Technology and education in rural women entrepreneurship: approaches and problems in some case studies in Mali and in Italy

(Article begins on next page)

23 April 2024

Scientific Journal of Agricultural Economics

Volume 2

Issue 1

Scientific Journal of Agricultural Economics

Volume 2

Contents

Scientific Journal of Agricultural Economics

Dr Jose Roberto Parra

RBB Economics, UK

Dr Keith Walley

Harper Adams University, UK

Dr Nicola Randall

Harper Adams University, UK

Dr(c) Ouarda Dsouli

University of Northampton, UK

Dr Peter Tait

Lincoln University, NZ

Dr Priscila Hermida

Oxford University, UK

Dr(c) Treasa Kearney

Keele University, UK

Scientific Journal of Agricultural Economics

Welcome to the second volume of the *Scientific Journal of Agricultural Economics.*

In this volume we present three articles, by Angela Calvo, Silvana Paratori, and Omid Karami and Mina Mahmoudi, dealing with the subjects of technology and education in rural women entrepreneurship, farmers' willingness to produce healthy and safe food products, and trade-related adjustment costs in the agricultural sector in Iran.

Angela Calvo analyses the relevance of technological development and field training in the promotion of women entrepreneurship in rural areas. This analysis is based on two contrasting case studies corresponding to rural areas in Italy and Mali. In comparing these areas, Angela Calvo concludes that ownership, educational background and technology control have all a positive impact on the following: women' confidence; decision making; and the ability to develop businesses in their farm. This finding suggests that programs of local development would have the potential to promote women entrepreneurship in rural areas if they addressed the problems of ownership, educational training and technological control.

Silvana Paratori challenges the profit maximisation assumption adopted by some researchers to study the issue of healthy and safe products. Using the Theory of Planned Behaviour, the article proposes a novel behavioural model of farmers' decision making. This model is used as the basis for an empirical research developed with the objective of identifying non-economic drivers that may influence farmers' willingness to produce these products. The results strongly support the hypothesis that farmers' decision making is influenced by socio-psychological considerations. As a consequence of this finding, it is argued that analyses based on pure economic principles should be considered with caution.

Omid Karami and Mina Mahmoudi analyse the effects of trade liberalisation on tax revenue in Iran using the TRIST method. The results obtained from this method revealed that different forms of tariff can generate different levels of income even under similar degree of trade liberalisation and similar trade effects on farmers. This finding is used to argue that trade liberalisation can both generate income and favour social welfare when an appropriate tariff regime is adopted. This interesting result challenges the argument establishing that international trade causes income loss in the agricultural sector of developing countries.

We would like to thank all our contributors and hope that their articles will be of interest and practical benefit to our readers.

Dr Daniel E. May
Harper Adams University, Newport, Shropshire, TF10 8NB, United Kingdom.
Tel. +44 (0) 1952 815085
Email: dmay@harper-adams.ac.uk

Angela Calvo

Technology and education in rural women entrepreneurship: approaches and problems in some case studies in Mali and in Italy

Abstract

The promotion of women entrepreneurship in agriculture includes (other than economic assets and marketing strategies) technology, education and a reliable extension service, but few rural women are involved in the technological development and the excuse is often that women are not technology suited, especially where they have a lower education level. In this work the gender education and technology approach in two different areas of developed and developing countries (Italy and Mali) is analyzed, to understand how education and technology may have a positive impact on women's ability to widen businesses in the rural sector and which kind of barriers does exist that prevent them from benefiting from education and technology. It is found that both Italian and Malian rural women have a good approach toward the technology if it belongs to their background, if it has been analyzed in a participative way and if an educational background exists. The ownership and the technology control make rural women more confident and empower them especially at the level of the farm decision, improving their ability to develop businesses in their farm.

