



CEFAGE-UE Working Paper
2011/05

Attitudes, Behaviours and Motivations for Mechanization in Small Scale Portuguese Agriculture

Maria Inês Mansinho¹, Carla N. Lúcio², Pedro D.S. Henriques³

¹ *Universidade Técnica de Lisboa, Instituto Superior Agronomia*

² *Instituto Politécnico de Viseu, Escola Superior Agrária de Viseu*

³ *Universidade de Évora, Department of Economics and CEFAGE*

Attitudes, Behaviours and Motivations for Mechanization in Small Scale Portuguese Agriculture

Maria Inês Mansinho (Instituto Superior Agronomia – Universidade Técnica de Lisboa, imansinho@isa.utl.pt)

Carla Nogueira Lúcio (Escola Superior Agrária de Viseu – Instituto Politécnico de Viseu, lcarla@isa.utl.pt)

Pedro Damião de Sousa Henriques (CEFAGE and Department of Economics, Universidade de Évora, pdamiao@uevora.pt)

Correspondence Address: Pedro Damião de Sousa Henriques, Departamento de Economia, Universidade de Évora, Largo dos Colegais 2, 7000, Évora, Portugal. pdamião@uevora.pt

Abstract

Knowing that the purchase of agricultural machinery largely dominates the investment made at farm level in many programs to support the development of the agricultural sector, we sought to evaluate the reasons and rationale for that choice by farmers. The study was conducted in Beira Interior region at the request of the Regional Agricultural Services under the EC measure AGRIS and regarding the period between 2000 and 2004. The methodology includes the analysis of documentary sources, interviews with machinery agents and technicians, and a questionnaire survey of farmers benefiting from the AGRIS measure in the region. The analysis identified relatively homogeneous groups of farmers regarding the behaviour, attitudes and motivations in the use and purchase of tractors. As a consequence the demand was characterized. It was also possible to identify the factors that influenced the supply, either of the machinery and equipment or the funds to purchase them. The findings measured the opportunity of farmer's technology choices, aiming at the increasing productivity and welfare that the funds available helped to achieve.

Résumé

Tout en sachant que l'achat de machines agricoles a largement dominé l'investissement au niveau de l'exploitation agricole, en ce qui concerne les programmes d'aide au développement de l'agriculture, nous avons essayé d'évaluer les motivations du choix des agriculteurs. L'étude de cas a été conduit dans la région Beira Interior à la demande des Services Régionaux du Ministère de l'Agriculture, sous le programme AGRIS (2000-2004). La méthodologie utilisée recouvre l'analyse de sources documentaires, interviews à des vendeurs de machines agricoles, à des techniciens et aussi à des agricultures bénéficiaires des mesures AGRIS. L'analyse a identifié des groupes relativement homogènes d'agriculteurs en ce qui concerne leurs attitudes et comportements dans l'utilisation et l'achat de tracteurs: la demande a donc été caractérisée. Il a été aussi possible d'identifier les facteurs qui ont influencé l'offre, soit de machines et équipements, soit de fonds destinés à leur achat. Les conclusions mesurent l'opportunité des choix de technologie dans le sens de l'augmentation de la productivité et du bien-être des agriculteurs, rendue possible par l'utilisation des fonds AGRIS.

1. Introduction

The agricultural mechanization is an important support of modernity and development¹. The choice of machinery and equipment to be used depends on several factors including the size of the farm, the relationship of complementarity or substitutability of the labour force and its price, the expected increase in production and the availability in markets of machinery and equipment for rental.

With regard to technological progress, mechanization has two consequences, somewhat contradictory: on the one hand it allows the replacement of labour and the increase of labour productivity, which, moreover, represents an historically documented evolution, and on the other hand it permits the intensification of agricultural production with increased use of labour and use of skilled labour. The economic justification of mechanization is therefore found both in lower costs and in improved levels of production obtained.

Apart from the purely economic view, other factors may influence the process of mechanization in rural areas. Among them, we emphasize the possibility to carry out the work in less hard ways, local transportation of people and goods, and even other intangible benefits resulting from mechanization, with emphasis on the social prestige which is usually associated with it and the continuity of ancient practices of mutual aid, a factor in the consolidation of social relations and cohesion of communities.

