Attitudes of the Portuguese farmers to the EU Common Agricultural Policy

Postoje portugalských farmářů ke Společné zemědělské politice EU

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Abstract: The main purpose of this paper aims to know the farmer's attitudes towards the agricultural production, the political support, and the irrigation project of Alqueva in the context of the 2003 Common Agricultural Policy (CAP) Reform, the *Health-Check*, in a micro-region located near the Mediterranean Sea. For this purpose, we use the Theory of Planned Behaviour. The main results suggest that the majority of farmers are a relatively homogeneous cluster about their attitudes but not in their behavioural intentions. These farmers still maintain a productivist mindset, wish to maintain an agricultural focus and strongly reject the notions of policy liberalisation. The main conclusions suggest that although the farmers have a great potential of innovating the future CAP policies, the water supply irrigation price and the conditions of access to agricultural credit, may compromise their innovation capacity in the future, in particular on the smaller farms.

Key words: Common Agricultural Policy, Mediterranean region, attitudes; farm's typologies

Abstrakt: Hlavním cílem tohoto příspěvku je zjištění postojů farmářů k zemědělské výrobě, podporám v rámci Společné zemědělské politiky (SZP) a zavlažovacímu projektu v Alquevě, a to ve vztahu k reformě SZP z roku 2003 a její kontrole v rámci *Health-Check* ve vztahu k mikroregionu v oblasti Středozemního moře. Pro tyto účely byla použita Teorie plánovaného chování (Theory of Planned Behaviour). Hlavní výsledky výzkumu ukazují, že většina farmářů tvoří relativně homogenní cluster, pokud jde o jejich postoje, nikoliv však pokud jde o záměry jejich budoucího chování. Tito farmáři stale vykazují produktivistický typ názorů, přejí si udržení důrazu na zemědělskou produkci a ostře odmítají politickou liberalizaci v tomto směru. Hlavní závěry práce naznačují, že ačkoliv farmáři mají velký potenciál ve vztahu k inovacím budoucí SZP, ceny vody pro zavlažování a podmínky přístupu k zemědělským úvěrům mohou tuto inovační kapacitu v budoucnu výrazně omezit, zejména pokud jde o drobné zemědělce.

Klíčová slova: Společná zemědělská politika, Středomořský region, postoje, typologie farem

Luxembourg Agreement on reform of the 2003 Common Agricultural Policy (CAP) has allowed for the decoupling of all direct payments from production from 2005 onwards in Portugal. To date, most direct payments have been coupled to production, and therefore farmers were required to grow crops or stock animals to qualify for support. With decoupling, farmers will receive these payments regardless of their production decisions as long as they maintain their land in accordance with the 'basic standards for the environment, food safety, animal health and welfare and good agricultural and environmental conditions' (European Commission 2003). This was possible by the introduction of the Single Payment Scheme (SPS) per farm. Following the 2003 CAP, the European Commission adopted in 2008 the Health Check (HC), aiming to prepare the CAP financial framework from 2013. To find that, some adjustments on the 2003 CAP reform were proposed. A major adjustment was the significant increase in modulation in the SPS which

led to a progressive diminution of its value by farm on the end of 2013 and its value transferred to the CAP 2nd Pillar.

All these policies will entail changes in the allocation of resources on- and off-farms. As a result of the WFD, although water pricing is an environmentalist demand, the reasoning on which the instrument is based is purely economic, in accordance with the "polluter pays" principle. In this way, farmers in the irrigated areas, according to neoclassical economic theory, would respond to the increase in water prices by reducing their consumption, in accordance with a negatively sloping demand curve. As a result of the 2003 CAP and HC reform, the management of agricultural land and the landscape is subject to the same level of payment independently of the level of production practiced. This change constitutes an important shift in the policy environment, recognising the role of farmers in maintaining the landscape and providing a payment for this role without a requirement to produce (Gorton et al. 2008).

Policy makers have recognised that the way in which farmers adjust to changes in agricultural and environmental policy depends partially on the latter group's attitudes and mindsets (USDA 2004). However, while the agricultural policy has changed from the production orientation into the forms of payment decoupled from production, there is a little evidence that the attitudes of farmers also have adjusted (Gorton et al. 2008). Nevertheless, important contributions have been made by many authors on this problem. The majority of these papers refers of the study of the farmer's attitudes of the 2003 CAP at the macro-regional, or the inter-community countries levels (Gomez-Limon et al. 2007), countries, or even comprising several EU countries including the New States Members (Gorton et al. 2008). However, none of these studies explicitly focused on the farmer's attitudes on the 2003 CAP and structural changes resulting from public investment in the irrigated agriculture in the Portuguese region.

