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1. Introduction

The productive arrangement Pingo D’água, an object of this study, is an innovatory case in the semi-arid region (backwoods) of Ceará and the Northeast. Based on an appropriately developed technology to drill shallow wells in alluvium areas, this productive arrangement develops some agricultural activities turned to local (Quixeramobim), regional (neighboring municipalities) and state (Fortaleza's CEASA) markets. Studying this arrangement is important and justified by at least four reasons: (i) technological innovation of water resources exploration; (ii) small scale irrigated agricultural production; (iii) increase in agricultural production; (iv) generation of occupation and income in Ceará's semi-arid.

That importance can be verified by the conquest and prizes received in contests organized by several institutions dedicated to innovatory projects and programs: Fundação Getúlio Vargas - FGV de São Paulo (Getulio Vargas Foundation) (Public Management and Citizenship Program); Fundação Banco do Brasil (Banco do Brasil Foundation) (technology prize); Sebrae (entrepreneur prize) and Caixa Econômica Federal - CEF (Federal Savings and Loans Bank). Besides the prizes received, Pingo d’Água Arrangement has gained the State of Ceará Government's recognition through its Secretariat of Agriculture - SEAGRI, by serving as a source of inspiration for the creation of the Program Poços do Sertão (Backwoods' Wells), dedicated to irrigated agriculture of the small family production, based on water resources originated from alluvium areas.²

This paper tries to present some results of the research contained on the Second Phase of the Redesist works, applied to Pingo d’Água APL case. For that purpose, it was broken down into 10 items, besides this introduction namely: (i) Panorama: supply structure and technological regime; (ii) Identification of arrangement; (iii) Identification of arrangement; (iv) Territory, location and its characterization; (v) Origin and history; (vi) Identification of Undertaking; (vii) Barriers and difficulties faced by the producers; (viii) Production and Market; (ix) Innovations and their impacts; (x) forms of cooperation; (xi) support programs; (xii) conclusion.

2. Panorama: supply structure and technological regime

Irrigated agricultural production in Ceará is relatively recent, its drive dates back to the end of the nineties, being associated to the creation of the Secretariat of Irrigated Agriculture - SEAGRI and the implementation of some large size irrigation projects. More recently, the conclusion of the construction of the Pecem Port brought new drive to the segment, to the extent that it began to facilitate exports at a low operating cost. In 1999 there were 18,044 ha of irrigated area in the state used for fruit production and in 2003 that area was expanded to 26,493.4 ha, increasing 46.8%. The main products produced in that area in 2003 were coconut with 7,026.4 ha, banana with 6,123 ha, melon with 4,846.0 ha, papaya with 1,201.0 ha and passionfruit with 1,023.5 ha.

The irrigated agriculture standard that is emerging as a predominant standard in the state of Ceará is that of agribusiness, characterized by high production scale directed to national and international markets. The two emblematic projects of this standard in the state are the irrigated perimeters of Baixo Jaguaribe and Tabuleiro de Russas, which together amount to 18,3 thousand irrigated area.³ Their technological bases are divided into technology for water impounding and distribution and technology for irrigation.

The first one is distributed into big structures used for stocking and transferring water to plantation areas among which are included dams, big and long transfer channels (or permanent flow-converted rivers), impounding stations, small distribution channels, electric pumps for impounding and distributing water to properties. Part of these structures is built by the public sector and remains as public property, and part is built by agricultural entrepreneurs who appropriate its benefits. Knowledge relating to dams and water transfer is shared between public institutions (DNOCS, Secretariat of Water Resources and Universities) and the big construction companies like Andrade Gutierrez and knowledge relating to water resources management belongs to the state government.

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² Alluvium areas are recent detrital deposits of fluvial or lacustrine nature, made up of pebbles, sands, silt and clay transported and deposited by currents on flood plains and on the foot of many cliffs (IBGE).