Author Contact Detail: DISAFA (Department of Agriculture, Forestry and Alimentary Sciences) and CIRSDe (Interdepartmental Centre of Women Studies), University of Turin, Italy
E-mail: angela.calvo@unito.it

1.   Introduction

The promotion of women entrepreneurship in agriculture includes (other than economic assets and marketing strategies) technology, education and a reliable extension service but, since a long time, prejudices weigh on rural women, especially concerning technology and technical training. The literature is very rich of field experiences and women know-how in food and natural resources processing (Ilkkaracan and Appleton, 1995; Tinker, 1981; Appleton, 1995) but, in despite of this, their expertise is often unrecognised and little

exploited, with an apparent invisibility of women's technical contribution. Many factors contribute to lower visibility of women's technical knowledge and to the lower profile of women overall as technology users and producers: the most important one is that much of rural women do is labelled as domestic, unpaid work, which does not contribute to the GNP (Gross National Product) increase. Other this, very few women are involved in extension services or in decision making, technical development or formal research.

A further factor that undermines women's technological capabilities is the assumption that technology is neutral. This assumption ignores the social and cultural priorities that shape the development of any technology, and overlooks the gender specific nature of food production, where women's needs are different from those of men. Where conscious attempts are made to access women to farm inputs, they are channelled through men: this fact technically helps men but increases women's labour; as Boserup observed (Boserup, 1970), the use of mechanical equipment is a status symbol reserved to men and when tools and other techniques are upgraded, female labour is systematically replaced by male labour.

Few rural women are involved in the technological development, both in developing and developed countries, and another pretext is often that women are not technology suited, especially where they have a lower education level. In many regions of the world women of rural areas have really less education and less access to the extension services, which increases the difficulty to gain access and to use the main resources (technology, land, credit): these factors also prevent women from adopting new technologies as readily as men do (Puhlmann, 2000). As a consequence, a greater part of the women engaged in farming works within a household production unit (not classifiable as an economically unit because it does not generate income), where field activities are not usually detachable from the household as a whole. On the other hand, worldwide rural women are a major part of the economically active farm labour force and nearby play a fundamental role in ensuring household food security managing complex households and pursuing multiple livelihood strategies. Whilst a wide range of agricultural tasks, they have all the housekeeping and family care responsibilities, but many of them do not have a formal employment status (Fieldsend, 2008).

In spite of their active presence, rural women have often to face gender oriented challenges, also if it has been demonstrated that increasing female participation in the rural labour force there is a positive impact on economic growth and on poverty alleviation (Klasen and Lamanna, 2009; FAO, 2011a; Hazel, 2010). Rather than age, level of education is emerging as an important factor determining the participation of rural women in the decision-making process (Rad *et al.,* 2012; FAO, 2011b). It is well known that education can increase rural women's access to economic opportunities and productivity and strengthen their voice and agency.

Aim of this work is to analyze these aspects (education and technology approach) in two different areas of a developed and a developing country, to understand how they may have a positive impact on women's ability to widen businesses in the rural sector and which kind of barriers does exist that prevent them to benefit from education and technology. In this paper different case studies are discussed. The first part of the work refers to a survey on agricultural machineries used by farmers (men and women) in a Region of Mali and to a little project of the University of Turin for the improvement of the shea butter production to strengthen women entrepreneurship in another Region of Mali. The second part reports the result of three surveys conducted in Piedmont (Italy), the first two concerning a gender analysis on agricultural mechanization and farm work organization, the last regarding the gender entrepreneurship in agrotourism farms.

2.   Materials and methodology

A frame of the rural women condition in Mali and in Italy, using especially the available statistical data, is previously outlined, with a specific widening in the analyzed Regions (Sikasso and Koulikoro in Mali, Piedmont in Italy). The surveys and the projects carried out in these specific Regions of the two Countries are therefore shortly described, considering the relation between the rural women entrepreneurship and the available technology, especially regarding the education level (which may influence the training for the technology utilisation).

2.1   The agricultural mechanization survey in the Sikasso Region and the project of the simplified press in the Koulikoro Region (Mali)

A first survey was conducted in the Region of Sikasso (in the south of Mali): the cultivation, the agricultural equipment and the different activities in the fields were investigated in four villages (Saniena, Finkolo, Daoulasso and Kebéni), where farmers work also for the CMDT (Compagnie Malienne du Textile). The CMDT helps farmers to buy tools and machineries (through a soft loan), but at the same time push them to cultivate cotton for the company. Group and individual questionnaires were submitted to 36 farmers and to their wives.