The Alqueva Irrigation Project (AIP) is the largest public investment in hydro-agricultural hitherto carried out in Portugal in the last decades. This project is currently under construction in the Alentejo region in Southern Portugal; it includes the implementation of 110 thousand new hectares of irrigated land and will be completed in 2013. The strategic objective is to create structural conditions to replace the traditional agricultural dry land productions for a diversified crop pattern of irrigated crops in order to promote agricultural competitiveness and regional development (Fragoso and Marques 2003). The Irrigation Scheme of Monte Novo (ISMN), the object of this study, is included in this enormous project, although it has very specific particularities in relation to the AIP and to the country in general. The farms of the ISMN are in average 4.1 and 18 biggest than in the Alentejo region and the country, respectively. This is a micro-rural region, with the Mediterranean agro-climatic conditions. These characteristics associated with the existence of irrigated water create the potential to diversify the agricultural production. However, these conditions depend on the farmer's attitudes in relation to the CAP policies and from its intentions in relation to this irrigation project.

Against this backdrop, the paper investigates whether a typology of farmers from the ISMN can be discerned depending on their opinions to the policy support and farming objectives, and whether different values or opinions can be linked to diverging behavioural intentions to adjust to the 2003 CAP reform, the environmental water policy (WFD) and to the irrigation Alqueva's project. The paper's objective is to provide a better understanding of the farmers' attitudes and behavioural intentions and consequently to generate insights into likely responses to the policy change. For this purpose, we use the Theory of Planned Behaviour (TPB) as a theoretical basis, and the data were collected through a face to face interview from a representative sample of farmers of the ISMN.

Attitudes have long been thought of as important determinants of behaviour (Bagozzi 1981). According to Beedel and Rehman (2000), the research on farmers attitudes and motivations in the past tended to be subjective, and, theoretically, imprecise. However, the use of the Theory of Planned Behaviour (TPB) from Ajzen (1991), initially used by Willock et al. (1999a, b) and Beedel and Rehman (2000) in agriculture, enabled the subsequent development of various scientific papers in this area. Among those works, there are Solano et al. (2003), Bergevoet et al. (2004), Rehman et al. (2007) Gorton et al. (2008) and Maye et al. (2009).

The TPB model of Ajzen (1991), based on the assumption that human beings usually behave in a sensible way, i.e., take into consideration the available information and implicitly or explicitly consider the implications of their actions. The theory postulates that the intention of a person to perform behaviour is a direct function of the related individual and social variables. The individual component is based on a person's attitudes, where an attitude is a disposition to respond favourably or unfavourably to an object, person, institution or event (Kim and Hunter 1993). The relative contribution of attitudes and subjective norms vary according to the behavioural context and

the individuals involved. Attitudes are determined by beliefs about the performance results of the behaviour and the evaluation of results. Attitudes to a particular behaviour are based on beliefs about outcomes of that behaviour and an evaluation as to whether such outcomes are perceived as good or bad. The social related component is referred to as the subjective norms which are the person's perceptions of the social pressures acting on him/her to perform or not perform the behaviour in question (Ajzen and Fishbein 1980). Subjective norms are independent of the person's own attitude toward the behaviour in question, but the influence of subjective norms on a person will depend on the individual's willingness to comply with the attitudes of others (Gorton et al. 2008).

According to Midgley and Dowling (1978), highly innovative farmers are those who decide to adopt an innovation, regardless of the decision of others. In that sense, the intentions of farmers to adopt new technologies in irrigation is likely to be inextricably linked to its capacity of innovation. There are a large number of researches on the farmer's attitudes linked to intentions, in particular, Rehman et al. (2003), Verhees et al. (2005), Zarafshani et al. (2008), Buchta and Fedorovičová (2010) and Chen et al. (2010). On the other hand, there is also a relatively extensive research about the intentions of farmers and future plans that is not linked to the farmer's attitudes. In this case, according to Gorton et al. (2008), farmers' surveys about their intentions have been seen as constructive, because their reliability seems relatively high, especially in the short time. Nevertheless, surveys of intentions in the Mediterranean region until still rare, except Khalkheili and Zamani (2009), Zarafshani et al. (2008) and partly Tranter et al. (2004).

Irrigation land in the Alentejo amounts to 115.6 thousand hectares. More than half of this area, about 62 thousand hectares, is included in the public irrigated schemes (Fragoso and Marques 2003). During the present period, there will be completed the AIP. Therefore, the irrigation surface will almost duplicate in the best soils of the Alentejo region.

The ISMN belongs to this project. This scheme is located in the Alentejo region, in the council of Évora, at the Southern region of Portugal, near the Mediterranean Basin. This irrigation project is covering about 25 000 hectares (ha), where 7.1 thousand will be irrigated. The ISMN includes 112 farms with the utilized agricultural area (UAA) much higher than the Alentejo and the country in general. This is the unique micro-region in Portugal where this situation occurs. The average UAA of these farms is about 229 ha. This value represents 4.1 times the UAA

average of the Alentejo's farms (55 ha) and 18 times the average of the Portuguese farms (12.1 ha).