This study arose from the need to clarify the reasons for which the funds are concentrated massively on agricultural mechanization and motorization, given the known results from implementation of the AGRIS² measure in Beira Interior and trends observed in other programs that support the rural development. The AGRIS measure reflected a programmatic

¹ We will use here, without transcribing *ipsis verbis*, references in the bibliography published on the subject (Ellis, 1992, Johnson 1981, Johnson, 1982; Upton, 1996).

² Is the agriculture and rural development measure in the regional development programs.

support to small farmers, with an orientation to the efficiency and diversification of holdings³ in a context in which the territory revitalization, sustaining the environment and stimulating activities in rural areas were increasingly demanded.

Passing from the letter of the law and regulation to the analysis of the interventions which, in practice, the measure AGRIS has resulted in, what has been found - and was not expected - was that the majority of the grants given (in number and amount), concentrated in a very expressive manner, on the purchase of agricultural machinery and equipment (more than 80% of the number and amount of investments approved).

How to explain this deregulation of demand or what can be viewed as a bias of the strategies for managing supply included in the activities of the measure AGRIS? The question is just why the farmers, small farmers⁴, mostly opted to invest in machinery and equipment, and not in other investments that may be possibly more structural. Will the mechanisation be a priority investment at farm level in Portugal? This was the bottom line question at the outset that we face.

Today, especially in the Beira Interior region, where this study took place, the overriding concern is perhaps to tie to the land use, with productive or environmental purposes, people who live exclusively or marginally from agriculture with income levels and well-being similar to those in other sectors (whether it is true that the purpose of reducing the agricultural labour force is still arguable). The purchase of agricultural machinery and equipment (or better machines and better farming equipment) may be one of the best ways to reach this goal.

What has not been completely clarified is whether a certain convergence of demand and supply and its overexpression in mechanization are justified on technical, economic and social grounds. Do farmers "really" need the machines that get the support - legitimate? – of public

³ The action 1 foreseen by Decree No. 1109-E/2000 - Diversification of small-scale agriculture - include two sub-actions: sub-Action 1.1 Support the small-scale farming and sub-action 1.2 Diversification of small farms.

⁴ Remember again that the measure AGRIS merely support farms with an economic size which do not exceed 6/8 UED.

funds? What is really at issue is not just to know whether farmers really need the machines they buy, but if that need should be supported. This study aims to shed some light on these issues.

In fact, one of our objectives is to clarify, at the level of demand (of equipment and means to acquire them) the explained motivations, the attitudes and behaviours of farmers who had submitted mechanization applications. At the same time we also want, at the supply side (of equipment and funds), to capture the views of machines vendors and regional technicians of the Ministry of Agriculture, who more closely dealt with this measure.

2.Methodology

The study was done in three municipalities of Beira Interior region - Fundão, Pinhel and Figueira de Castelo Rodrigo. The three counties listed were divided into two separate groups - Pinhel / Figueira de Castelo Rodrigo and Fundão - representing well-defined territorial units (and) with different soil, climatic and social characteristics.

The analysis, in addition to documentary analysis, was divided into two distinct orientations: in the supply side, interviews were conducted based on a non-rigid guide to some privileged agents involved in the acquisition of machines, such as the technicians from the Ministry of Agriculture and machines vendors and in the demand side, 78 farmers⁵ were interviewed, representing 7% of the population of the farmers applying for Action 1 of the measure AGRIS for the period between 2000-2004 in the three counties mentioned. The Regional Agricultural Services of Beira Interior mediated the contact with the farmers selected, finding out their interest in collaborating with the study. The structure of the survey consisted, in brief, of three groups of questions: characteristics of the producer, characteristics of the farm and motivations, attitudes and behaviours underlying the application. The latter group focused on

issues relating to the knowledge of the measure, elaboration of the candidacy project, the type of investment required, the sources of funding, the motivations and the influences that they have gone through.