A project (partially funded by the decentralized cooperation office of the Piedmont Region) was then realized to promote women entrepreneurship for the shea butter production in the village of Kolokani, located in the Region of Koulikoro (in the centre of Mali). The shea butter production is just a women activity and women of the rural areas of the Sub-Saharan Regions widely use this product as traditional sauce, skin liniment or cosmetic. The shea nut tree grows wild in the savannah and women collect the nuts to transform in butter. The problem is the shea butter extraction: the process is long, complicated and tiring. Development projects were dedicated to solve this problem, but in many cases there are a lot of abandoned presses and mills for shea butter extraction in the villages (Sigliano, 2001). There are many reasons related to this fact (Hillebrand *et al.,* 1994): lack of training, few blacksmiths or local technician for repair and spare parts, shortage of recovery and of adequate places to use, equipment difficult to use (tiring, and/or difficult to accept from the local culture), lack of credit systems and of the knowledge to access to, none or scarce literacy.

In the shea butter project, realised by the Section of Mechanics of the Department of Agricultural, Forestry and Food Science and by the Interdepartmental Centre of Women's Studies of the University of Turin, some practical actions were carried out to face the previous problems:

- the introduction of handcarts and donkeys to transport the shea nuts from the bush to the production centre in the village
- the enhancement of women's empowerment by promoting a specific women association (AFK, Association Femmes du Karité) for shea butter production and commercialisation
- the design and the realization of a press to easier produce the shea butter using the participative method
- a micro credit action (to let the women the possibility to buy handcarts, donkeys and the press)
- a specific training (for the book-keeping of the micro credit, the shea butter selling and the press maintenance and rest).

The most substantial item of the budget was a specific training and demonstration (26% of the total budget, Figure 1), followed by a micro credit action. The first step of the project was the creation of the AFK association to involve interested women in the shea butter production (task already present among these women). Then, a simplified press was developed with the AFK members to let the women to use this tool. In a previous project a press was already purchased for another women association in the South of Mali, but the existing tool was too much complicated and difficult to use. The five disks press (very bulky and heavy) was abandoned in the bush after the project ended.
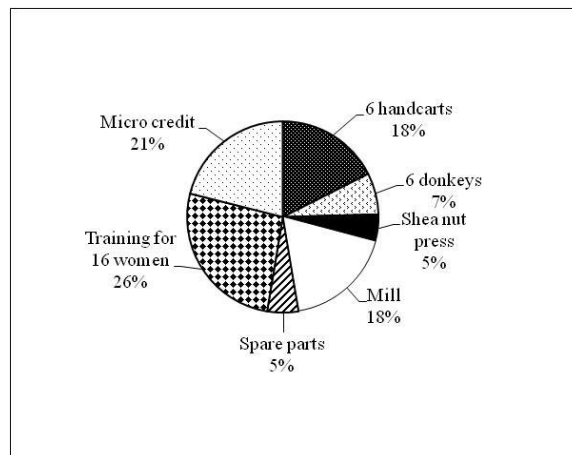
Figure 1 Budget distribution of the project to promote the improved shea butter production and commercialisation at Kolokani (Mali)

The simplified press for the AFK was built by a specialized blacksmith of Bamako (the main town of Mali). A female technician came in the village to explain how to use the press and how to perform its maintenance (Figure 2).

Figure 2 Female trainer for the correct use and maintenance of the press

Then, it was necessary to start with a finalised training project to help women to a minimum book-keeping and to the basic reading. For almost one month, in the winter period, when women are free from the fields works, started the women's training (titled: 'Start to write and read in the bambara language to use technical tools'): a man of the educational centre of Bamako (there were any women available to move from the city to the village) came to

Kolokani to help the women of the association to be more confident with the basic tools of the microcredit system, from the book-keeping to the management of the simplified shea nut press. The 16 participants were AFK members and they were chosen among the secretaries and the presidents of each village (normally these women have the highest education level): many of them cultivated millet, sorghum, peanuts and vegetables in the home gardens and some of them were involved in the little local commerce.