The irrigation average area of the ISMN per farm is 63.5 ha. Almost half of this utilized irrigable area (UIA) will benefit the farms with the UAA from 1 400 ha up. About a third benefits farms between from 900 ha to 1 400 ha. Finally, 8.4% benefit farms between 300 and 600 UAA, and only 7.9% benefit farms greater than 50 ha. The farmers' average age is 51 years, while in the Alentejo it is 56 years (Dos-Santos 2008).

MATERIAL AND METHODS

This article emerges out from a more comprehensive research developed by Dos-Santos (2008), where this author tries to know the farmers' attitudes and intentions of the ISMN, in order to model the decision making process at the farm level, through a mathematical programming model.

In Portugal, there are no specific studies on farmers' attitudes and intentions under the context of the 2003 CAP reform and the WFD, none on the irrigation Alqueva project, despite that this is the largest dam in Europe and this region has structural and socio-economic particularities unique in Portugal. This paper aims to fill this gap in the literature; however, it is a preliminary case study.

Data collection was conducted in 2004 autumn through a face to face interview applied to a representative sample of 30 farmers of the total of 112 farms. The questionnaire includes six sections: (1) a general characterization of the farmers and their family members, the farmer's profile, and the farms' organization, (2) farm structure, (3) the crop systems of irrigation land, (4) the management of the farm, (5) the farmers' attitudes and the sources of used information, and (6) their intentions towards the irrigation project and the CAP policy.

The analysis is divided into two parts. First, we use the multivariate analysis to classify and identify the farms from the ISMN based on their farmer's attitudes. Then descriptive statistics are presented for the sample as the distribution of behavioural responses to the Likert scales is used. These scales were based on the previous studies to capture the values of farmers based in (Willock et al. 1999a; Gorton et al. 2008). The innovation capacity and farmers' intentions in relation to irrigation were based on the data from face to face interviews by Dos-Santos (2008), through open and closed questions.

There is a huge consensus among various authors about the importance of the multivariate analysis

in the definition of the farmer's typologies through multivariate methods. These techniques were initially used in order to avoid the aggregation errors in the mathematical programming models and/or to integrate the psychological aspects of farmers in the decision-making process, especially when using the multicriteria decision models, as Kobrich et al. (2003), Gómez-Limón and Martínez (2006), López-Baldovin et al. (2006) and Silva and Berbel (2007). More recently, the analysis has been used combining data from the psychological and socio-economic data in order to study the farmers' attitudes and intentions, especially to predict the impacts of the 2003 CAP Reform (Caballero 2001) or to study the technological change or the structural and/or the adoption of innovations done by Karami (2006) and Iraizoz et al. (2007) or the development of diversification strategies of farming systems relevant at the local level done by Daskalopoulou and Petrou (2002) and Casu et al. (2006) among others.

The multivariate analysis used in this study was based on Henriques (1997) Solano et al. (2000), Silva and Berbel (2007) and Dos-Santos (2008). The techniques used included the cluster analysis and the discriminant analysis.

Cluster analysis is a multivariate analysis technique used to form homogeneous groups, i.e., those that present great homogeneity characteristics within the group and a great heterogeneity between groups (Hair et al. 2005). This technique was used to form farm homogeneous groups in the ISMN. For this purpose, it was necessary to select the variables with explanatory power in order to separate these farms. Traditionally, this process is done by the factorial analysis in order to linearly transform a high original set of variables into fewer uncorrelated variables without any significant loss of information (Hair et al. 2005). In this work, we used the cluster analysis of variables for this purpose according to Hair et al. (1998).

We use the correlation analysis in order to exclude the correlated variables. Then the *standard* process of variables was also done. The cluster analysis used the Squared Euclidean Distance as a measure of proximity and the Ward method as the aggregation criterion. After, we did a cluster analysis of the cases based on the factors obtained on the previous cluster analysis of variables. Finally, in order to identify and characterize the representative (type) farms, and to validate the above analysis, we used the discriminant analysis technique usually used for these purposes.

Discriminant analysis consists in finding linear combinations of independent X_j variables in order to discriminate individuals from different groups Y_i,

allowing the minimization of errors in the incorrect classification. It is made through one or more linear combinations of independent variables (X_j). Each linear combination (Y_i) is a discriminant function:

$$Y_i = a_{i0} + a_{i1}X_1 + a_{i2}X_2 + \dots a_{ip}X_p \quad i = 1, 2, \dots, t$$

where a_{ij} is the weighting factors and X_j the discriminant variables (Dos-Santos 2008 and Henriques 1997).

