

Linkage of Agricultural Research and Extension in Paraguay

- Interview to Key Actors -

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파라과이 농업연구와 지도의 연계

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Abstract

The linkages between agricultural research and extension are important to enhance farmers' competence. The objectives of the study were to explore the linkage between research and extension for the family farm. Data including quantitative and qualitative were obtained from the key actors about the public management regarding linkage which were the method, the topic of the agricultural technology dissemination, and the agricultural research topics. Results show that the main structural problems of the agricultural technology dissemination were technical support services, credit services, and farm planning and infrastructure deficit. Furthermore, as for the topics or content of agricultural technology dissemination, organic agriculture, soil management and conservation, agricultural credit, organizational strengthening, marketing, participatory research, dissemination of technology, equipment, infrastructure and agricultural mechanization were preferred.

Key words: agricultural research and extension, Paraguay

국문초록

농업연구와 지도의 연계는 농업인의 역량을 증진시키는데 있어서 매우 중요하다. 이 연구의 목적은 농업연구지도 분야의 핵심 담당자를 대상으로 면접을 통하여 가족농 육성을 위한 농업연구와 지도의 연계에 관한 방안을 도출하고자 하였다. 농촌지도의 방법, 내용 그리고 농촌연구의 내용 등과 관련한 현안들이 인터뷰를 통해 양적, 질적 자료를 수집하였다. 파라과이 농업기술전파의 구조적 문제점은 기술지원서비스, 신용 서비스, 농가 계획과 기본 인프라의 부족 등이었다. 더욱이 요구되는 농촌지도내용은 유기농업, 토양관리와 보전, 농업신용, 조직역량강화, 마케팅, 참여연구, 기술이전 장비와 인프라, 농업기계화였다.

주제어: 농업연구와 지도, 파라과이

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1. Introduction

Even though the more than 500,000 agricultural extension agents in the world have to play a crucial role in increasing farmers' competence (Van den Ban & Hawkins, 1996), agriculture and agricultural extensions are facing a number of serious problems in the present era for which it is not easy to find good solutions.

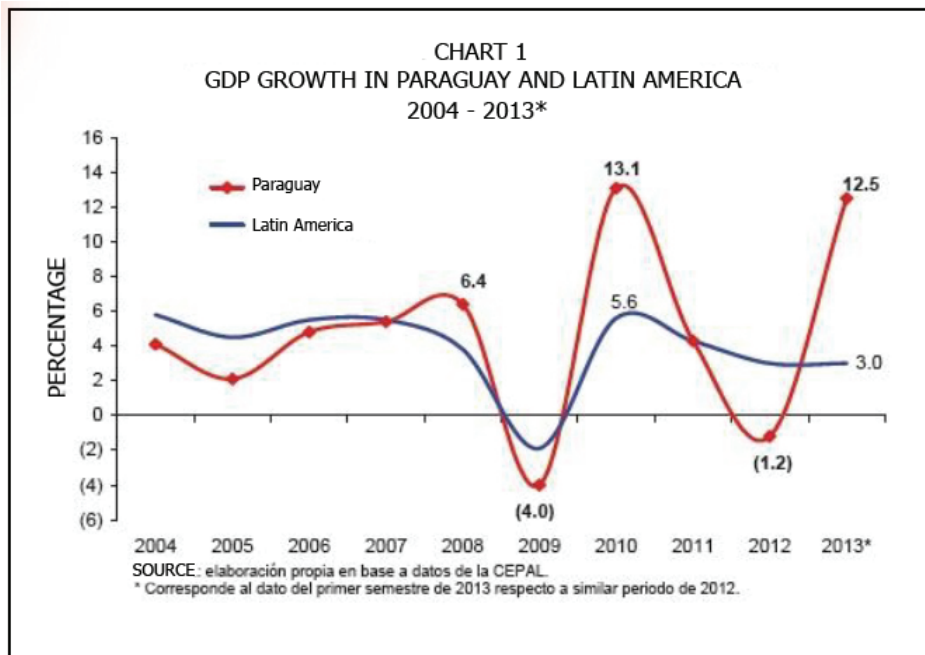
The linkages between agricultural research and extension are important to enhance farmers' competence (Agbamu, 2000; Deneke & Gulti, 2016; Kaimowitz, 1991; Kyomo, 2016; Roling, 1990). The concept of linkage implies the communication and working relationship established between two or more organizations pursuing commonly shared objectives in order to have regular contact and improved productivity. Roling (1990) argues that scientists involved in basic, strategic, applied and adaptive research, together with subject-matter specialists, village-level extension workers and farmers, should be seen as participants in a single agricultural knowledge and information system. The interface between research and technology transfer is an important one in determining the performance of the whole system. One of the known ways of bridging the gap between research and extension is the method adopted by medium-sized and small business (Roling, 1990). Such businesses

become more innovative by enhancing their capacity to utilize external information.