2.2   Three surveys in Piedmont Region (Italy)

The first survey (entitled "Agricultural mechanization and female work") conducted in the Piedmont Region in Italy concerned both men and women and was mainly focussed on mechanization aspects. The inquiry involved 124 women and 64 men of the Province of Cuneo and individual questionnaires were filled up. Besides the difficulties encountered during the machine utilization, the requirement of machines modification and the injuries and the professional diseases surveyed, the questionnaire considered also other aspects. Concerning the decisional aspects, the survey pointed out the different way, between men and women, to participate to the decisional activities about farm management or machinery purchase and utilization.

At the end of the survey, a question remained without answer: 'What is the perception of women in doing mechanized agricultural works? Do they feel leading parts in the accomplished tasks or they feel themselves as subjects without a real role?' This question came out during the discussion of the results, when inquired women declared to work more than they declared to do in the questionnaire. For this reason another survey followed ("Women and men: who works and who decides in the farms?") and it was submitted only to the women of the previous survey.

About new opportunities of work in rural areas for women, it came out strongly that the household activities were an important decision point to raise knowledge and personal qualities, as well as the environment care and the public relation capability, that are good elements for the farm success. In this framework agrotourism was the activity where women both recognised themselves and became the central point of the farm. In this context experiences, skill, and knowledge that belong to the women's history grow up easier and the household activities become income generating opportunities. Agrotourism means refreshment, meals, hospitality and also food transformation, quality product valorisation, agriculture with a low environmental impact, revaluation of typical crops and cultivars abandoned because not so productive in the gross market, maintenance of the river and of the agro-forestry system: in all these activities women's role is universally recognised.

The third survey: 'Technology, roles and women's expectations in agrotourism' was carried out to better understand this evolution and another questionnaire was submitted to 40 women holders of agrotourism farms in the Piedmont Region.

3.   Results and discussion

3.1   Mali

In Mali there is an over-representation of rural women in working-age population: while women are under-represented both in lower and higher age groups, they are over-represented in the central part of the age (20-45 years old) reaching a maximum ratio of women with respect to men at 130% for the 20-24 age group in rural areas (FAO, 2011c). Women's gross enrolment ratio for primary education is however lower than boys and lower than the Sub-Saharan region, also if it increased in the last 20 years (Figure 3).

Unfortunately, these are Country data, which do not represent the real situation in rural areas, where girls often do not attend the school, because forced to the rural workload. The lack of roads and of schools not close at home and a lower investment of parents on female education are further constraints to girls' education: the school abandonment must also be considered, as well as the fail to read and write application during the women's life. As a consequence, the percentage of illiterate women in rural areas of Mali and of Regions of Sikasso and Koulikoro (venues of the survey and of the project) are around the 80% (85% in rural Mali, 80% in rural Koulikoro and 85% in rural Sikasso; INSTAT, 2011).
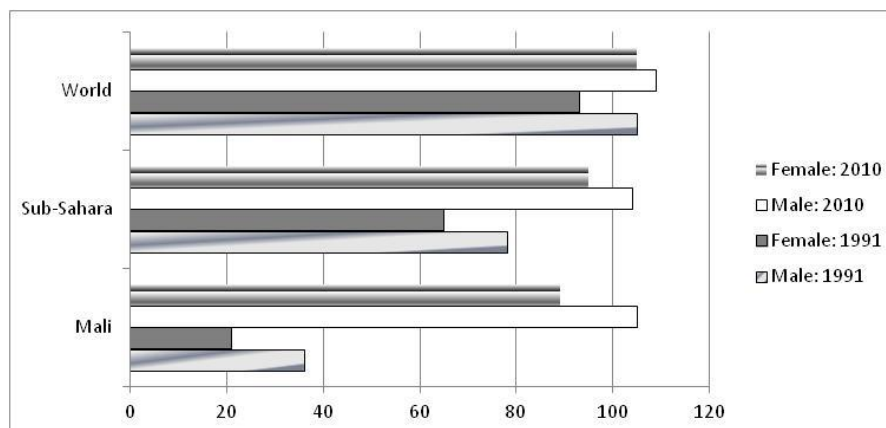
Figure 3 Gross enrolment ratio of women and men in 1991 and 2010 (the gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown). Source: FAO, 2011