We used the Fisher discriminant criterion for two or more functions and the statistical test of Wilk Lambda. The hypothesis of equality of averages for three functions was rejected, because the values of Λ are significant. The results led to the following discriminant function:

$$Z1 = -3.469 + 0.026X_2 - 0.273X_9 - 0.574X_{10} + 0.035X_{13} + 0.044X_{14} - 0.026X_{16} + 0.043X_{18}$$

$$Z2 = -1.067 + 0.88X_1 - 0.186X_2 - 0.300X_9 + 0.158X_{10} - 0.021X_{16}$$

In the function $Z1$, the independent variables highly discriminatory is the Utilised Irrigation Area (UIA) per farm (X_9), the number of livestock (X_{10}), the surface of irrigated wheat (X_{13}), the surface of irrigated vineyard (X_{14}), the long-term loans (X_{16}) and farmer's training level (X_{18}). On the function of $Z2$ independent variables highly discriminatory are: farmer's age (X_1), farmer's education level (X_2), the UIA per farm (X_9), the number of livestock (X_{10}) and long-term loans (X_{16}). The Mahalanobis Squared Distance was used to calculate the three farm types.

In order to know the farmer's attitudes on 2003 CAP reform and its behavioural intentions face to the irrigation Alqueva project, we used a Likert scale, and closed and opened questions in face-to-face interviews.

RESULTS AND DISCUSSION

The results of the cluster analysis of variables show that there are three factors that distinguished the farms: the structural characteristics, the farmer's characteristics and the production orientation of these farms. The structural variables include the Utilised Agricultural Area (UAA) per farm, the UIA per farm, the private UIA per farm, the number of tractors and agricultural labour force. The characteristics of the farmer included age, education and the farmer's information sources. The production orientation included the irrigation production systems

and the relative economic importance of livestock on these farms.

The results of cluster of cases show that there are three farm clusters:

Cluster I – *Smaller farmers*

It includes the small farms, with the average UAA from 50 to 450 ha. On these farms, the farmers are, compared to the other clusters, less skilled and older. They have in average 8 years of formal education and are in average 59 years old. The irrigated production systems mainly consist of crops and oilseeds. A small number of farms have irrigated maize and vineyards.

Cluster II – *Entrepreneurs farmers*

It includes farms from 450 to 1400 ha of the UAA. These farmers are moderately skilled and are relatively young. They have in average 13 years of education and are 47 years old. The irrigation production systems mainly consist of crops cereals, oilseed, vineyards, olive orchards and livestock activities with beef cattle.

Cluster III – *Consolidated agricultural companies*

It is formed by the greater UAA farms in this micro-region, i.e., of more than 1400 ha. These companies have a complex structure and a solid organizational form. They are mostly organized to corporations. Their managers are the youngest and are a more skilled group. In average, they are 46 years old and they have a bachelor degree. The irrigated production systems, compared with the others clusters, have more investment in vineyard (1.7 per cent), irrigated olive orchards (0.3 per cent) and smaller areas of irrigated wheat and beef production.

On the opposite to our initial hypothesis, the results show that these farmers are a homogeneous group in relation to their attitudes towards the 2003 CAP reform, the structural change and the irrigation project, because these factors did not separate these clusters. These results are explained, *a priori*, because this group of farmers comes from the same micro-region, they are in general relatively young (compared with the average Portuguese farmers) and more than 94 per cent of their profits come from exclusively on the agricultural production. These results are partially confirmed by Dos-Santos (2008) in the model calibration of a multi-period mathematical programming. This author found that all of these farmers had similar attitudes to the risk market and risk production.

In order to understand why these farmers did not differentiate in relation to their attitudes towards the CAP and the Aqueva irrigation project, we used the discriminant analysis. This analysis results proved that more than 90 per cent of farms were correctly classified.

Based on the Square Mahalanobis Distance, there are determined three farm types, namely, A, B and C, the cluster corresponding I, II and III, respectively.

Table 1 presents the principal results of the discriminant analysis. These results confirm the relative homogeneity of the ISMN farmer's attitudes. These farms are very similar both in their characteristics and those of their owners. All of them are commercial farms with large to a very large area. The farmers manage their farms, they are their owners, they are moderately skilled and relatively young and their profit comes exclusively from agricultural activity.

Table 1. Characteristics of three clusters farms type

Farm's characteristics	Farm's type		
	A-I	B-II	C-III
UAA/farm (ha)	350	1334	1775
UIA/farm (private) (ha)	116	250	477
UIA/farm (Alqueva) (ha)	50	150	615
Land tenure	owner	owner	owner
Farmers' organization	individual farmer	individual farmer	company
Farmers age (years)	55	45	44
Level of education (years)	9	12	17
Irrigation production systems (per cent UAA)	sunflower (18), wheat (33), maize (5.7)	sunflower (6.7), wheat (18.7), fodder (1.1), vineyards (3)	sunflower (8.8), wheat (13.4), maize (4.4)
Livestock (beef cattle unit)	120	250	–