³ In Tabuleiro do Norte, for example, the lots are divided into the following manner: Small Producer, 8 ha; Agricultural Technician, 16 ha and Entrepreneurs, 30 ha.

The second one supports the irrigation methods which are divided into (i) seeping, carried out by gravity or by groove, (ii) submersion or inundation, (iii) sprinkling or artificial rain and (iv) dripping. Each of these methods is used according to topography, soil make-up, climate and water availability, however in Ceará, due to water scarcity it recommended that the methods be most economic ones, specifically the seeping and dripping methods. These methods are usually controlled by multinational companies, which produce and are represented in Brazil, in the Northeast and Ceará, among them Polysack Indústria Ltda., Plastro do Brasil and Netafim do Brasil. They are enterprises that compete at international level, feature great research and development-R&D capacity and innovate intensively. The last novelties presented by them are for example the "anti-draining vacuum" sprinkler, 0.6mm-thick irrigation pipes, etc.

The difference between the Pingo D'Água productive arrangement and irrigated agriculture in the agribusiness pattern lies in the technological standard, both at the structures and equipment level necessary for impounding water and at the level of irrigation methods. Starting with water source localization, it is found close to the producer, found in shallow wells which eliminate costs relating to conflicts and the water transfer operation. The drilling equipment is completely manual and can be handled by a team of three trained people. This equipment is built by small local metallurgy shops in the municipality of Quixeramobim. Water is transported through 150mm diameter PVC pipes, big enough to withstand water pressure and inexpensive enough to be acquired by the small producers. (Burte & Schrader, 1998; 1999).

3. Identifying the Arrangement

Pingo D'água productive arrangement is made up of around 27 family farmers who explore irrigated agriculture mainly fruit-growing and vegetables besides other complementary activities linked to dry land agriculture, small scale cattle, sheep and goat raising, and the production of milk and papaya sweets. These are the products generated by irrigated agriculture: papaya, guava, melon, green pepper, passionfruit and tomatoes. All produced for the market. The name pingo *d'água* (dripping water) can be attributed both to a play formulated by those who did not believe in the method of exploring shallow wells because of the small quantity of water stored in the alluvium lands and also the irrigation method carried out through dripping water transported by PVC pipes that are placed among plants.

4. Territory, Localization and its Characterization

The arrangement is located in the 30 Km long Forquilha Valley, in the District of Maniuba and it is made up of producers from the following eight communities: Campina, Boa Vista, São Bento, Várzea do Meio, Forquilha, Trapiazeiro, Lagoa Cercada and Limeira. On the outside of the valley, but inserted into the above mentioned arrangement is the Encantado community. The valley region lies in the Municipality of Quixeramobim, the central backwoods of Ceará, 200 Km away from Fortaleza, the capital of the State.

Quixeramobim municipality was established in 1766 and has a total area of 3,275.84 Km² and a negative altitude of -191.7 meters and gets an average of 707.7mm rainfall a year. In 2000, it had a population of 59,235 people, being 51.66% urban and 48.34% rural. In that same year, its population was made up of 50.15% men and 49.85% women. In the same year 2000, total GDP at market price in this municipality was (R\$ thousand) 112.338, indicating a per capita GDP of (R\$1.00) 1.896,48. Out of the total local GDP, 15.48% corresponded to agriculture sector, 26.13% to industry sector and 58.39% to service sector. In the farming and cattle-raising sector into which Pingo D'água arrangement is inserted, the highlights are cotton, bovine raising and its derivatives as well as sheep and goat raising as commercial products of significant importance (www.ipece.ce.gov.br).

5. Origin and History

The productive activity, which integrates local producers and motivates the present arrangement, is irrigated fruit growing, which has a recent history regarding the productive history of Quixeramobim municipality and the region, the Forquilha Valley. Its emergence is the result of the combination of local agents' will who have always struggled in an organized manner for water, electrical energy and production and the water technological knowledge brought by the academic researchers, the political and technical support of Quixeramobim's city hall and the technical support of those institutions dedicated to training and technical assistance.