Considering technology, in Mali, as in many other countries of the South of the world, the traditional gender connotation which refers to the hand tools (for example ploughs and cultivators are 'men's' while hoes, sickles and other harvesting tools are 'women's') disappeared (Sigliano, 2001). The workload has forced women to use all available implements and tools: however, there is still a tendency for women to use lighter hand equipment, as demonstrated by the survey carried out in the four villages of the Region of Sikasso.

In this Region ploughs, sowing machines, handcarts, back-pack spraying machines and hand held cultivators are produced locally and are mainly used by men. Women manually harvest cotton and cereals and sometime use a short handle hoe (called 'daba') to clear from weeds (Figure 4).

Figure 4 The short hand hoe (daba) used by women in the rural Region of Sikasso

Women have evolved a traditional production system based on rational and time tested options in the management of their limited resources. They resist adopting heavy and unpopular tools: thus, the new technologies must be based on a careful identification and understanding of women's needs and possibilities, as learned from this field experience. Each of the four villages has a motor mill managed by a specific group of literate women chosen among the GPF (Groupement de Promotion Féminin) members: they both have in charge the economic management of the mill and must provide the fuel supply and the repair and maintenance expenses. In two villages the mills are not fully operative owing to a bad management and in another case the account book is lost. Each village has a man miller who operates the mill and defines the technical interventions on it. In one case holdups were noticed because the miller has a low literacy level and he is not able to understand and to determine the correct maintenance interval. The price to grind one kilogram of cereals is around 3 eurocent (because the mill is not private but belongs to the women's association; if it were, the cost would be twice as expensive) and 300 euro/year are necessary to amortize the machine in about 10 years (the technical life of these mills), considering one engine replacement. Management problems may seriously compromise the correct machine work: it is not difficult to operate the mills, but it is necessary to know some technical parameters and to have a fair literacy level. In all the four villages only the miller attended the technical courses for the mill operation and any woman followed specific courses.

In these cases the extension service may fill these gaps, but in Mali, as in other Sub-Saharan countries, extension service agents tend to approach male farmers more often than female farmers because of the general misperception that women do not really farm works and men can teach what they learn to all other household members (Meinzen-Dick *et al.,* 2010): but what does it happen when a machine like a mill is only used by women? Also in this situation of an associative use and management of the mill, we have almost never found any written information about consumption, daily utilisation, detailed maintenance and repair costs: the

loss of accuracy to record these operations demonstrate how it is difficult to 'quantify' the work done and consequently to give a value (economic and social) to it.

In the observed situations, the technology is often considered as an efficient way to make the food transformation easier and to diminish the women labour: some of the women have also the consciousness that the technology may improve the food production with a consequent income activity, but they unlikely consider all the production variables (raw material, spare parts, fuel, working time) and they are not able to quantify them for the final product evaluation. As a consequence the technology becomes expensive to use and, if it is not abandoned in a courtyard, a skilled man intervention that privatise the machinery and become responsible is often necessary: beneficiary women must therefore pay more for the use of their machinery. In this way the technology, also if it is suitable, simple, not imported, locally made and requested by the inhabitants, fills itself of economic contents from which it becomes dependent.

The simplified press for the shea butter extraction, built with the women's contribution at Kolokani, in the Region of Koulikoro, would like different. It is a simple tool driven by a screw (Figure 5).

Figure 5 The shea nut simplified press

Two, maximum three, women are necessary to operate this press and each cycle (15 minutes long) produces about 2 kilos of shea butter. The efficiency of the tool is about 30% and the press needs a low maintenance (only clean the device after the use and periodically oil the gears), but during the training period of some women for the bookkeeping and the machine maintenance some problems come out. Fifteen trainees are married (7 co-wives) and 1 is a 63 years old widow; the average age is 33 years. About their original literacy level, 7 attended the primary school, 2 left the last year of the primary school 12 years before, while the 63 years aged attended the primary school 35 years before. Two women (41 and 55 years old) left the second year of the secondary school more than 15 years before and the remaining 2 women left the third year of the secondary school 10 years before. Regarding the literacy level, the 16 women could be considered at the first beginning of the reading, writing and calculating in bambara language. Although the 16 women attended the school in the past, 9 of them look illiterate.