Using descriptive and multivariate statistical methods, specifically cluster analysis, farmers/farms with similar characteristics were grouped to assess their attitudes and behaviours dealing with the purchase of tractors.

3. The framework of supply

In this point we collected information about the mechanization of agriculture from the perspective of the agents that materialize the supply of machinery and equipment and the funds to purchase them. Experts from regional agricultural services and machine vendors were contacted.

In the agricultural area covered by this study, what was the role played by technicians under the AGRIS measure? Their responsibility was to make the measure to be known, to enforce the legal procedures and to approve/reject the projects submitted. Confined, most of the time, to bureaucratic and administrative tasks, and without great resources for technical assistance and field work, technicians do not seem to have had a very active role in the dissemination of the measure. Available to attend the farmers in the office, technicians acted in a more passive and indirect way, leaving to others, project designers and suppliers of the machinery⁶, the freedom to publicize the measure.

In order to provide the system of project approval of some objectivity, the regional agricultural services created an analytical framework that allowed, based on the data from the farm and the equipment, to calculate a breakeven point that supported the decision making

⁵ The sample was drawn randomly and systematically among the applications for Action 1 of the measure AGRIS previously ordered by increasing area.

process⁷. Nevertheless, it was made possible that the farmers with the approved applications requested, without additional subsidy, to get an increase in power contractually agreed (these were in all 19 cases in Fundão and 41 in Pinhel). The justifications given by these farmers were vague and poorly substantiated and they referred mainly to arguments such as greater durability and increased efficiency of the equipment. Indeed, this enhanced power which generated additional costs, mostly supported by farmers and their acceptance by the Administration makes part of a broader understanding of the subsidy considered as a financial contribution to the farm's cash flow, underlining the general principle of fungibility of monetary resources.

This decision was however criticized for undermining in some way, the effort of rationality and objectivity that the technicians had tried to apply to the analysis of the AGRIS projects, leading somehow to a reversal of the information and decision-making chain (it allowed machines vendors to recommend the tractor suitable for the stated size of the farm, on the assumption that afterwards it would always be possible to suggest a more powerful tractor, which within known limits, would be accepted).

The regional experts also questioned the extreme concentration of support in mechanization and the relevance to subsidize the replacement of the machinery, which often happened. The argument most often made against the support of mechanical equipment for farms was the fact that this would only make sense as the "starting" of the process. In other words, in the opinion of the regional technicians, if one can justify the funding of a first tractor, it no longer makes technical sense to support preferentially the replacement of obsolete or old equipment. In theoretical terms, this statement may be defensible; however, in practice, farmers are not always able, even the most thoughtful ones, and given the time between the first purchase and

⁶ Nevertheless, as carefully pointed out by some of the farmers interviewed, the technicians have also made particular projects of candidacy, which will be only objectionable from an ethical standpoint, whenever the same technician produce the technical report for the AGRIS management unit.

the replacement, to totally self-finance the replacement of obsolete equipment. Indeed, in other countries, such as Spain, the “Renewal Plan” was created in recent years, that with greater flexibility and simplicity allowed the "renewal of tractors with more than fifteen years and self-propelled machines with more than ten years".

The agricultural experts contacted in the counties, although critical, as we said, consider that there is still much to do for the mechanization of agricultural tasks in rural municipalities. They argue, therefore, the continuation - perhaps in new ways – of the European Community and national support. They say that it is without a doubt necessary to determine if “the machine fits the land” in cases of small-scale agriculture.

Interviews with local officials and technicians linked to the sale of mechanical equipment produced slightly different findings. Three companies acting in the region were contacted: the market leader in the sales of tractors, its nearest competitor and a company that sells mainly specialized equipment (irrigation). The structure of sales and marketing differs somewhat from company to company, but it is based on a quite decentralized intervention that consists either of "shop sellers" around the villages (who are real market prospectors) or of regional officials that operate in defined sub-regions. When the business is focused on specialized equipment, the mechanization is fundamentally organized according to the technical needs they induced.

The interviews only intend to indicate the behaviours of farmers regarding mechanization analyzing also the key points in the market development of machinery and equipment in the region and their linkages with the AGRIS measure.