The first solutions started to come by means of the Ceará State Government during the 1987 drought period when water holes and small wells were dug and cisterns were built. (State Program to Fight Droughts). In 1990, French and Cearense researchers who were attracted by the organization of farmers and who brought ideas and water solutions to be discussed began to arrive in the Vale. In 1992, because of demands to build a "wet passage" over the Riacho do Forquilha (Forquilha Creek), the State Government built the Veneza Dam in the heart of São Bento village in order to store some water that used to flow and flows in abundance in the Riacho do Forquilha (Forquilha Creek) during the rainy season (from January to May) and at the same time to allow the passage of people, animals and goods over the creek during that period.

The above-mentioned researchers have perceived and verified favorable conditions to explore and use water resources in alluvium areas, a possibility that was not very accepted by traditional technicians who were used to irrigation systems sustained by big structures, in irrigated agriculture poles. Supported by local leaders and politicians the idea began to be discussed with the population and small farmers in the Vale do Forquilha villages, especially that of São Bento⁴. In 1997, the recently installed mayor Cirilo Pimenta (PSDB) learned about the idea and supported it immediately and it resulted in a cooperation agreement between Quixeramobim's City Hall and the State University of Ceará - UECE and the Université d'Angers. In 2001, the Universidade Comunitária de Quixeramobim-Unicentro participates in the agreement.

6. Identifying the Enterprise or the Entrepreneurship

The totality of the researched producers is micro sized. Properties, within which the areas used in irrigated fruit growing cultivation generally vary from 1 ha to 3 ha, but above this limit, they are exceptions. Along the Vale do Forquilha there are about 500 families of small family producers exploring traditional dry land agriculture, raising small-scale cattle and small animals. Currently, the number of producers who dedicate themselves to irrigated fruit growing can come to 27, a number, which has been increasing very slowly because of the existing obstacles for the candidates to this type of exploration. This research presents results extracted from 23 producers, visited and interviewed, or rather 85.18% of the total of the universe.

While eight producers (34.8%) answered that they had started the activities between 1996 and 2000, the remaining 15 (62.2%) said that they had started between 2001 and 2003. It is appropriate to say that after the first tests were carried out by the researchers team from the French and Cearense universities as to the digging of wells and incidence of water, which showed to be of good quality and satisfactory run-off in 1997, only in 1998 there was the first attempt to plant within the form of irrigated agriculture. It was a producer from São Bento village who took the risk of converting his production system and facing problems and uncertainties in the fields of technology and market. After this attempt which appeared to be relatively successful, other producers started to follow suit.

The undertakings that are analyzed here do not have a legal constitution in the form of an enterprise, and therefore do not constitute a legal entity. They are completely informal family productive units to the eyes of public authorities whose origin is local and proper, fruit of a property parceling process and the productive traditions in the region. As a result, the producers are independent and are not subject to controls or agreements made with great players in the sector, like the many cases of small family producers found in several productive chains of agribusiness, in other regions of the country and even in the Northeast. With a prevalence of micro size and the family's whole control, it has not called the attention the fact of having been verified only two cases, out of the twenty three in which the undertaking is shared by two partners, by the way, two brothers who continue to go on with the activities that their family carried out in the past, cattle-raising.

In order to build up a profile of the producers, several elements called the attention in the research. With regard to age, it has been verified that there is a concentration of nine producers, or 39.1% at the age bracket that goes between twenty one to thirty years, a significant number. Another concentration, this a strong one, was found in the two brackets between forty-one and fifty years and above fifty years, being These elements allow us to do some observations enriched by interviews carried out in the field. The first one is that the number of young producers is relatively high when it is about a region of old occupation and located in the semi-arid. The second one is that there is within the arrangement a benign mixture between young producers and old producers, what allows a good combination between vigor and boldness and between experience and prudence.