Source: Discriminant analysis results

Table 2. Distribution of responses for the Likert scales (from 1 = strongly agree to 5 = strongly disagree); share of farmers (per cent)

Attitudinal statement	1	2	3	4	5
Attitudes to the market					
A good farmer is a competitive producer of goods sold on the free market	–	16.7	10	40	33.3
My farming abilities will allow me to maintain an adequate profit, whatever is the European agricultural policy	16.7	10	3.3	66.7	3.3
Policy support					
Farmers should not receive any commodity price support	–	3.3	20	20	56.7
Farmers should not receive any support for the farming area	–	10	13.3	33.3	43.3
Farmers should not receive any income support	–	10	26.7	46.7	16.7
Farmers should not receive any subsidies related to the environmental goods production	–	20	10	60	10
Agricultural focus					
Farmers should only produce food and fibres	3.3	33.3	16.7	40	6.7
Farm land should be fully used for agricultural production	60	20	10	10	–
Farmers should produce landscape and environmental goods	13.3	40	16.7	10	20
Farming is a more rewarding job in terms of the quality of life, independence, lifestyle, than it is in terms of money	6.7	63.3	13.3	16.7	–
Motivation to comply					
When making key decisions about the farm, I consult close family/partners and friends	6.7	63.3	3.3	27.7	–
My family/partners and friends' views come first	–	40	10	46.7	3.3

Source: Adapted from Gorton et al. (2008) and Dos Santos (2008)

Table 3. Distribution of responses for the Likert scales (from 1 = strongly agree to 5 = strongly disagree); share of farmers (per cent)

Attitudinal statement	1	2	3	4	5
Locus of control					
The CAP system of subsidies imposes too many restrictions on my future farming plans	50	30	16.7	3.3	–
The water price policies (WFD) could compromise my irrigation future plans	40	53.3	6.7	–	–
The supply water conditions of public irrigated water (under pressure or with gravity) could compromise my financial capacity of irrigation investment	–	16.7	40	43.3	–
I need technical support information in irrigation practices in some irrigation crops	10	46.7	33.3	6.7	3.3
I'm willing to pay for technical assistance in irrigation practices an/or irrigation crops	3.3	46.7	33.3	16.7	
I have to keep my farm running (to secure succession or for other reasons)	23.3	36.7	13.3	20	6.7
Subjective norms on agricultural focus					
Friends and family think that farmers produce only agricultural commodities	–	10	16.7	60	13.3
Friends and family think that farmers produce landscape and environmental goods	6.7	43.3	26.7	20	3.3
Friends and family think that the CAP support should help producers to maintain farming	6.7	60	13.3	16.7	3.3
Friends and family think that the Alqueva project should help producers to improve her competitiveness	10	63.3	13.3	10	3.3

Source: Adapted from Gorton et al. (2008) and Dos Santos (2008)

Tables 2 and 3 present the mean scores of the responses obtained by the Likert scale concerning the ISMN farmer's attitudes.

The results for each item of the Likert scale about the farmer's attitudes towards the CAP policy reveal that the majority of the ISMN farmers strongly oppose the policy liberalisation (in terms of the loss of price support, income support and subsidies related to the production of environmental goods). At the same time, approximately three quarters of the sample disagree or strongly disagree with the statement that it will be possible to maintain their agricultural competitiveness in a free open market.

About the policy liberalisation, nearly the same percentage disagrees or strongly disagrees about its application. Farmers believe that the policy support measures are essential for its maintenance in agriculture and in order to maintain their competitiveness. On the other hand, the agricultural focus of these farmers is very strong, about 80 per cent believe that agricultural land should be only used for agricultural production. However, they state that their functions extend the farming production. More than one half per cent of the sample also agrees that farmers protect the landscape and also create environmental goods. The farmers say that they are in agriculture not only for agricultural profit, but because this activity is very attractive, independent and permits a good lifestyle. Nevertheless, most farmers (80 per cent) believe that the CAP imposes too many restrictions on their business.

Almost all of the sample agrees or strongly agrees with the statement that the WFD they could endanger their future irrigation schemes, particularly through the increased cost of irrigation water in the future. The conditions of the supply of irrigation water are another concern for the future of farmers.

 Most would prefer that the irrigated water they use was released under pressure. They argue that this would imply lower investments in storage and pumping systems, primarily for those already practicing irrigation. The investments in water pumping, if it was distributed by gravity, would bring more investment. Despite the obvious discontent of the most of them about the water distribution, they believe that it does not compromise their financial capacity in these investments. In relation to the technical assistance (or rural extension), although more than one half of the respondents agree or strongly agree with it, one third of the farmers do not agree nor disagree, principally because they practise or practised irrigated crops and intend to do the same in the future. Although these farmers are receptive to paying for the technical assistance in irrigation, they were very apprehensive about the price to pay for it. Despite these constraints,

more than two thirds of the farmers want to stay in agriculture because they are the owners of their land, and for the reasons of succession (most of them have an agricultural successor).