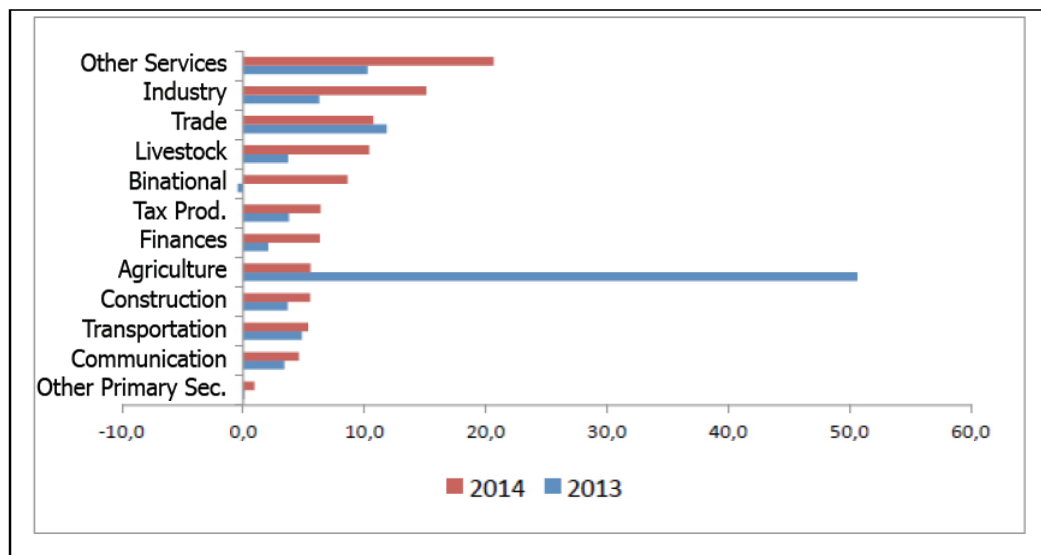
In an attempt to improve the linkage mechanism, countries must apply a number of approaches (Roling, 1990). One method includes surveys of farmers' problems conducted jointly by research and extension to make published annual reports. And annual workshops where research and extension activities are presented to a large audience is another useful mechanism.

The objectives of the study were to obtain opinions from the key actors about the public management regarding linkage between research and extension for the family farming, to gather qualitative information of models and technical assistance strategies proposed by the experts. The thematic research subject from different perspectives that rewards the content can be analyzed. Base on the analysis of information and obtained conclusions, provide recommendations to improve the proposal of technology dissemination for the family farming strengthening implemented by MAG(Ministerio de Agricultura y Ganadería)-IPTA(Instituto Paraguayo de Tecnología Agraria)-DEAG(Dirección de Extensión Agraria) and other institutions.

〈Figure 1〉 GDP growth in Paraguay & Latin America



(Figure 2) Contribution to the growth the GDP by sectors without agro-food chain (%)



Source: National Account of the BCP.

2. Economy & Agriculture in Paraguay

General Economy

The Gross Domestic Product (GDP) of Paraguay at the end of 2009, recorded a fall of 3.8% compared to 2008; thereby interrupting the continuous growth of the economy during the previous six years (2003-2008), when the annual average was 3.3%. Paraguay had experienced the longest economic expansion since 1970, which contributed to the decline in overall poverty levels, from 49.7% in 2002 to 37.9% in 2008.

The GDP growth was 4.3% in 2006, increased to 6.8% in 2007; but with the onset of the global economic crisis, in 2008, the rate of economic growth dropped to 5.8%, a trend that was accentuated by the contraction of the economy in 2009. The highest levels of growth in 2006-08 were the result of increased domestic demand, but mainly the growth of agricultural production which averaged 7% per year between 2003 and 2007. On the other hand, beef production also grew by 6% average annual during this same period.

The contraction of the economy in 2009 was a result of the slowdown in domestic demand, corresponding to the components of consumption and investment. Moreover the productive activity was affected by the sharp diminution of 23.8% in agricultural sector, partly a consequence of adverse weather conditions.

Much of the Latin American economic boom of the 2000s is explained by a significant increase in international prices of commodities. Vigorous growth in emerging economies, especially China, then led to a significant increase in demand for those products.

Paraguay has not been absent from this cycle. The numbers show that as of 2004, exports rose from US \$ 1,500 million to about US \$ 7.600 million estimated for late 2014 (Data from OBEI). But the country's total exports comprise not only originating products, also include re-exports (trade triangulation Asian products to neighboring countries), as shown in the following CHART No. 2. In 2014 the country's exports would reach more than US \$ 11,600 million, being composed by 65% for goods originating (US \$ 7,600 million) and 35% for re-export products (US \$ 4.015 million).

The calculations based on official data indicates that the (agriculture and livestock) primary sector has been having a very important incidence in the economic growth of Paraguay since 2004. Between 2004 and 2014 the agriculture contributed on average with 19% to the growth of the economy (industry and construction with 12% and the services sector with 69%).

While the contribution to GDP growth from the agricultural sector seems to not be as significant in that period, there were years when this contribution was greater than 50%: 2007, 2010

and 2013. In those three years the GDP grew at an average annual rate of 11% and 56%, the GDP growth was due to the contribution of the agricultural sector.