The main objective of the course is the beginning of the equipment utilisation (hardware and documents management) using the initial level of bambara calculus and grammar, but it is necessary to come back at these points:

- how to hold a pencil;
- how to use a copy book;
- how to use a book;
- the bambara alphabet (27 letters);
- the knowledge of the principal calculus numbers (from 0 to 9) and signs;
- the reading-writing of the alphabet and of the signs.

Some exercises to check each of these levels produced the following results. About the dictation of a text after having shown it, almost all the women are able to reproduce it, while only 9 are able to write a text without seeing it before. About the signs, all the women, except the two eldest (with sight problems) are able to recognise them, but with common problem with the sign "/" and "\". Nine women have problems with the orientation of the writing system (from left to right and from top to bottom). At the end of the training period some results are reached in comparison to the initial situation, but the 16 women are still far from the bookkeeping ability and from the basis of a micro credit management and of the press maintenance.

A single action is not sufficient to reach the objective. It is necessary to continue with major efforts to establish a literacy system that must consider the target people (middle aged women, with a literacy level close to illiteracy and very tired by the country works and by the household tasks). For these reasons, it is possible to improve effective training projects only with continuous efforts to support women's strains in reading, writing and calculus, far from their daily routines. Some of the biggest problems in these kinds of projects are both the high price of training and the possibility to involve a local woman as trainer, as well as to motivate and disseminate the literacy 'part' of the project among more and more women in the villages. Another problem is the imbalance of investment in education in agriculture when compared to funds made available through the major donors loans for agricultural research and extension (research: 51.5%, extension: 46.25%, education: 2.25%, Lindley, 1999).

3.2   Italy

In Italy, differently from Europe, in these last years the agriculture scenario of the rural women is changed and the female share of economically active in agriculture is increased. While demographic ageing in rural areas is an important issue especially in the south of Europe, the masculinisation of the farms, especially due to the selective migration of young females, is a fact in the Eastern countries (SERA, 2006). In many rural areas of Europe females working in farms are not counted as labour force, and they have less paid employment opportunities compared with urban areas: this fact commonly discourages young women, who prefer to look for a visible employment out of the countryside. In Italy, on the contrary, the female agricultural holders lightly increased in the last 20 years, from 24% in

1990 to nearly 31% in 2010 (Figure 6) and in this year the female workforce in the farms is 40% (ISTAT, 2012).
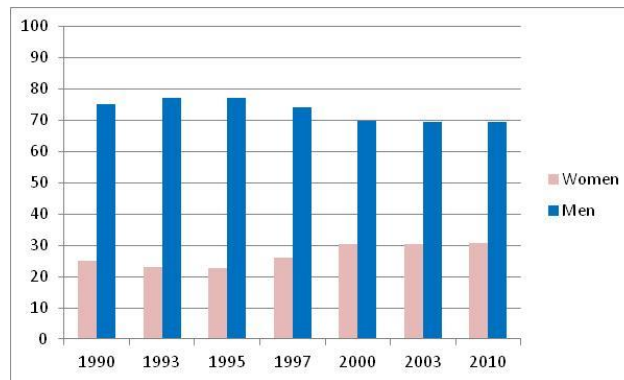
Figure 6 Percentage of women and men agricultural holders in the last 2 decades in Italy. Source: ISTAT, 2012