The respondents were unanimous in saying what was expected then: a notable drop in sales of tractors and other equipment with the end of AGRIS subsidies as it happened in 2005 (a drop of around 15%) but they expected a worsening of the situation in the years to come.

⁷ This was, to some extent, benevolent once it considered the cost of rental identical for all powers of the equipment(s) and also by carrying out a 20% discount on the total costs associated with the tractor itself.

Continuing to quote the views expressed: "People here still need tractors, and have little means to buy them; the situation is far from market saturation."

In the interpretation of machinery sellers, the purchase of subsidized tractors has had an undeniable effect on the renewal of machinery and the equipment. It has increased the comfort at work and started the mechanization in many farms that were not yet mechanized. According to one of the respondents "more than 90% of purchases are for replacement, but there are still many people who purchase the tractor for the first time". The machine sellers declared that they have not given special facilities to the beneficiaries of the AGRIS measure, "Farmers always paid their money". They admit, however, that in some cases, they increased the value of the old equipment given in exchange, or made discounts in the official prices, but "the farmers always had to pay the value added tax". The financial effort made by the farmers was emphasized too, whenever they acquired the equipment with higher power than it was contractually agreed under the approved projects. But vendors argue that a more powerful tractor is always more comfortable, gives more security, allows the strengthening of the neighbourhood relations ("farmers supply small services to others") and, finally, it is an important factor of social imposition that results from the higher status that the ownership of physical assets (especially machines) induces.

When we asked them who will continue to buy tractors in the absence of the AGRIS measure two groups emerged with generalized evidence: the part-time farmers (people who take pleasure in the country-side, though the source of their income is diverse and sometimes predominantly non-agricultural) and emigrants that have returned⁸. "The small local agriculture, which continues to feel the need to replace manual labour with capital, will inevitably have as a solution the purchase of second-hand tractors and without legal registration. This latter process, which refers to the parallel and "unfair" market, will open up

⁸ Matching in some way with the cluster "multiple activities" considered ahead.

opportunities beyond imaginable. "Is this best way for agriculture?" The interviewed sellers of machines questioned this course of action.

Another point raised by these agents is the increasing importance of individual and collective companies of "project design and development" in rural areas. According to the largest commercial operators of the sector, it is the small intermediaries in the sale of machinery and project designers in a team or individually, that will suffer the most with the elimination of the AGRIS subsidies, and it is not clear whether the small scale agriculture will benefit from their disappearance.

4. The characteristics of demand

In the characterization of demand intended to assess the appetency of farmers not only regarding the equipment but also regarding the financial support that enabled its acquisition through the AGRIS measure, farmers were directly surveyed. Farmers are mostly men (68%), aged between 45 and 65 years old (54%), proportions somewhat similar to those recorded in the population of farmers that applied to Action 1 of the AGRIS Measure, in Beira Interior region, in the period between 2000 and 2004. Primary education is the dominant academic level and only a small percentage (2%) of the farmers has high school or higher education. Agricultural activity is pursued in full time by the majority of farmers surveyed (65%), registering two different situations: those who are full time farmers and those who are retired but are now engaged in farming full-time.

The farms belonging to producers surveyed have, on average, a total and agricultural area of 10 and 9.3 ha, respectively. The fragmentation of the holding is the rule, with 13 blocks on average.

The farmers interviewed were aware of the AGRIS measure mainly through the family and friends. Regarding the preparation of the project, about 40% of applications were developed

by vendors of machines, and 32% by individuals, mostly project designers. Of the 78 producers surveyed, only 12% did not submit any application for mechanization, because they had already been equipped. Regarding the remaining farmers, 16% saw their project rejected, and from these 36% said that in the absence of European funds, they would acquire a new tractor as soon as possible according to their need.

Regarding the farmers whose mechanization candidacy was approved, the vast majority of them had already had mechanical traction (70%). This situation was more pronounced in the area Pinhel/Figueira de Castelo Rodrigo where the percentage reached 80%. This was in fact a renewal of the existing farm machinery. If we look at where the old equipment ended, most of it was "taken" with the purchase of the new tractor (55%). However, a significant percentage of farmers kept the old tractor on the farm (34%).