However, analyzing the effect of agriculture on GDP as part of the value chain of this sector is wrong because it poses a partial and isolated vision of intra-sectorial productive dynamics of the country. The agro-industry, mainly the food has grown in production and exports in recent years and, according to official figures, is half the manufacturing or industrial GDP.

Adding figures agro-industrial sector, the primary sector, the results are different. Without this aggregation, the contribution of agriculture and livestock would be reduced from 54% to 17% from 2013 to 2014, while the contribution to GDP growth from the manufacturing sector increase of 6-15%.

Structural Problems of Agricultural Sector

The structure of agriculture in Paraguay, with 289,649 productive farms registered in the last National Census of Agriculture (CAN) 2008, is composed of small, medium and large producers, mainly associated in cooperatives, associations, committees, commissions and by individual producers, who are mostly incorporated into the market for goods and services in the economy, although there is considerable number of producers, which require a comprehensive state support for their sustainable inclusion in the formal market.

The agricultural sector, which is the driver of economic development of Paraguay, has a highly heterogeneous structure of production between producers, reflected, among other indicators, the economic concentration of land and capital and the marked differences in access to international markets, and increasing environmental deterioration associated with prevailing patterns of production based on grain and livestock.

These features of the structure of the agricultural sector are defined, especially as it relates to the marked productive activities and environmental differences between the two regions in the Paraguay River divides the territory which are western region or Chaco and eastern Reg.

The Eastern Region covers 39% of the national territory and is home to almost 98% of the population. It has more than 800 rivers and streams and 95% of its land is arable; The annual

rainfall varies from 1,400 mm to 1,700 mm. It has increased road and basic economic infrastructure services and better education coverage.

In 1945, 55% of the eastern region was covered by forests, and now has been reduced to 6% of its surface, now its main use being agricultural. Western or Chaco region covers 61% of the national territory and is home to a little over 2% of the population. In this region, low level of rainfall is recorded with an annual average of 400 mm to 1,100; the soils are clay, and 65% coverage corresponds to your plant natural woods and thickets. The main agricultural production in Western region, is focused on livestock.

In the two regions, the production structure is manifested in the coexistence of a dynamic and minority sector that works like enclave and other major sector that has little dynamism. The first brings together 16% of farms of medium and large commercial companies or cooperatives, incorporated into the formal mainstream of the economy. Moreover, a considerable number of traditional family farms, corresponding to 84% of the total, with a weak presence in the sector and national economic context.

These two groups also differ in each match export sector, associated with the production of soybeans and beef; while the other groups within the Peasant Family Agriculture (AFC) whose production includes several subsistence crops; their income than in the past was mainly due to the cultivation of cotton, and in recent years has been driven mainly by products like sesame.

The agrarian structure of Paraguay, has been characterized in recent decades by major producers of soybeans and beef, in productive units of large areas, even underutilized, living with a large number of smallholders, whose production is based mainly in units productive family. Among small producers they can characterize two groups distinguished by differences in access levels the land, human capital and basic social services and production support to which you have access.

Those who have had better access to basic services -in particular, education and health, have been constituted small rural middle class, whose economic activity is focused on agricultural activities and in some services such as sesame.

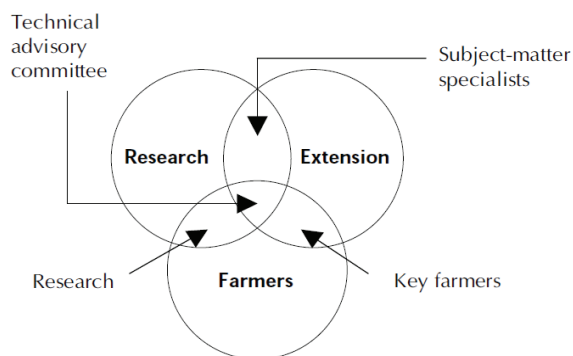
Another group of farmers with little education, very limited access to land and effective access to agricultural extension

services, whose low income puts them in poverty levels, depending on their survival in a meaningful social assistance.

One of the characteristics of the families of smallholders, emigration of young people to Asuncion or mainly to neighboring countries. (World Bank. "Partnership Strategy for the Republic of Paraguay 2009-2013).

The relationship between key actors in the research-extension system is illustrated by Figure 3. Researchers, extension workers and farmers must play important roles in identifying research problems, adapting the recommendations to local conditions and providing feedback to researchers about the innovations that have been developed.

(Figure 3) The linkage between the main actors in the agricultural research-extension linkage system



Source: Agbamu, J. U. 2000, Agricultural research-extension linkage systems: An international perspective, *Agricultural research and extension network, network paper No 106*, P. 1.

There are three generic types of linkage model which are linear top-down model, farming systems research model, and innovation systems model (Deneke & Gulti, 2016). The linear top-down model is commonly known as the transfer of technology or 'ToT' model. It is a top-down one-way communication model with information and technology flowing from researchers to end users via extension agents like a conveyor belt (Kassa, 2008). Research, extension and adoption were viewed not as interlinked and iterative processes but as separate and compartmentalized processes that can be organized in different specialized structures.