In the last 10 years in Italy the average surface of the farms managed by women increased from 4.2 to 6.3 hectares, but the graph of Figure 7 reveals that women holders are mostly present in farms with lower surfaces, from 0 to 5 ha: it is however important to notice their presence in greater farms, unusual fact twenty years ago (approximately 3000 women manage today farms with a surface greater than 100 hectares).
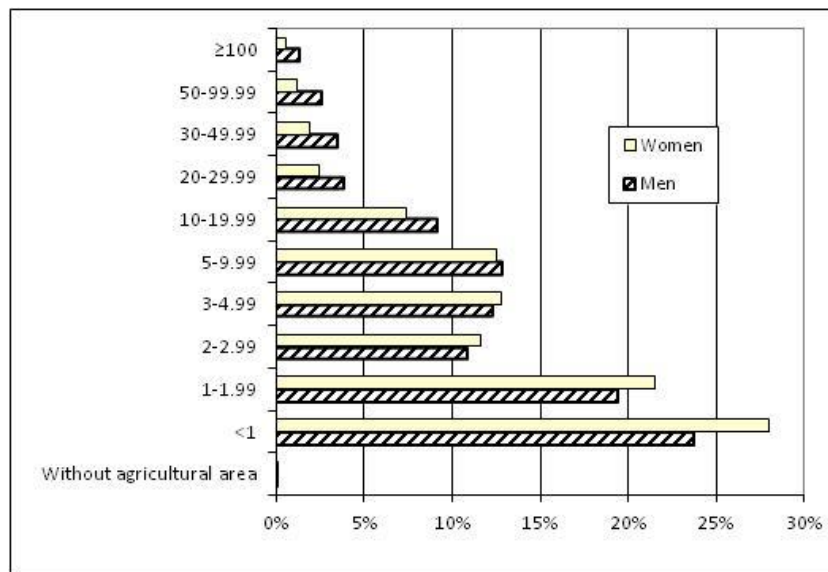
Figure 7 Distribution of men and women farm holders in Italy, divided by farm surface area (hectares) in 2012. Source: ISTAT, 2012

Italian rural women have furthermore an educational level higher than men, especially at primary and tertiary levels (Figure 8): they are less qualified than men in agricultural studies, but more than 16% has a certificate of diploma and 6% a university degree. On the other hand, only 20% has a professional training certificate. As in the past, management, machinery maintenance and mechanized fieldwork are typical male activities, while

accounting, milking, calf rearing and some manual seasonal labour like fruit picking and harvesting is classified as typical female (also if the percentage of immigrant workers for breeding and harvesting works is increased in these last years as reported by ISTAT, 2012).
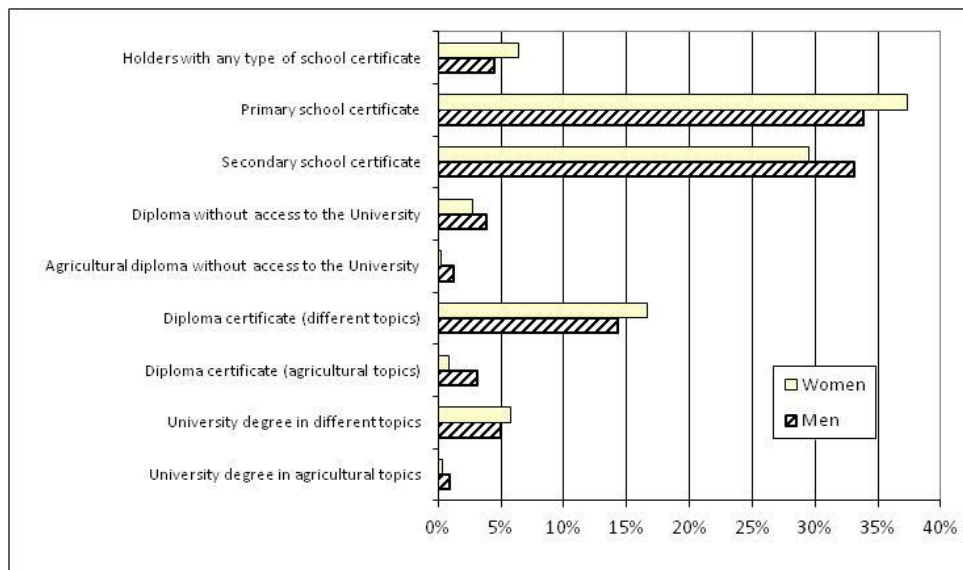
Figure 8 Education levels of rural women and men in Italy in 2010. Source: ISTAT, 2012