About the subjective norms relating to friends and family, there is also a strong agreement among all the ISMN farmers. About three-quarters believe that their friends and family are aware that their functions also extend far beyond the production, but the support of the CAP is essential for remaining in agriculture. Although the farmers assume that the decision making process is influenced by the family and/or members (two thirds of the sample), this is partly because the form of organization also includes agricultural firms (companies). At the same time, almost three quarters of the farmers believe that their friends and family have so many expectations concerning the success of the Alqueva project in the competitiveness of their local farming activities. That means that the Alqueva project is welcome in this region not only by the farmers but too by their family and friends.

The innovation capacity of these farmers is very high. About two thirds of the sample have implemented over the past six years at least three new vegetal irrigated activities (mainly olive orchard, vineyards and sugar-beet) and new production technologies (low-farming systems, mechanical harvesting of olives orchard and vineyards and new irrigation systems) and new investment projects approved and financed by the EU funds and long-term loans. About one third of these farmers use more than three sources of agricultural information, and 36.7 per cent have a bachelor's degree in agricultural sciences. Private irrigation has been or is being done in the past six years by 86 per cent of these farmers.

About the intentions of the irrigation farmers, all of them have the intention of using the total irrigable area of the Alqueva project in the next three years, although they expressed a very high very concern about the future water price of this public irrigation project. About 47 per cent of farmers intent to acquire more land, but there are significant differences among the three clusters. So, just three quarters of farmers in cluster II and one half of the remaining cluster III intend to acquire land, while that intention in the cluster I is only valid for one quarter of these farmers. About 80 per cent of the total samples want to increase the irrigated area in the next five years. However, while in clusters II and III, the farmers manifested this as fully favourable, in the cluster I, only 58 per cent of the sample expressed this intention. These farmers show a strong focus on farming innovations irrigation activities. Almost two-thirds of them have the intent to carry it out in the next five years. Nevertheless,

there are significant differences between the clusters. Thus, while this idea is shared by all sub-sample from cluster III, this intention is shared approximately by three quarters of cluster II farmers and only by one half percentage in the cluster I. This means that the big agricultural firms with a larger structure are those that will easily innovate in the agricultural irrigation activities. Approximately two-thirds of the samples want to increase the beef production and to introduce new irrigation crops: fodder (73 per cent), olives orchard (50 per cent), vineyards (17.7 per cent) and vegetables (16.7 per cent). By cluster, these percentages are different according to, principally, the financial capacity and the UAA per farm. So, the permanent crops are preferred for investment, principally for the cluster III and II, while the cattle production associated with fodder are a quite transversal intension among the three clusters.

Nevertheless, the farmers appear to be very apprehensive about the evolution of the CAP policy (87 per cent). In general, more concerned with this issue are the farmers of the cluster I and II with a quite similar percentage. The entire sample is also concerned about the marketing constrains of their production in the future. In addition, 76.7 per cent are quite receptive to the introduction of new technologies, mainly as a way of reducing the labour force (60 per cent), because they believe that it is not so skilled and involves high costs for 80 per cent of respondents. Even if these farmers express precise opinions about their intentions in the short term in their farms, more than one half (56.7 per cent) report difficulties in accessing the agricultural credit so that they may compromise their future plans. It should be noted that the main farmers concerned about this belong, principally, to the cluster I and therefore they are smaller farms owners, i.e., those which *a priori* need more of that support.

Those results show that in general the ISMN farmers have not similar intentions with regard to innovation, because they have different financial and technical capacities. That implies different future options regarding irrigation in cropping patterns and investment. So they have different intentions towards the future of the Alqueva irrigation project face to the CAP policies and the WFD.

CONCLUSION

This paper aims at understanding the farmers' attitudes and behavioural intentions in the Irrigation Scheme of Monte Novo in Southern Portugal, regarding agricultural production, the political support to farming innovation and the Alqueva irrigation project