The farming system research is also mainly based on the idea that the reasons behind the low level of adoption of agricultural technologies is related to the fact that conditions for farmers were different from those of research stations, and the technologies

developed were hardly suitable for their conditions. This model focuses on-farm client-oriented research and ways of linking farmers directly with researchers. Lastly, the views of the innovation systems model recognize institutional constraints and the usefulness of multiple actors led to a shift in focus from 'technology' to 'innovation'. In this model, institutions are emphasized as being the main bottlenecks, not technology. It also recognized that complex problems require solutions that come out of interactions between many actors (Ceneke & Bulti, 2016).

3. Methodology

Data collection

The in-depth interviews as a technique to generate primary information have advantages as the wealth of information or the ability to provide qualitative results obtained through quantitative methods contrast. In addition, the interview favors the understanding of issues due to direct contact with experts in the field, able to enrich, corroborate or refute possible arguments raised during the diagnosis made. With this technique, we obtained information from professional experience, background, knowledge, and perception of stakeholders, working in the domestic agricultural sector, the national reality of technology dissemination to the traditional agriculture or family farming.

In the study, results from the interviews are gathering declarations made by the interviewed experts, using the questionnaires made by the consultancy as a tool and it is adjusted to recommendations of the technical team integrated by outstanding technicians from IPTA-DEAG.

Interviews to 10 key actors of the agricultural and livestock sector, public and private have been made. Considering qualified informers due to their knowledge on this field, this study selected those key actors. The interviews has been performed within a social context, therefore an interviewer (person who makes the interview) was needed as well as an interviewee (person who provides the information requested by the interviewer).

The interviewer, person linked to the technical team of MAXZA S.A. Consultancy (2015), has performed the interviews based on an interview questionnaire, adjusted to recommendations of IPTA-

MAG-DEAG team. Regarding this phase, it is important to outline two remarkable moments: the elaboration of an information-gathering tool, as an open script and the other is the process of the interviews. The profile of the relevant actors, is being working on have worked within the MAG structure the last 20 years, occupying relevant positions related to technical assistance, agricultural extension and research. It is related to university education and currently working in the private sector, in activities related to the national agricultural sector.

The gathered information has been compared with the collected ones from the SWOT workshop about technology dissemination, carried out within the framework of the consultancy and as an outcome of this analysis, some recommendations that will help the strengthening of the technology dissemination made by IPTA-MAG -DEAG for the family farming.

The processes of the interview had the following components: Firstly, Where the objective of the consultancy work was explained to the interviewees; after that, a summary of a preliminary diagnosis was presented, and the results of the SWOT Workshop about technology dissemination for the family farming. Secondly, the interviewee, after having the gathered information and be fully aware of the topic, share its opinions about the areas where he had more experience, thus rewarding more the SWOT and proposing strategies and actions needed to improve the technology

dissemination process. Lastly, the previous component helps the interviewee to be fully aware of the topic and after that, the questionnaire is presented, with the established questions. In some cases, the interviewer fills the questionnaire according to the opinion provided by the interviewee; in some, the interviewee fills the questionnaire by himself.

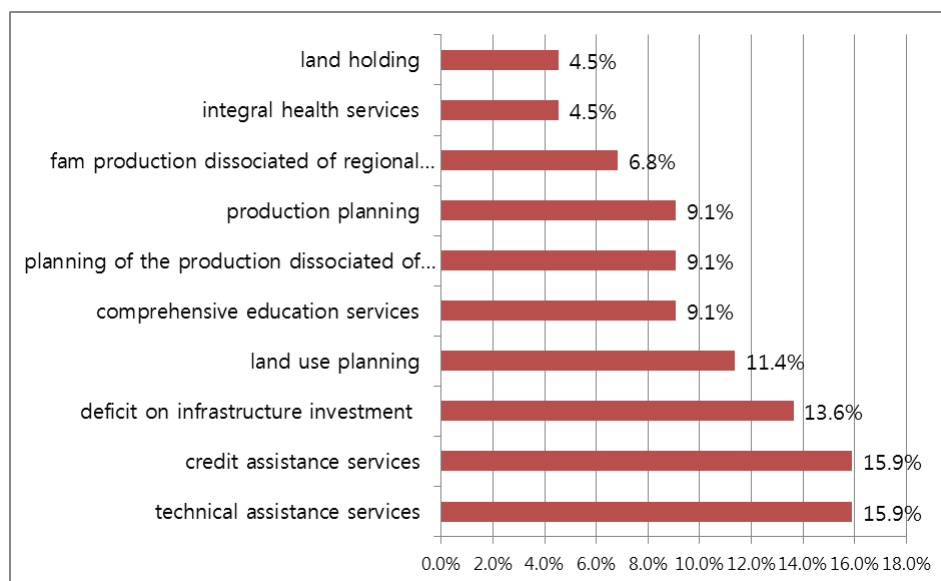
Due to this close relation between the interviewee and the research thematic subject, all of the interviewees had answered the questions established on the questionnaire. Anyways, it went in depth according to the knowledge of the interviewee about each item.