From the farmers who purchased tractor with European Community aid, majority (59%) said they would buy a tractor even in the absence of the AGRIS measure. However, 50% stated they would buy second hand tractors. The unavailability of financial means was referred by 41% of the farmers who said that in the absence of the AGRIS measure they could not buy any machine. "The old is still working" was often heard by the researchers.

Different responses to the question about what are the main types of tasks performed by the tractor were obtained, depending on the areas considered: agricultural tasks in the farm, transportation of agricultural products from and to the farm and forestry tasks or transportation of people. In Fundão tractors are used mainly for agricultural tasks within the farm, while in Pinhel/Figueira de Castelo Rodrigo they are mostly used for transporting products to and from the farm. This is also linked with the different land structure in the two regions and the different agricultural activities practiced (the importance of vineyards and orchards in Pinhel). No farmer referred to forestry task , but about 11% said that the

transportation of people is the main function of the tractor. This task is also cited as a secondary task for many respondents (22%).

For the purchase of a tractor, 76% of the farmers had their own financial resources, 15% used bank loans, 5% used informal loans from family and friends and only two farmers said they had obtained a loan mediated by the vendors of machines. This aspect is very important because it means that in fact, regardless of the subsidy and the eventual facilities provided by vendors, farmers pledged their own money in the acquisition, which once again underlines that the acquisition of tractors meets objective needs of the farm or of the farm family.

As mentioned above, after the approval of the project farmers could require the increase of the power stipulated. About 46% of farmers surveyed who have seen their application for tractors approved, asked for the power increase. The reason given was solely the need for a more powerful tractor to carry out agricultural tasks.

When asked who or what influenced the purchase of the equipment under the measure AGRIS, about half of the answers was the chance to benefit from the subsidy. The influence of the sellers of machines was reported by 14% of the respondents, while the influence either of technicians from the Ministry of Agriculture or the neighbours can be considered residual. Finally, analyzing the motivations that were mentioned by farmers for the purchase of mechanical traction (tractor and cultivator), approximately 32% of the respondents indicated that the replacement of the old tractor was the main motive for the purchase made, and then the possibility to usufruct from the subsidy (21%).

To clarify the characteristics of demand for agricultural machinery through the AGRIS measure it is useful to identify homogenous groups of farmers, both in terms of intrinsic characteristics of the producer (gender, age, educational level, etc.) and also of their farm (agricultural land area). Based on the variables identified in Table 1 and using the method of

cluster analysis, K-means, we obtained three distinct types of farmers identified as clusters one through three in Table 2.

Table 1: Description and mean of the variables used in the construction of clusters

| Variable | Description | Mean* |
|---------------------------|--|-------|
| Gender | 1 – Male; 0 – Female | 0.68 |
| Location | 1 – Pinhel/Figueira de Castelo Rodrigo; 0 - Fundão | 0.67 |
| Qualifications | 0 – Without qualifications; 1 – Primary education 2 – Secondary education; 3 – Higher education | 1.24 |
| Age Classes | 0 – < 45 years old; 1 – ≥ 45 e < 65 years old; 2 – ≥ 65 years old | 1.39 |
| Time Dedicated to Farming | 1 – Full time agriculture; 0 – part time agriculture | 0.65 |
| Sector of Activity | 1 – Primary; 2 – Secondary; 3 – Tertiary | 1.24 |
| Activity | 1 – Retired; 0 – Other(wise) | 0.42 |
| Area classes | 1- <5ha; 2- ≥ 5 e <10ha; 3- ≥ 10 e <20ha; 4- ≥ 20 ha | 1.88 |

* reflects the average of the values assigned to classes.

The cluster one aggregates 42% of the sample and consists mainly of producers with low level of education (primary education) and older (more than 60 years old). This group is farming (in) full-time and consists mainly of the retirees from the primary sector and it has the lowest class of agricultural area (6 to 10 ha) of the three clusters. For simplification and to facilitate future identification they are designated as “small farmers”.