7. Obstacles and Difficulties faced by producers

There is a certain consensus in the location, and even between the external observers, that one of the main obstacles that made difficult the passage from traditional agriculture to so-called commercial agriculture, was the deep-rooted mentality of local farmers or the lack of confidence of farmers with regard to the activities and alternative productive methods like the irrigation method. Without a doubt, this was an important obstacle, however it has been overcome by the producers today who are involved in the productive arrangement being built after a long period of discussions within the Association of São Bento's inhabitants.

However, a not less important obstacle to the access of producers to irrigated agriculture was and still is the decapitalization situation, a fact that prevents them or makes it difficult for them to make the initial investments and to defray the first crops. These expenses relate to land boring, well construction, purchase of equipment to pump and to distribute water within the property, purchase of inputs and payment of electrical energy. Decapitalization has led the majority of farmers who opted for irrigated agriculture to resort to bank loans under the PRONAF credit line at

⁴ It is worth emphasizing here the important role played by the councilman Carlos Simão, who has "bought" and supported the idea since from the beginning of the discussion process.

the Banco do Nordeste do Brasil⁵, and supported by the Fundo de Aval (Guarantee Fund) offered by Quixeramobim City Hall, guaranteeing up to 50% of the value of each project.⁶ Dependence regarding credit is well illustrated with clarity by the data relating to the capital structure of the undertakings.

To this item, 98.2% of farmers interviewed answered that their capital structure is made up of financial institutions' loans. The same item has also shown that, besides lacking alternative and less onerous loan sources in an institutionalized manner, producers do not resort to informal sources of credit, be they provided by friends and relatives or by suppliers and clients. Finally, in front of the questions related to the obstacles that restrict the producer's access to external sources of financing, the bureaucratic restraints and the guarantee requirements were identified as the main obstacles.

In the first year of activity, the three main difficulties were linked to the quality of products, the production sale and the cost or lack of working capital, with ratios of 0.32, 0.37 and 0.35 respectively. It should be noticed that these producers were absent from the local or regional fruit market, being this the reason why they had a high initial cost to be inserted into the market. But in 2002, the three main difficulties related to cost or lack of working capital (0.23), interest payment (0.18) and production with quality (0.15).

8. Production and Market

Most of the arrangement producers and those who were interviewed (34.78%) are concentrated in São Bento village, the cradle of the organization and movements and struggles of Vale do Forquilha's farmers. Then comes the Várzea do Meio village, with 17.39% participation. The villages Boa Vista, Forquilha, Trapiazeiro and Lagoa Cercada are around 8% and Campina, Limeira and Encantado villages are around 4%. The products produced are passionfruit, tomatoes, green pepper, melon, papaya and guava. The average size of the areas used for the exploration of these products is around 1.8 ha per producer, but there are cases in which the areas are 4.0 and up to 6.0 ha, but they are an exception.

Under the conditions in which the production control was found at the research time, surveying and establishing the exact figures of the amount and quantity produced and sold per each farmer became difficult, as well as surveying the number of members at production costs, because there is no concern or recording routine of expenses with inputs (labor; fertilizer; pesticide; electrical energy; etc.) quantity and productivity of what is produced. In this case, the culture of subsistence production in which there is not this type of control or concern is kept.

The total planted area has evolved from 2.5 ha in 2001 to 12.5 ha in 2002 and to 42.5 ha in 2003, reaching an average of 1.8 ha per farmer in the last year. Very clearly, the year 2003 has presented itself as the highest point in the expansion process of planted area. It is noticed, in the second place that out of the twenty-three producers interviewed in 2003, only two appeared in the producers' list in 2001 and seven in 2002.