Instrument & Analysis

Interview questionnaire largely covered the issues discussed during the SWOT Workshop on Technology Dissemination, held in the framework of this consultancy. The Questionnaire was set according to the recommendations of the counterpart IPTA-MAG-DEAG. In this questionnaire, on each subject in consultation, previously it made some options that the interviewee can select, which it may include other unforeseen issues.

The analysis of the in-depth interview has a specific objective: the compression of the interviewee's perception about the real situation of the social and economic components of the family farming and the structural deficiencies that it has regarding public

〈Figure 4〉 The main structural problems of the family farming



assistance to get the peasant out of poverty.

The results of the preliminary diagnosis and the conclusions were shared with the interviewee, on a first phase, rewarded validated by a SWOT workshop, carried out with the key actors of IPTA-MAG-DEAG.

Based on these elements, several recommendations were made for the strengthening of technology dissemination for the family farming system, implemented by IPTA-MAG-DEAG, within the frame of a coordinated process with other public or private institutions, with the aim of reducing the rural poverty.

4. Results

4.1. What are the main structural problems of the family farming?

According to the interviewees, the main structural problems of the family farming are technical assistance services (15.9%), credit assistance services (15.9%), deficit on infrastructure investment (13.6%), land use planning (11.4%), comprehensive education services (9.1%), etc. (see Figure 4)

Besides the points selected above, the interviewees added more structural problems which are poor regional and local markets in infrastructure, and deficient and untidy related organization. And extensive items shall pass to intensive ones through technology and training. The capacities should be improved in order to manage efficient and effectively the farms. The self-esteem of the farmer

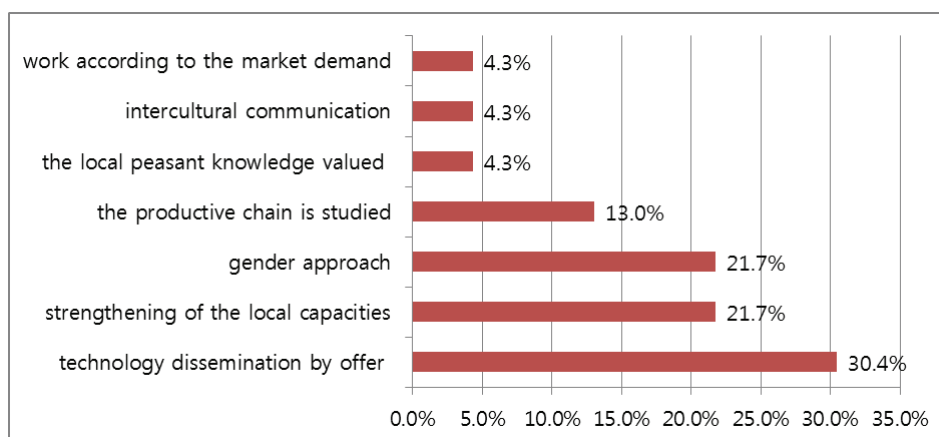
shall be improved, more self-confidence and on its family. The organization of the farm and the market shall be improved for their products and supplies. Furthermore not all of the people in the family farming are farmers. There are no limitations and conditionings to provide the assistance. Limits for the support and help shall be fixed, in order to know if the farmer will be farmer or not. The responsibility of the farmer regarding finding self-solutions is not encouraged.

4.2. What are the principles or approaches of interaction that MAG system should use on their interaction with family farmer?

According to the results of the questionnaire, the perception of the interviewees about the principles or approaches of interaction that the MAG system uses on their relations with the members of the family farming are. Results show that the principles or approaches of interaction are technology dissemination by offer (30.4%), strengthening of the local capacities (21.7%), gender approach (21.7%), the productive chain is studied (13.0%), the local peasant knowledge valued (4.3%), intercultural communication (4.3%), and work according to the market demand (4.3%).

Especially, some items were not selected by the interviewees. Those are diagnosis and farm planning approach, interdisciplinary approach, and technology dissemination by demand.

(Figure 5) The principles and approaches of interaction



(Table 1) the main problems regarding technology dissemination for the family farming

Technical profile of the extension specialist	<ul style="list-style-type: none"> - Technicians not well trained on the problem of the Family Farming - Technicians not integrated to the socioeconomic context of the farmers - Technicians dissociated from the peasant culture
Methodology of dealing with problems of the family farming	<ul style="list-style-type: none"> - Productive income approach instead of food security - Activities that doesn't respond to the local productive pattern are implemented - Lack of coordination among extension specialist and researchers based on a common work plan - Lack of real diagnosis - Low interest and motivation of the farmers - Integral production system shall be transferred instead of items - The programs are focused on goals like "number of assisted people" and not in principles like improvement of quality of life - There are no institution mechanisms of monitoring and evaluation for the process of assistance for the family farming to get out of poverty - Lack of efficiency - The traditional feeding culture has been dissociated from the peasant family
Support for the extension specialist	<ul style="list-style-type: none"> - Lack of support for extension specialist regarding extension methodologies - No monitoring - evaluation - Devaluation of the service that the extension specialist is provides - Almost absence of the agricultural economy in technology transfer (market, cost, earnings, financings, projection of investments and its profitability, etc.)
Research	<ul style="list-style-type: none"> - When the researches are designated managers, the programs are left behind - Dissociation among extension specialist and researchers - Upgraded techniques on programs of sustainable production that the farmers intend to perform are needed to be researched and transferred - The actions are not based on the demand but on the offer (technology, markets, quality and requirements from the consumers)