in the context of the CAP 2003 and the Health-Check and the Water Framework Directive. For this purpose, a face to face interview was applied to a representative sample of farms. Then, the multivariate analysis including cluster analysis and discriminant analysis allowed to identify and characterize the types of farms in this micro-region that formed three clusters, respectively. The results of the analyses confirmed that these types are a very homogeneous farmers' cluster with regard to their attitudes toward the PAC and the public irrigation project, because these variables are not a differentiating factor in the cluster analysis. This is justified because this group of farmers has quite similar production structures and production systems and all of them came from the same region, as the results of discriminant analysis confirmed. In order to know their attitudes and farmers intentions concerning the 2003 CAP, the Health-Check and the irrigation project, were used descriptive statistical techniques, using the Likert scale contained in the questionnaire as well as open and closed questions. The main conclusions highlights confirm that the majority of the ISMN farmers form a relatively homogeneous group in relation to their attitudes to agricultural policy but they have not the same intentions towards the Alqueva irrigation project and environmental policy of water, with respect to the WFD. These farmers still maintain a very high productivist mindset, a strong agricultural focus and reject the notion that they could be competitive without any policy support in the open market. Although they have a high innovation capacity, they show an apprehension about the CAP future evolution and the water public cost for irrigation. Nevertheless, all of them have the intent to practise irrigation and technological innovations in the short time, but they are very concerned about the water price and the marketing constrains of their production. The smaller farms are also very preoccupied with the credit access conditions and technical support. These results suggest that there should be given a greater attention in the terms of financial and technical support to smaller farms in the ISMN so that they become competitive and innovative. In general, this work provides a useful empirical tool for the policy makers improve the responsibility and participation of local farmers in projects of this nature. However, more comprehensive studies are needed for the Portuguese case in order to find more consistent results.

REFERENCES

Ajzen I. (1991): The theory of planned behaviour. Organizational Behavior and Human Decision Processes, *50*: 179–211.

Ajzen I., Fishbein M. (1980): Understating attitudes and predicting social behaviour. Prentice-Hall, Inc., Englewood Cliffs.

Bagozzi R.P. (1981): Attitudes, intentions and behaviour: A test of some key hypothesis. Journal of Personality and Social Psychology, *41*: 607–627.

Beedell J., Rehman T. (2000): Using social-psychology models to understand farmers' conservation behaviour. Journal of Rural Studies, *16*: 117–127

Bergevoet R.H.M., Ondersteijn C.J.M., Saatkamp H.W., Van Woerkum C.M.J., Huirne R.B.M. (2004): Entrepreneurial behaviour of Dutch dairy farmers under a milk quota system: goals, objectives and attitudes. Agricultural Systems, *80*: 1–21.

Buchta S., Federičová Z., (2010): Diversification into non-agricultural activities under the conditions of Slovakia. Agricultural Economics – Czech, *56*: 284–291.

Caballero R. (2001): Typology of cereal-sheep farming systems in Castile-La Mancha (south-central Spain). Agricultural Systems, *68*: 215–232.

Casu S., Molle G., Decandia M., Ligios S., Carta A. (2006): Using cluster analysis to characterize the goat farming system in Sardinia. Livestock Science, *104*: 63–76.

Chen M.-q., Zhong T.-y, Zhou B.-j., Huang H.-s., He W.-j Chen M.-q., Zhong T.-y, Zhou B.-j., Huang H.-s., He W.-j. (2010): Empirical research on farm households' attitude and behaviour for cultivated land transferring and it's influencing factors in China. Agricultural Economics – Czech, *56*: 409–420.

European Commission (2003): CAP Reform, Council Regulation – establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers. Final text, 19 September, DS 303/1/03 REV 1.

Daskalopoulou I., Petrou A. (2002): Utilising a farm typology to identify potential adopters of alternative farming activities in Greek agriculture. Journal of Rural Studies, *18*: 95–103.

Dos-Santos M.J.P.L. (2008): Análise da competitividade do regadio de Alqueva: O caso do Perímetro de Rega do Monte Novo (Analysis of the competitiveness of irrigated Alqueva Project: The case study of the Large Irrigation Scheme of Monte Novo). Tese de doutoramento, Universidade de Évora, Évora.

Fragoso R.M., Marques C.F. (2003): Perspectives for the irrigated agriculture in Alentejo. New Medit – Mediterranean Journal of Economics, Agriculture and Environment, *2*: 21–26.

Fragoso R.M.S., Marques C.C.A. (2007): Competitividade do regadio em Portugal no contexto da nova Política Agrícola Comum: O caso de uma exploração agrícola no Alentejo (Competitiveness of irrigated land in Portugal under the new Common Agricultural Policy: The case study of a farm in the Alentejo). Revista de Economia e Sociologia Rural, *45*: 49–70.

Gómez-Limón J.A., Martínez Y. (2006): Multi-criteria modelling of irrigation water market at basin level: A Spanish case study. European Journal of Operational Research, *173*: 313–336.

Gómez-Limón J.A.R., Moyano E.E., Vera T.E., Garrido F.F.E. (2007): Actitudes y percepciones sociales sobre la multifuncionalidad agraria: el caso de Andalucía (Attitudes and social perceptions on multifunctional agriculture: the case study of Andalucía). Revista de Estudios Regionales, *80*: 345–356.

Gorton M., Douarin E., Davidova S., Latruffe L. (2008): Attitudes to agricultural policy and farming futures in the context of the 2003 CAP reform: A comparison of farmers in selected established and New Member States. Journal of Rural Studies, *24*: 322–336.