Cluster two includes 25% of the sample. It also consists mostly of producers of low qualifications (primary education) and older age. As full-time farmers, the candidates worked or work in the primary sector and more than half are retired. Their holdings have an agricultural area higher than of the other clusters, ranging between 11 and 20 ha. They are located mostly in the Pinhel/Figueira de Castelo Rodrigo area. Basically, it is the features related to the area dimension and to some extent to the location⁹ that distinguish this cluster from the previous. Farmers from this group are mainly elderly farmers with larger farms that can be referred to as “medium sized farmers”.

⁹ although with a significance level of 0.145.

Table 2: Typology of farmers/farm

| Variable | Cluster | | | Level of Significance* |
|---------------------------|---------|------|------|------------------------|
| | 1 | 2 | 3 | |
| Gender | 0.62 | 0.59 | 0.83 | 0.190 |
| Qualifications | 0.86 | 0.94 | 1.52 | 0.000 |
| Age class | 1.66 | 1.65 | 1.04 | 0.000 |
| Time dedicated to farming | 0.93 | 0.94 | 0.13 | 0.000 |
| Sector of occupation | 1.00 | 1.00 | 2.78 | 0.000 |
| Activity | 0.59 | 0.59 | 0.17 | 0.004 |
| Area class | 1.31 | 3.29 | 1.57 | 0.000 |
| Location | 0.62 | 0.82 | 0.52 | 0.145 |
| N | 29 | 17 | 23 | |

*Test F-Snedecor

Cluster three comprising a third of the sample, is composed largely of young producers with higher educational qualification (secondary education), with the overwhelming majority being part-time farmers, working, as a rule, in the tertiary sector. The agricultural area farmed by these candidates is roughly half of the area grown by the producers of cluster two, but similar to those of cluster one (6 to 10 ha). Therefore, they are younger farmers that are characterized mostly by having another activity, so can be referred to as “multiple activity farmers”.

Once the typology of the farmers that benefited from the AGRIS measure was established, it was of interest to know their behaviours and attitudes towards the purchase of mechanical traction, namely how the farmers found out about the AGRIS measure, executed their project as well as the motivations and influences which determined their application (see Table 3).

Let us start with the knowledge of the measure: the question was which entity conveyed the information about the existence of AGRIS measure. It was observed that the "small farmers" and "multiple activities" were mainly informed by friends and to a lesser extent, by the regional agricultural services. The "medium farmers" were informed primarily through machine vendors, and in this group the purchase of equipments for replacement is more concentrated.

With regard to the execution of the project application machine vendors are effectively the entities that worked for the "small farmers" and the "medium farmers, with special importance

for this last group (71% of respondents). The "multiple activities", use the individual project designers more for the completion of their application.

With respect to the motivations expressed for the purchase of tractors through the AGRIS measure it can be said that subsidies exert a strong attraction for all the farmers, being named principally by the "multiple activities". The need for farm mechanization (vague category) is also felt by all farmers but it is the "small farmers" and "medium farmers" that gave greater importance to it (in the latter case for replacement of equipment). The "multiple activities" are those that are able to better characterize various motivations that support the decision-making process. Probably better informed, they emphasize technical issues such as the replacement of rented power by own power, and are also showing a greater awareness of the objectives of the AGRIS measure.