As to production in 2001, three products were produced: tomatoes, papaya and melon, with a production of 602 boxes/year, 1,750 boxes/year and 500 boxes/year respectively. In 2002, five products were already produced: tomatoes, papaya, melon, passionfruit and green pepper, presenting it their turn, a production of 1,884 boxes/year, 8,338 boxes/year, 245 boxes/year, 650 boxes/year and 1,720 boxes/year respectively. In 2003, six products were grown within the arrangement, presenting the following production: tomatoes, 3,940 boxes/year; papaya, 18,374 boxes/year; melon, 2,405 boxes/year; passionfruit, 3,170 boxes/year and green pepper, 1,195 boxes/year, guava, 420 boxes/year.

By multiplying the quantities produced in 2003 by their respective average prices⁷, the following gross revenues are reached: tomatoes (11.17) R\$ 44.009,80; papaya (6.04) R\$ 110.978,96; melon (6.40) R\$ 15.392,00; passionfruit (10.30) R\$ 32.651,00; green pepper (5.30) R\$ 6.333,50⁸. Adding up all these parcels we come to a total gross income of R\$ 209.365,26 in 2003 or R\$ 758,56 a month per each producer. This income, after the obligations with bank loans are deducted, is practically spent in the local market, in the purchase of inputs, components and pieces, hiring of labor, besides consumer goods. Considering that this income did not exist five years ago, we can presume that its impact on the local economy may have been significant, bear in mind the extremely low degree of monetization, which still predominates.

Regarding the destination of that production or part of it, twenty-two answers were obtained indicating Fortaleza's CEASA as the main destination; ten answers indicated the local market as destination and nine producers said that

⁵ PRONAF - National Program for Strengthening Family Agriculture, "is meant for the financial support of cattle-raising and non-cattle-raising activities explored through direct use of the rural producer's and his family's labor force" (BACEN/www.bcb.gov.br). At the beginning of the productive arrangement setting up process, more than 100 dry land farmers from Vale do Forquilha, desiring to change to irrigated agriculture have deposited their loan applications at the Banco do Nordeste, but only 18 of them were selected by the Analysis Committee.

⁶ The Expert's Opinion given to the project is carried out by EMATER-CE.

⁷ These prices were surveyed directly among the arrangement producers.

⁸ It was not possible to obtain the average price of guava, therefore the value of its production is not within the sum of the gross income.

they sold their production to the regional market. Be understood as local market the sweets factory in the Vale do Forquilha, the school snack program of Quixeramobim's City Hall and the Municipal Market of Quixeramobim, and, at the regional level, the neighboring municipal markets. The main solution for the commercialization of the production originated among the farmers themselves through the association system, be it to reach CEASA, be it to reach the closest markets, using the small size truck acquired by two farmers who are now also transporters. The most distant farmers use as solution the profiteer or another transporter other than the two transporters who belong to the arrangement group.

9. Innovations and Their Impacts

On account of being a productive arrangement of agricultural nature, located in the semi-arid region of the Northeast, of family base, influenced by men older than forty years, whose productive culture had ever experienced any type of innovatory influence, it would be natural to suppose that the Pingo D'Água arrangement may have behaved refractory to innovations. Contrary to that, the research results showed a picture of intense innovation. First of all, the engineering project of the well drilling equipment brought by the researchers was carried out in Quixeramobim itself, by means of a small family metallurgy shop installed in a garage which incorporated some adaptations to the above mentioned equipment.⁹ Other waves of innovation appeared later, and they occurred at the level of the arrangement rural producers, and they could be verified through the radical change in the standard of the productive process as well as through the basket of products of this group of producers.

The totality of producers interviewed answered that they introduced innovations of products into their properties, even though they did not present themselves as new products for the national and international markets. The same thing happened at the level of the process innovations for which the totality of the people interviewed answered positively, in spite of not being unknown technological processes to producers of other regions of the state and the country. Regarding the innovations introduced to the form of packaging the products, the answer was positive, also among one hundred per cent of the people interviewed, having in mind that they started to meet the market's demand instead of producing for their subsistence, besides going to some demanding clients as it is the case of CEASA. The answers were also positive and at high rates in the fields of management, organizational structure, marketing and commercialization, being that in these two last items the answers were positive in one hundred per cent. In these four last aspects, the support offered by the Secretariat of Agriculture - SEAGRI and SEBRAE through training courses and seminars was very significant.