Hair J.F., Anderson R.E., Tatham R.L., Black W.C. (1998): Multivariate data analysis. 5th ed. Prentice Hall International, New Jersey.

Hair J.R., Black B., Babin B., Anderson R.E. (2005): Multivariate Data Analysis. 6th ed. Maxwell MacMillan Editions, New York.

Henriques P.D.S. (1997): Technical efficiency and changes in Alentejan farming systems. [PhD Thesis.] University of Reading, Reading.

Iraizoz B., Gorton M., Davidova S. (2007): Segmenting farms for analysing agricultural trajectories: a case study of the Navarra region in Spain. Agricultural Systems, *93*: 143–169.

Khalkheili T.A., Zamani G.H. (2009): Farmer participation in irrigation Management: The case of Doroodzan Dam Irrigation Network, Iran. Agricultural Water Management, *96*: 859–865.

Karami E. (2006): Appropriateness of farmers' adoption of irrigation methods: The application of the AHP model Department of Agricultural Extension, University, Shiraz, Iran. Agricultural Systems, *87*: 101–119.

Kim M.S., Hunter J.E. (1993): Attitude-behaviour relations: A meta-analysis of attitudinal relevance and topic. Journal of Communication, *43*: 101–142.

Kobrich C., Rehman T., Khan M. (2003): Typification of farming systems for constructing representative farm models: two illustrations of the application of multivariate analyses in Chile and Pakistan. Agricultural Systems, *76*: 141–157.

López-Baldovin M.J., Gutiérrez-Martin C., Berbel J. (2006): Multicriteria and multiperiod programming for scenario analysis in Guadalquivir river irrigated farming. Journal of the Operational Research Society, *57*: 499–509.

Maye D., Ilbery B., Watts D. (2009): Farm diversification, tenancy and CAP reform: Results from a survey of tenant farmers in England. Journal of Rural Studies, *25*: 333–342.

Midgley D.F., Dowling G.R. (1978): Innovativeness – concept and its measurement. Journal of Consumer Research, *4*: 229–242.

Rehman T., McKemey K., Yates C.M., Cooke R.J., Garforth C.J., Tranter R.B., Park J.R., Dorward P.T. (2007): Identifying and understanding factors influencing the uptake of new technologies on dairy farms in SW England using the theory of reasoned action. Agricultural Systems, *94*: 281–293

Rehman T., McKemey K., Garforth C., Huggins R., Yates C.M., Cook R.J., Tranter R.B., Park J.R., Dorward P.T. (2003): Theory of Reasoned Action and its integration with economic modelling in linking farmers' attitudes and adoption behaviour – an illustration from the analysis of the uptake of livestock technologies in the South West of England. In: Proceeding of the 14th International Farm Management Congress, Perth, Western Australia, August 10–15.

Silva E., Berbel J. (2007): An Azorean farms typology. New Medit – Mediterranean Journal of Economics, Agriculture and Environment, *6*: 51–54.

Solano C., León H., Pérez E., Herrero M. (2001): Characterising objectives profiles of Costa Rican dairy farmers. Agricultural Systems, *67*: 153–179.

Solano C., León H., Pérez E., Herrero M. (2003): The role of personal information sources on the decision-making process of Costa Rican dairy farmers. Agricultural Systems, *76*: 3–18.

Tranter R., Costa L., Knapp T., Little J., Sottomayor M. (2004): Asking farmers about their response to the proposed bond scheme. In: Tranter R.B., Swinbank A. (eds.): A Bond Scheme for Common Agricultural Policy Reform. CABI Publishing, Wallingford, pp. 127–148.

USDA (2004): Decoupled payments in a changing policy setting. Agricultural Economic Report No. 838, USDA, Washington D.C.

Verhees F.J.H.M., Meulenberg M.T.G., Penings J.M.E. (2005): The influence of market factors on intention to adopt a "radical" product innovation by farmers. In: American Agricultural Economics Meeting, Providence, Rhode Island, July 24–27.

Willock J., Deary I.J., Edwards-Jones G., Gibson G., McGregor M.J., Sutherland A., Dent J.B., Morgan O., Grieve R. (1999a): The role of attitudes and objectives in farmer decision making: Business and environmentally oriented behaviour in Scotland. Journal of Agricultural Economics, *50*: 286–303.

Willock J., Deary I., McGregor M., Sutherland A., Edward-Jones G., Morgan O., Dent B., Grieve R., Gibson G., Austin E. (1999b): Farmers' attitudes, objectives, behaviors, and personality traits: The Edinburgh study of decision making on farms. Journal of Vocational Behaviour, *54*: 5–36.

Zarafshani K., Alibaygi A.H., Nasrin Afshar (2008): The utility of discriminant analysis for predicting farmers' intentions to participate in farmer-managed irrigation systems in Iran. Journal of Applied Sciences, *8*: 697–701.

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