Table 3 – Characterization of the attitudes by typology of farmers

| | Small Farmers (%) | Medium Farmers (%) | Multiple Activities (%) | Total (%) | Level of Significance * |
|---|-------------------|--------------------|-------------------------|-----------|-------------------------|
| How farmers found out about the measure | | | | | |
| Friends | 51.4 | 35.5 | 52.2 | 47.8 | 0.491 |
| Technicians of IFADAP | 3.4 | 0.0 | 0.0 | 1.4 | 0.497 |
| Technicians of Mutual Agricultural Credit Units | 5.6 | 0.0 | 8.7 | 2.9 | 0.127 |
| Vendors of Agricultural Machines | 13.8 | 47.1 | 4.3 | 18.8 | 0.002 |
| Technicians of Farmers Associations | 10.3 | 5.9 | 8.7 | 8.7 | 0.874 |
| Technicians of Regional Agricultural Services | 17.2 | 11.8 | 21.7 | 17.4 | 0.713 |
| Who made the Project | | | | | |
| Technicians of the Ministry of Agriculture | 13.8 | 5.9 | 17.4 | 13.0 | 0.558 |
| Technicians of Selling Machines Enterprises | 44.8 | 70.6 | 26.1 | 44.9 | 0.020 |
| Private Technicians | 27.6 | 17.6 | 47.8 | 31.9 | 0.104 |
| Technicians of Farmers Associations | 13.8 | 5.9 | 8.7 | 10.1 | 0.665 |
| Motivations for the Application | | | | | |
| Replacement of Old Tractor | 37.9 | 57.1 | 23.8 | 37.5 | 0.136 |
| Replacement of Renting in | 6.9 | 7.1 | 4.8 | 6.3 | 0.942 |

| | | | | | |
|--|------|------|------|------|-------|
| Replacement by Mechanical Traction | 0.0 | 0.0 | 9.5 | 3.1 | 0.121 |
| Performing Tasks on Time | 13.8 | 0.0 | 38.1 | 18.8 | 0.012 |
| Comfort | 10.3 | 0.0 | 9.5 | 7.8 | 0.465 |
| Subsidies | 45.3 | 64.3 | 76.2 | 62.5 | 0.209 |
| Need | 57.8 | 85.7 | 42.9 | 57.5 | 0.039 |
| Influence for the Application | | | | | |
| Technicians of the Ministry of Agriculture | 0.0 | 0.0 | 4.8 | 1.6 | 0.353 |
| Vendors of Agricultural Machines | 10.3 | 14.3 | 19.0 | 14.1 | 0.682 |
| Neighbours | 6.9 | 0.0 | 4.8 | 4.7 | 0.605 |

*Test of Chi-Square

Regarding the question of what influences were most striking for producers in the decision to proceed with the project application, it was found that the distinction between motivation and influence in decision-making was not clear, and there were few farmers that named the influences revealed. Although there is an indication that the family members and the neighbours have had some responsibility in the trend to equip the farms - running somehow a game of social emulation, especially visible when farmers applied for an increase in the power approved - this influence is only sparingly quoted by "small farmers" and "multiple activities". The latter are also the only ones who report some vague influence of the technicians from the Ministry of Agriculture.

If we now want, in a slightly different perspective, to consider the role of sellers of machines in different regional contexts, it seems clear that the role of these agents is more relevant in the area of Pinhel/Figueira de Castelo Rodrigo. The promotion of mechanization owes a lot to them, either at the level of dissemination of the measure or at the level of development/monitoring of the project.

6. Final Remarks

Against facts there are no arguments: the demand for machines and equipment by small scale Portuguese farmers is a reality. From the results obtained and the interpretation made of them

it is possible to document some features of the mechanization of agriculture in Beira Interior region facilitated by the AGRIS measure.

The question: "Is mechanization a priority investment at farm level?" - needs a better clarification. It is true that over 80% of the total number of applications for the AGRIS measure (during the period from 2000 to 2004) and also more than 80% of the total investment made (about 39 million of euros) is related to mechanization.

Moreover, the importance of investment in machinery also reflects the implementation of other policy measures (for example, measure 1 of POAGRO¹⁰ - Action 1.1 and 1.2). If the structure of investment made by smaller farmers is similar to the "other farmers", we can have a choice of a common pattern of development of both types of agriculture. The policy measures accelerate the choices but do not determine them. This may signify that the importance of mechanization of small farms does not correspond to a particular bias of AGRIS measure, but to an observed trend in Portuguese agriculture, perhaps more evident here.

Having said all this it can be concluded that both the demand for mechanical means by small farmers and the strategies to supply funds to co-finance the investment needed in this area were completely justified. In particular in a special program to support small farms, where in addition "to promote the improvement of incomes and living conditions, employment and production," it was intended to "maintain and strengthen the social strata of rural areas," and the viability and development of "models of agriculture based on multi-activity and multi-income"¹¹.