4.3. What are the main problems regarding technology dissemination for the family farming.

In this part of the questionnaire, the interviewees emitted several opinions about the main problems. The opinions were organized as follows:

The opinions are divided into four dimensions which are technical profile of the extension specialist, methodology of dealing with problems of the family farming, support for the extension specialist, and research. (see Table 1)

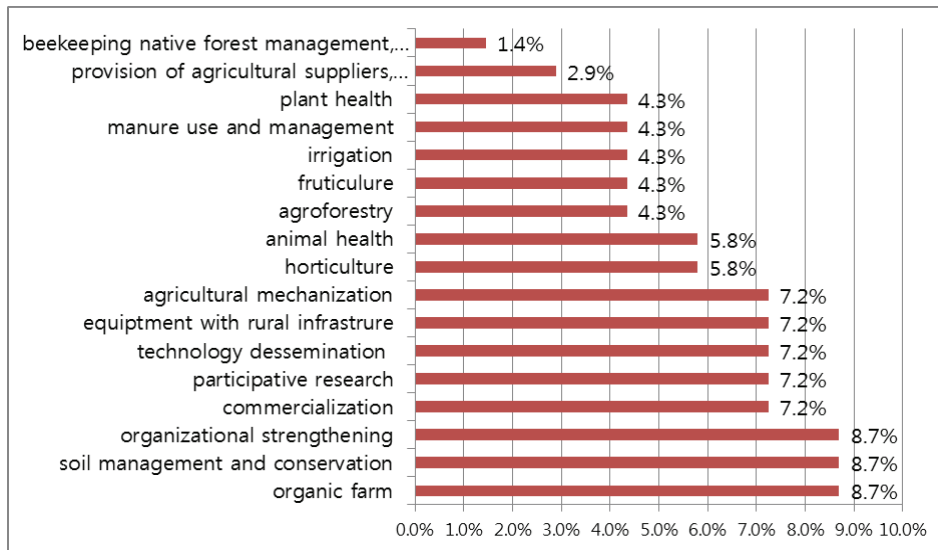
4.4. What are the ways of interaction that the MAG system should adopt regarding farmers of the family farming?

In this part of the questionnaire, the interviewees gave their opinion about the ways of interaction that the MAG system should adopt regarding farmers of the family farming, some of them below:

- Services of extension research closer to the problems of the family farming
- Major presence of the responsible agents of the transfer with the farmers

- Through the farmers organization
- Participative planning. Plan according to the economic reality of the farmer
- The service shall include the whole family
- Respect the peasant knowledge
- More institutional coordination. Higher levels of participation of other sectors
- Real diagnosis
- Somehow reward the ones who adopt technologies and are organized into committees or cooperatives. Promote outlined group of farmers from the family farming
- Pragmatic advisory in order to solve the problems in an integral manner
- Local and regional coordination. Plan based on the territory and the sectoral plans
- Better use of the mass media
- Strong relationship among small farmers and the agro industrial enterprises, in modern concept of agribusiness, it should be not considered as an enemy but as an all-strategically to commercialize or transform its production, to move supplies, etc.
- Registration and monitoring of the clients
- Systematize experiences

〈Figure 6〉 The principal contents or themes to promote for the family farming



- Do not create extension services for each new program – strengthen what is available
- Diversify credits
- Strengthen experimental centers and agricultural schools

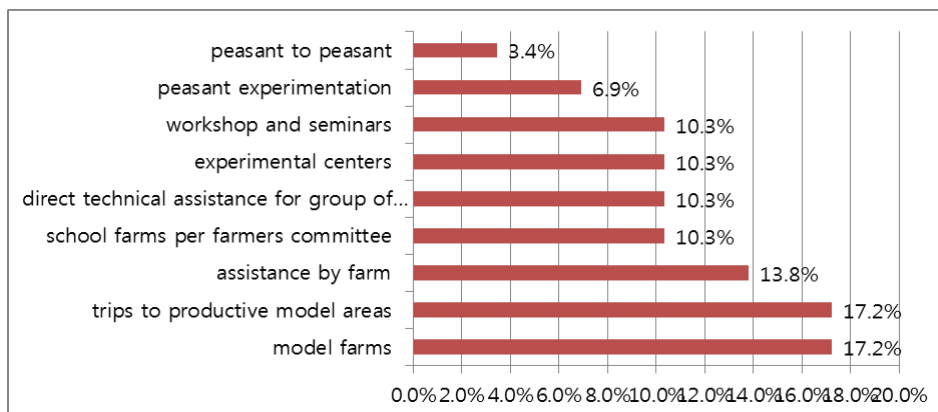
4.5. What contents or themes should MAG promote for the family farming?