If in the field of innovations introduction the behavior was homogenous enough among producers, in the field of innovation impacts the results were, in a way, heterogeneous even though with a positive profile. As is well known, differently from the industrial organization, in which parameters are more symmetrical and the variables are more controllable, in the agricultural organization parameters are asymmetrical among producers, and the variables are less controllable. In agriculture, the quality of the soil can vary within the same property, the risk of loss of production is constant and the market variables are out of control, especially for the small producers.

Even within this picture of relative heterogeneity of results, it was possible to visualize two main convergence in the answers: the first one, in which the totality of the interviewed people answered that the impacts of innovation were null, happened about the participation in the foreign market, the reduction of labor costs, the reduction of input costs, the reduction of electrical energy consumption and the fitting in regulations and standard norms directed to the foreign market. Very clearly, the innovations introduced by these farmers have increased the costs of the undertakings, since they started to practice a modern agriculture. The second convergence, even though without unanimity, happened to items relating to the increase in productivity, expansion in a range of products, increase in their quality, maintenance and increase in markets where it acts and the internal market. For such items, the importance attributed by producers concentrates on medium and high.

Farmers have presented a zero rate of importance what regards research and development, by their own initiative as well as by external acquisition of research and development, even because they are micro producers, undercapitalized and without background for such activity. However, the rates were high, between 0.76 and 0.89 for the remaining items, especially for training programs (0.89), quality management programs (0.87), and acquisition of machines, equipment and projects that try to improve the product's profile (0.80). For these items, the behavior has shown a certain routine in the innovatory activities. This constancy should be attributed, in great part, to the positive answers offered by the arrangement supporting institutions.

The Pingo D'Água producers have undergone a very sudden change in their productive process, without there previously being a learning process that would be able to train them for the exploration of new crops. The accumulated learning until then, even though it was useful, was turned to dry land agriculture; very different from irrigated agriculture. For this reason, training and capacity building were vital for these producers to increase and to expand production as well as for the sustainability of the productive arrangement itself. It was not at random that all

⁹ Today, another metallurgy shop, which functions in the Industrial District of Quixeramobim, also manufactures such equipment.

the twenty three farmers interviewed attributed high importance to training, however, only to those kinds of training held in the enterprise itself, or in the property, and in the arrangement itself.

As to the other kinds of training and capacity building, such as those held out of the arrangement, or held by clients, or by hiring engineers or consultants, etc., all the interviewed people were unanimous to consider the importance null. This is explained, on one side, by the lack of mobility and financial resources on the part of farmers but on the other hand, because those have received permanent technical assistance from Quixeramobim City Hall itself, through the Municipal Association of Agronomists, besides training brought by SEBRAE, the Secretariat of Agriculture-SEAGRI and by SENAR to the territory where the arrangement is located.

Besides identifying the outstanding points of the importance of training, the producers are aware of the impacts and results provoked by this kind of activity. Twenty three interviewed people have considered as high the impact caused by training about the use of productive techniques, equipment, inputs and components. For this same item, only three producers have considered the impacts medium. Therefore, an outstanding rate of 0.95. In the field of knowledge about the characteristics of markets where the enterprise operates, which they did not know much about before they started producing fruits, the rate was also high, 0.83, in which fourteen producers considered high importance and eight indicated medium importance.