In a recent work, which depicts the evolution of Spanish agriculture, one can read: "In Spain, the most problematic crops are those that have not dealt satisfactorily with their

¹⁰ The Operational Programme for Agriculture and Rural Development

¹¹ Article 2° of Decree n.° 1109-E/2000 of the DR n.° 274, SÉRIE I-B, 1° SUPLEMENTO, 27 of November, MADRP

mechanization”¹². In this country, the machines are still regarded as "means of production that are essential in any modern agriculture and mechanization of farms is a priority to achieve a modern, profitable and competitive agriculture"¹³.

In conclusion, according to our work, it can be stated the following:

- The regional technicians of the Ministry of Agriculture, who had the role of selecting the applications, and who did so on the basis of a discrimination supported by technical and economic criteria (refusing therefore unviable projects) do not seem to consider that the level of mechanization required by the conditions of production of Beira Interior region has been achieved at the moment. Under certain conditions, they support the continuity of measures like AGRIS, either for new acquisitions or for renewal of the existing machinery.
- The commitment of the vendors of machines in the process of dissemination of the AGRIS measure does not seem, however, to have been materialized, neither against small farmers, nor against the objectives of the AGRIS measure which they helped to succeed; but it generated, for sure, a demand bias in favour of mechanization.
- These machine sellers believe that the suspension of subsidies will change the market, which will especially be boosted by part-time farmers and immigrants, predicting also a growth in the market of second hand equipment and even in the market of tractors without registration, which according to them constitutes unfair competition.
- Regarding farmers, at least in the testimony of those contacted, their need to equip is real, but there are some difficulties in getting it done and some expectation about future support.
- Although differentiated in groups that show different attitudes and behaviours concerning the purchase of mechanical equipment, all farmers are interested in the support for

¹² MAPYA, 2004 (Translation by the authors)

¹³ *Idem*

mechanization. With different production structures, different channels of information, cash flows with non comparable dimensions and especially different types of integration in the economy of rural areas the farmers would require a versatile support either at the level of information channels or technical support or providing differentiated levels of subsidies.

- Future steps are worth taking into account the different receptors: the farmers of the type "multiple activities" are the most easily integrated into the existing information channels, while the farmers of the type "medium-scale" seem to depend more on commercial agents, namely vendors of machines. The "small farmers" will always have a residual fraction (and occasional) of the expected support and it is necessary to consider the appropriate mechanisms of extension that reach them better.

References

- Ministério de Agricultura, Pesca y Alimentacion (MAPYA), 2004. *Atlas de la España Rural*, MAPYA, Madrid.
- Ellis, Frank, 1992. *Agricultural Policies in Developing Countries*, Cambridge University Press.
- Johnson, Glenn L, 1982. An opportunity Cost View of Fixed Assety Theory and the overproduction Trap, *American Journal of Agricultural Economics*, 64 (4), 773-775.
- Jonhson, Marc A. e E. C. Pasour, 1981. An Opportunity Cost View of Fixed assety Theory and the Overproduction Trap : Comment, *American Journal of Agricultural Economics*, 63 (1), 1-7.
- Mansinho, Maria Inês de Abrunhosa e Carla M. Magalhães Nogueira Lúcio, 2005. *AGRIS 2000-2004: Caracterização das Candidaturas da Acção 1 na Beira Interior*, ISA, Lisboa.
- Mansinho, Maria Inês de Abrunhosa e Carla M. Magalhães Nogueira Lúcio, 2005. *Motomecanização – Um Investimento Prioritário ao Nível das Explorações Agrícolas?*, ISA, Lisboa.
- Upton, Martin, 1996. *The Economics of Tropical Farming Systems*, Cambridge University Press.
- Maroco, João, , 2003. *Análise Estatística com utilização do SPSS*, Edições Sílabo, Lisboa.
- Morrison, D., 1990. *Multivariate Statistical Methods*, 3ª edição, McGraw-Hill, New York.
- Reis, Elizabeth, 2001. *Estatística Multivariada Aplicada*, 2ª edição, Edições Sílabo, Lisboa.