The interviewees gave their opinion about the principal contents or themes that MAG should promote for the family farming, as follows. Results show that the principal contents or themes to promote for the family farming are organic farm (8.7%), soil management and conservation (8.7%), organization strengthening (8.7%), commercialization (7.2%), participative research (7.2%), technology

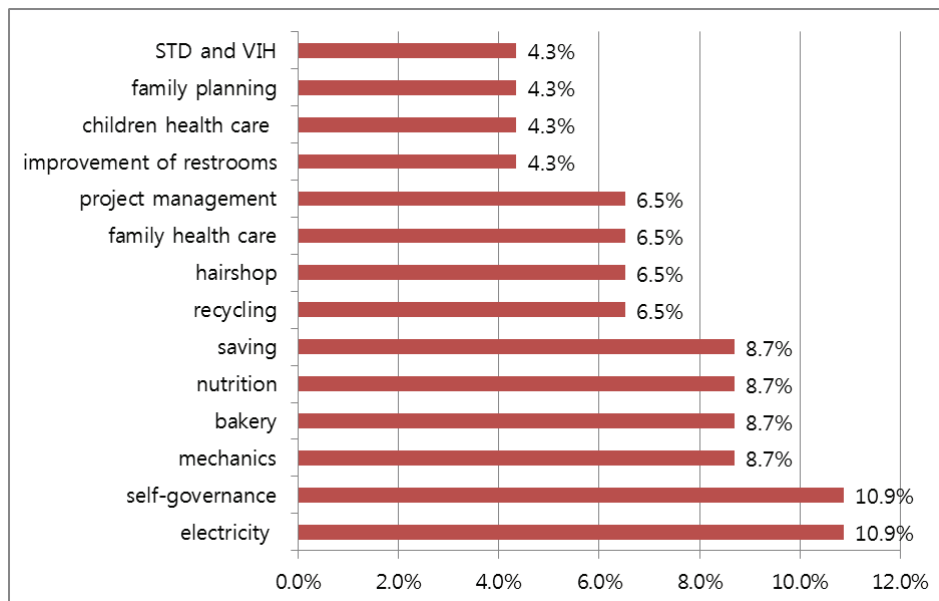
dissemination (7.2%), equipment with rural infrastructure (7.2%), agricultural mechanization (7.2%), horticulture (5.8%), animal health (5.8%), agroforestry (4.3%), fruticulture (4.3%), irrigation (4.3%), manure use and management (4.3%), plant health (4.3%), plant health (4.3%), provision of agricultural suppliers (2.9%), and beekeeping native forest management (1.4%).

Other suggestions are: classification and packing of products according to type of market; the agriculture under contracts, participation in chains, clusters; re-conversation for the youth without agricultural vocation, training on leadership and high content of efficiency

〈Figure 7〉 The technology dissemination methodologies for family farm



〈Figure 8〉 Non-agricultural themes to consider in technology dissemination system



4.6. What are the technology dissemination methodologies that should be used with more emphasis for the family farming?

In this part of the questionnaire, the interviewees gave their opinion about the technology dissemination methodologies that should be used with more emphasis for the family farming, as follows. Figure 7 shows that the technology dissemination methodologies for family farm are model farms (17.2%), trips to productive model areas (17.2%), assistance by farm (13.8%), school farms per farmers committee (10.3%), direct technical assistance for group of peasants (10.3%), experimental centers (10.3%), workshop and seminars (10.3%), peasant experimentation (6.9%), peasant to peasant (3.4%).

4.7. Among non-agricultural themes, what should be a part of the technology dissemination system of the MAG for the family farming?

In this part of the questionnaire, the interviewees gave their opinion about, other themes – no agricultural ones that should be a part of the technology dissemination system of the MAG for the family farming, within an integral assistance process frame, as follows:

Figure 8 shows that non-agricultural themes to consider in technology dissemination system are electricity (10.9%), self-governance (10.9%), mechanics (8.7%), bakery (8.7%), nutrition (8.7%), saving (8.7%), recycling (6.5%), hair shop (6.5%), family health care (6.5%), project management (6.5%), improvement of restrooms (4.3%), children health care (4.3%), family planning (4.3%), and STD and VIH (4.3%).

4.8. What are the themes or content that IPTA's research for the family farming should focus on?

In this part of the questionnaire, the interviewees gave their opinion about the themes or content that IPTA's research for the family farming should focus on, as follows

- Integral approach of the farm
- Improve productivity of the current income items and subsistence
- Relation soil-plant. Soil recovering
- Innovation on productive systems of the farm
- Increase alternative income items. Intensive items
- Packing and commercialization
- Keep the germplasm of the items from the family farming
- Use and management of water for irrigation

- Use of pesticides
- Managing and storing of products in the farms
- Transformation of the primary items
- Medicinal herbs
- Production of green manure
- Promote consumption of items from the family farming
- Themes of agriculture under contract. Concept of clusters
- Integral management of pests
- Micro mechanization- packing
- Recycling for the agriculture
- Homemade agro industries
- Organic agriculture

4.9. What are the principal actions to implement in order to improve the technology dissemination for the family farming.

