,930	344,276	318,820
Value (Php32/kg)	27,936	560,960	3,762,528	7,977,472	10,333,760	11,016,832	10,202,240
<i>Income of Farmers (Php30/kg)</i>	<i>26,190</i>	<i>525,900</i>	<i>3,527,370</i>	<i>7,478,880</i>	<i>9,687,900</i>	<i>10,328,280</i>	<i>9,564,600</i>
<i>Income of Primary Cooperatives (Php2/kg)</i>	<i>1,746</i>	<i>35,060</i>	<i>235,158</i>	<i>498,592</i>	<i>645,860</i>	<i>688,552</i>	<i>637,640</i>

Source: Del Rosario *et al.* (2007)

Empowerment, Collaboration and Complementation

The linkages have helped empower the smallholder-farmers. Individually, they may look disadvantaged owing to their limited income and resources. However, their membership in primary cooperatives facilitated the access to additional livelihood (dairying) and knowledge (improved husbandry practices) offered by the dairy buffalo module. The eventual creation of NEFEDCCO out of these cooperatives further strengthened their position in the society as entrepreneurs.

Thus, power is portrayed in the NIZ as the capacity of the smallholder-farmers to collaborate or “act in concert” to achieve a common goal (Arendt, 1970).

Becoming part of the NIZ Program has also extended the farmers’ networks via their linkages with other actors in the program e.g., NIZ Management Staff, field technicians, scientists, funding agencies, and market players. In other words, these connections have made it possible to improve their “bridging” (Putnam, 2000) and “linking” (Woolcock, 2001) social capital, which they now mobilize in gaining new skills and knowledge in dairying, marketing their milk products, generating extra income, sourcing out funds, and others. Conversely, scientists, field technicians, and NIZ Management Staff also derive benefits from their linkages with farmers, primary cooperatives, and NEFEDCCO in line with pursuing their own objectives or interests as employees of the PCC. These complementarities, made possible by being part of a single network, even out any power differentials among actors that may surface during their encounters at specific interfaces. In other words, “generalized symmetry” (Latour, 1987) is shown here to be a possible outcome of negotiation processes in the NIZ, which blurs any barriers or boundaries that may have divided the actors prior to their interfacing.

Conclusions

While not devoid of any constraints, the approach by the PCC and its partner-actors to spurring dairy buffalo development in the Philippines via the NIZ Program is proving effective. It hinges on the concept of ‘negotiation’, with the assumption that farmers, scientists, cooperative officials, and other key stakeholders have differing scripts or frames of reference, as influenced by their respective socio-cultural contexts. Thus, the greatest challenge was to promote two-way communication and perspective taking towards an integrative decision-making. This was made possible through the mediating functions of the NIZ Management Staff and the field technicians. As evidenced in the case study, negotiation is a necessary prelude to eliciting active participation among various actors and to establishing and maintaining the NIZ network. The main entry point for these initiatives is the primary cooperative, as it embodies a cohesive entity, which facilitates communication and coordination activities. The role of the cooperative officials is therefore of prime significance in this respect, as they are strategically positioned as ‘gatekeepers’ who can represent the individual farmers in particular negotiation activities with the PCC or with other actors in the network. While various socio-economic factors could affect the continuous success of the NIZ Program, a critical aspect would be the effective management of the network of actors that the program represents. The NIZ Management Staff currently does a

good job in this regard but there are limitations in performing their tasks in terms of budget and administrative or policy concerns. The NEFEDCCO, while tasked to perform centralized marketing, also had difficulties especially when there are milk surpluses. Thus, exploring strategic alliances with other (private) actors or organizations particularly on the business aspects of the NIZ operations could be helpful.

References

- Arendt, H. (1970). *On Violence*. San Diego; London: Harvest.
- Baltazar, H. (2003). *Development of Philippine Carabao Center's National Impact Zone Experience*. Unpublished.
- Barrett, C. (2004). Smallholder Identities and Social Networks: The Challenge of Improving Productivity and Welfare. *Strategies and Analysis for Growth and Access (SAGA)*, Working Paper (April 2004).
- Bureau of Agricultural Statistics (BAS). (2008). *Carabao Industry Performance Report: January to December 2007*. Department of Agriculture, Quezon City, Philippines.
- Burt, R. (1992). *Structural Holes: The Social Structure of Competition*. London: Harvard University Press.
- Callon, M. (1986). Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieurc Bay, In: J. Law, ed. *Power, Action and Belief: A New Sociology of Knowledge?* London; Boston: Routledge & Kegan Paul, pp. 196–223.
- Cash, D., W. Clark, F. Alcock, N. Dickson, N. Eckley, D. Guston, J. Jager, and R. Mitchell. (2003). Knowledge Systems for Sustainable Development *PNAS* [online]. [Accessed 8 June 2006], Available from: www.pnas.org/cgi/doi/10.1073/pnas.1231332100
- Del Rosario, W., H. Baltazar, L. Battad, M. Delizo, L. Cruz and M. Gonzaga. (2007). *Development of Impact Zone as Model for Smallhold Dairy Buffalo Enterprises*. Unpublished.
- Dougherty, M. (2002). Gendered Scripts and Declining Soil Fertility in Southern Ethiopia. *African Studies Quarterly: The Online Journal for African Studies* [online]. 6(1), [Accessed 5 May 2009]. Available from: <http://www.africa.ufl.edu/asq/v6/V6i1a5.htm>
- Kickert, W.J.M. and J.F.M. Koppenjan. (1997). Public Management and Network Management: An Overview. In: W.J.M. Kickert, E. Klijn, and J.F.M. Koppenjan, eds. *Managing Complex Networks: Strategies for the Public Sector*. London: Sage Publications.

- Klijin, E.H. and G.R. Teisman. (1997). Strategies and Games in Networks. *In*: W.J.M. Kickert, E. Klijin, and J.F.M. Koppenjan, eds. *Managing Complex Networks: Strategies for the Public Sector*. London: Sage Publications.
- Latour, B. (1987). *Science in Action*. Massachusetts: Harvard University Press.
- National Dairy Authority (NDA). (2009). Philippine Dairy Update. [online]. [Accessed 8 October 2009], Available from: <http://www.nda.da.gov.ph/ndadata.htm>
- Pruitt, D. (1995). Networks and Collective Scripts: Paying Attention to Structure in Bargaining Theory. *In*: R.M. Kramer and D.M. Messick, eds. *Negotiation as a Social Process*. California: Sage Publications, Inc., pp. 37–47.
- Putnam, R. (2000). *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon and Schuster.
- Rogers, E. (2002). The Nature of Technology Transfer. *Science Communication*, **23**(3), pp. 323–341.
- Silvasti, T. (2003). The Cultural Model of the “Good Farmer” and the Environmental Question in Finland. *Agriculture and Human Values*. **20**, pp. 143–150.
- Star, S.L. and J. Griesemer. (1989). Institutional Ecology, Translations, and Boundary Objects: Amateurs and Professionals in Berkeley’s Museum of Vertebrate Zoology, 1907–1939. *Social Studies of Science*. **19**, pp. 387–420.
- Wiederman, M.W. (2005). The Gendered Nature of Sexual Scripts. *The Family Journal: Counselling and Therapy for Couples and Families*. **13**(4), pp. 496–502.
- Woolcock, M. (2001). The Place of Social Capital in Understanding Social and Economic Outcomes. *Isuma: Canadian Journal of Policy Research*. **2**(1), pp. 1–17.
- Zartman, I.W. (1978). Negotiation as a Joint Decision-Making Process. *In*: I.W. Zartman, ed. *The Negotiation Process: Theories and Applications*. Sage Publications, Inc.