In order to continue to produce with relative quality and to keep themselves in the market, which they conquered, the producers under analysis need access to information of different kinds. The problem they face is the geographical isolation and communication (telephone and the Internet), in spite of which they manage to have access to several channels of information. Among the different kinds of internal sources considered more important, with rate 1.0 was the one linked to the area of production, or rather, the countryside, where they learn by doing, accompanied by technical assistance of the local City Hall. The remaining types were considered of null importance. In the universe of the external sources, two items have received absolute attention from the interviewed producers, in first place, with rate 0.95, or rather, twenty one producers considering of high importance, were the other enterprises of the sector, and in second place, the clients, receiving a 0.71 rate.

With respect to the sources linked to Universities, Research Institutes and Professional Capacity Building Centers in Science, technical formation, and maintenance, great attention is given to the high importance considered by the producers regarding these institutions. As to institutions dedicated to application of tests and co-related activities, the importance was null. About the three previous channels, they have obtained maximum rate of 1.0. It is justified because the French and Cearense Universities, which made an agreement with the local City Hall to provide technical support to Pingo D'Água, the association of agricultural technicians and EMATER - Ce give permanent assistance to farmers. It was not at random that the availability of specialized technical services and the existence of supporting programs were indicated by the producers as being the main advantages of localization in the arrangement.

In the field of other sources of information, attention is called by the role played by fairs and exhibitions, by informal meetings and by local business associations. These channels have also presented high importance rates of 0.75, 0.97 and 0.86 respectively. It is explained by the participation of farmers in annual fairs in the city of Fortaleza, in the Conventions Center, like the FRUTAL and the Irriga Ceará, also by informal family, social and religious meetings that occur regularly, facilitated by the physical proximity, as well as by meetings and encounters promoted by the Association of inhabitants of São Bento and by the Producers Association of Vale do Forquilha, or Pingo D'Água.

Producers identify in those people who have had training, learning and information the true partners in their activities. The local City Hall appears in the first plane as a first hour partner, gearing, stimulating, facilitating, supporting and technically assisting. Then they see Universities, Research Institute Centers of professional technical capacity building and maintenance, all with the utmost degree of importance. Not least important, in importance degree, 0.95 are the sector's enterprises, i.e. the producers of the arrangement itself and of other visited locations. Below, with a rate of 0.86 come the syndicate entities, but not with a consensus of opinion, distributed into high, medium and low, due to different political interests. At last come the clients with an importance rate of 0.73, in which are found the City Hall itself, represented by its school snack program, Fortaleza's CEASA and the clients from the proper region. It is worth noticing that the financial institutions, in this case, the Banco do Nordeste do Brasil - BNB, have null importance for the interviewed producers, even though this bank participates in the arrangement through PRONAF.

10. Modes of Cooperation

In item cooperation, the answers of the interviewed people were unanimous and positive, indicating that there is effective cooperation among them. Among the cooperation forms presented to the interviewed producers, only in two of them has it been verified that there is not any kind of cooperation as in capacity building of human resources and obtainment of financing. In this last form, the financial institutions themselves have created bureaucratic and institutional obstacles contributing for cooperation among producers to manifest themselves, because credit is granted individually not in-group.

The main element responsible for the presence of cooperation in this productive arrangement is in the frequent interactions carried out among producers, motivated by the search of solutions to the vital subsistence problems.

These interactions have resulted in the accumulation of a certain type of capital stock, formalized first through the creation of the São Bento Inhabitants' Association in 1987, and later, through the setting up of the Producers' Association of Vale do Forquilha in 2000. This association was created with the objective to discuss and organize the producers' interests of Pingo D'Água and not only of São Bento, moving away from issues and themes of communitarian mark which continued to be worked by the Association of Inhabitants of this village.¹⁰

The importance of these associations to the producers' life is high, seen by the evaluation rates obtained in the answers of the interviewed producers. With importance rates varying between 73.9% and 78.3%, farmers have disclosed that syndicates, associations and cooperated activities are important (i) in defining common objectives for the productive arrangement, (ii) in stimulating the generation of perceptions of future vision towards strategic action, (iii) in promoting cooperative actions, (iv) in presenting common claims, (v) in creating forums and discussion environments and (vi) in promoting actions directed to technological capacitating of enterprises.