According to the opinion of the interviewees, the actions that should be implemented to improve the technology transfer for the family farming are:

- Return to pre-extension service
- Improve the profile of the technicians from institutions working on the technology generation
- Unify actions between MAG-IPTA-DEG-SEAM-SENAVE with national, regional and local programs.
- Services close to the farmer- Services integrated to other integral actions
- Strengthen the experimental centers to train technicians and peasants
- Prioritize the investigation topics based on the demands
- Have an unit specialized on the support to the extension methods
- Establish training programs adjusted to standardized model of farms, adjusted to established socio-economic models
- Enhance the successful experiences (this requires processes of systematization, evaluation and monitoring of experiences)
- Incentive to extension specialist for increase of the productivity and efficiency on the farms
- Improvement of education systems
- Integrate the economic valuation in the processes of transfer

- Training in experimental centers (Schools of technicians and peasants – Exhibition of the technology advancements)
- Promote the traditional feeding culture
- Transfer according to the demand
- Roster for the Researcher- reward- give him a high hierarchy. Give continuity to his work

5. Conclusions

The main structural problems of the agricultural technology dissemination in Paraguay were technical support services, credit services, and farm planning and infrastructure deficit. The MAG system was deficient in addressing the problems of family farming, especially in the system of institutional organization to address the problem of poverty in a comprehensive manner. The main problems of agricultural technology dissemination were mostly related with technical issues such as the agricultural extension specialist profile, methodology of dealing with problems of the family farming, support for the extension specialist and research.

Some indicated that the agricultural research policy priority, stable agricultural research refund and the need for a seed bank.

The principles of the MAG system interacts with the farmers were technology dissemination by offering; strengthening of the local capacities; gender approach; and the productive chain study. In terms of agricultural technology dissemination method, model farms, trips to productive areas and assistance by farm were recommended, and school-farms by farmer committees, experimental research centers and direct assistance to peasant groups were also remarkable.

As for the topics or content of agricultural technology dissemination, organic agriculture, soil management and conservation, agricultural credit, organizational strengthening, marketing, participatory research, dissemination of technology, equipment, infrastructure and agricultural mechanization were preferred. Certainly, the economic components were considered one of the important issues in the idea that if it was not taught farmers to manage the farm and become small entrepreneurs, the sustainability of the farm comes uncertain.

There were other issues, non-agricultural that should be considered in the process of technology dissemination, for the purpose of a more comprehensive service. Among the selected were: electricity, self-management, mechanics, bakery, nutrition, savings, recycling, hairdresser, family health care. Most interviewees discussed the need to emphasize training that complement other agricultural activity on the farm, or could, be used by the farmer as an extra farm alternative. It was outlined that the MAG is currently providing rural equipment, but small farmers, do not have the expertise to implement good housekeeping or make basic repairs, which makes it dependent on a private coach, who becomes an operating expenses.

The agricultural research topics which the IPTA should enhance for family farming were comprehensive approach to the farm to improve the productivity of current subsistence and income crops soil-plant relation; land recovering; innovation in the farm production systems; increase alternative income items; intensive items; packaging and marketing; conserve germplasm of the items of family farming; management and use of water for irrigation and pesticide use. Agricultural extension services and research should be closer to the family farms with the installation of demonstration plots and farms adopting farm-schools per each committee, promoting more participation of farmers in the dissemination of technologies related to participatory planning and transfer by demand.

For agricultural technology transfer for the family farming, followings were noted: returning to pre extension services; improving the profile of the technicians from institutions working on the technology generation; unifying actions between MAG-IPTA-DEG-SEAM-SENAVE with national, regional and local programs, services close to the farmer-services integrated to other integral actions; strengthening the experimental centers to train technicians and peasants; prioritizing the investigation topics based on the demands; installing an unit specialized on the support to the extension methods; establishing training programs adjusted to standardized model of farms, adjusted to established socio-economic models; enhancing the successful experiences (this requires processes of systematization, evaluation and monitoring of experiences) among others.

Interviewees mostly agreed that many experiences, positive and

negative, occurred in the agricultural research and extension systems in the midst of an organizational and institutional structure, often chaotic in terms of definitions of their mission, roles, objectives, and capabilities or lack of coordination tools, framed within a territorial or sectoral planning. Duplication of functions between private and public agricultural extension was noted: private extension technical units do not coordinate with DEAG having more resources within the Plans and Projects of Technical and Financial Cooperation.

Many of the recommendations involve an operational change in the organizational agricultural extension and research system, which depends heavily on institutional strengthening to help improve care processes and inter-institutional coordination under effective tools planning.

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