The most important form of cooperation pointed out by the producers was the product's joint sale, with an importance rate of 0.98% since they do not individualize sales but aggregate the final, boxed products, and send them together to the markets. This has improved and even made possible the commercialization conditions. There are two more enterprising and prosperous producers who have changed themselves into transporters of products based on the purchase of small trucks. In second place come the claims, with 0.93, by the way, the most modern and responsible mechanism for the appearance of the productive arrangement. The organization and the claims are part of the history of these producers, since the period in which they suffered the extended droughts. Those two elements confer an endogenous character and force from bottom to top responsible for originality and singularity of the arrangement.

Another important form pointed out by the producers, with an importance rate of 0.90, was the development of products and processes, because these agents, besides producing seedlings together, packed in a greenhouse, share the results of the experiments in planting new products and new varieties. They also discuss together handling practices and irrigation techniques as well as plantations monitoring methods. These habits have contributed to the improvement of the quality of products, besides better adjustment of products to the specificity of the regions' environment. The joint participation in fairs, exhibitions and reconnaissance trips is also one of the important forms of cooperation, with 0.90 importance rate, but then they have the logistic and financial support, both from the local City Hall and the Secretariat of Agriculture-SEAGRI. In these events, besides expanding their knowledge, producers open new business opportunities. Finally, the least important cooperation form, with an importance rate of 0.48 is that one linked to the purchase of inputs and equipment, which happens in an atomized manner.

11. Support Programs

As could be previously noticed, the Pingo D'água productive arrangement presents a partnership picture of institutional support dreamed about by any productive agglomeration of micro and small entrepreneurs and or producers. Without there being a specific support program showing a certain nomenclature, the governmental and non-governmental institutions kept on appearing and bringing their contributions for structuring and strengthening the arrangement.

From there on, it is verified that the most important thing for a positive trajectory of an arrangement is based on the initiative of the productive players and the local powers which move from bottom to top in the search for complementary and adequate solutions to their needs. A good indicator of this picture lies on the fact that all interviewed producers were unanimous in stating that they do not know about and do not participate in any program or actions directed to micro and small enterprises. However, in spite of the demonstration of that perception, it is noticed that the institutions that offer programs and actions of this type have passed or are present in the arrangement, this by force of demand emanated from bottom to top.

Making an evaluation of the importance of the institutional support to increase competitive efficiency of the arrangement's producers, 100% of the producers interviewed indicated the support programs through technical consulting as important. In second place, with an importance rate of 0.98 were the improvement programs in basic education and credit lines and other forms of financing that might exist. In third place were the programs on professional capacity building and basic training with an importance rate of 0.97. Finally, in importance, were the access programs to information with an importance rate of 0.92.

12. By way of conclusion: Strengths and Weaknesses

The strengths of Pingo D'Água's productive arrangement can be identified under the following aspects:

¹⁰ Besides the Association of Producers there is also another association in charge of organizing and representing the water consumers' interests in Vale do Forquilha, whose president is also a producer within the productive arrangement.

- Effective participation (i) of productive agents; (ii) local power; (iii) state government; (iv) universities; (v) non-governmental organizations; (vi) financial institution.
- Presence of capital stock which extrapolates the productive arrangement itself.
- Strong sharing of common values among the arrangement participants.
- Strong intensity in the introduction of innovations of products and processes.

The following aspects were identified as weaknesses:

- Limit of water supply, obstructing the massive entry of producers or the unlimited expansion of the production area.
- High initial capital for the local accumulation standard, resulting in obstacles for the entry of new producers. Allied to that are added the difficulties to obtain bank loans from the financial institutions.
- Absence of any control system on quantity produced and sold as well as on production costs. The economic calculation is unknown to producers. All occurs by pure intuition.

12. Bibliography

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