Biological (30%), agrotourism (33%, Adua, 2006) and multifunctional farms are the places where women holders are more present in Italy. A study conducted in the Tuscany region (Vazzana *et al.,* 2010) highlights women holders peculiarity in biological farms: an high level of biodiversity, a particular care of the cultivations choice, of the product transformation and of the social aspects (the biological farm considered as a community service: children and elder care, hippo therapy, recreational activities): nevertheless, also in this study is reported the only men's competence for the technology choice and utilization. Also in Piedmont the percentage of women working in agriculture is increasing: 36% of labour force and 28% of female farm holders (ISTAT, 2012).

Considering women's working days in the farms, they increased from 16% in the nineties until the 22% in 2010 (ISTAT, 2012), also if the presence of the woman is still central in the farm household and in the family care. This is however a constraint for an equal gender participation in extension and training activities, because women have also to face with lack of time, of transports and of services. In this situation is quite difficult to improve women's participation in the extension service activities if there is not a deep motivation that can be found in new chances to improve the life quality and to save labour.

The last is a very critical point because includes the development of technologies that in the last years had several negative effects, like technologies designed to improve crops productivity, with men perceived as the real users in the mind of both the designer and the farm women. In fact, after the first survey on agricultural machineries use in Piedmont Region, we came back to discuss the results with the interviewed women: in that

circumstance we discovered that they worked in the fields with the machinery more than they declared to do in the questionnaire and, at the question: 'Do you perform maintenance work at the agricultural machinery?' the answer 'no' was 92%. When this result was discussed, a lot of women said that they did that kind of work, but they were only an aid, because the real expert was the man. More than 65% of these women use the tractor quite often, only 23% never. Correlating the answers with the age of the surveyed women, it come out that elder women have more weight in the farm management; the younger, that met agriculture when technology began to be more present, participate more actively to the machinery purchase and have less problems to use them.

As observed also in Mali, for women the technology is an aid to save labour and time, while for the men it is a useful tool to substitute manpower. Considering the time spent in the daily works in the farm, field works are 20%, while the 16% of the day time concerns kitchen-garden activities, 13% the poultry and 12% the breeding works. Women's presence is a fixed point in the household as well as in the farm activity, as observed also in the second survey. At the question: "How much is the weight of the different subjects in each field of family and farm work, such as household works, children's' education, sick person cure, family-garden cure, poultry breeding, stable works, field works?" the data of Table 1 were obtained.

Table 1 Family and farm works: who does what (results of the second survey in Piedmont)

	Interviewed	Husband	Others
Household works	76%	9%	15%
Children education	57%	41%	2%
Sick person cure	73%	19%	8%
Family garden	58%	28%	14%
Poultry breeding	61%	22%	17%
Stable works	40%	42%	18%
Field works	40%	42%	18%

Table 1 shows how much women are present in all types of farm works: however, at the question: "How much is the weight of the different subjects in each field of decision?", we obtained different results (Table 2).

Table 2 Who decides about what? (results of the second survey in Piedmont)

	Interviewed	Husband	Others
Furniture purchase	52%	37%	11%
Electric appliances	59%	32%	9%
Car purchase	37%	46%	17%
Agr. mach. purchase	35%	47%	18%
Farm management	41%	44%	15%
Children education	54%	41%	5%

It is clear that women are more present in the purchase of furniture and electric household appliances, while they decide less about cars and agricultural farm tools purchase. Men and women weight is almost the same in the farm management and in children's education. The agricultural mechanisation has brought deep technological innovations in this Region (as in many farms of the developed countries); as a consequence labour has changed both the time and the resources utilisation, especially for women. From women's experience arises a different way of living and working in the farm, far from the male model. These specific characteristics are represented especially by the women's presence in agriculture: the necessity to adequate time and life sphere that in the rural environment can find a concrete answer, as pointed out in the third survey.

The results of the survey on agrotourim farms show that women and men use in a more well-balanced way the tools; for example, women are present for the 61% in the use of agrotouristic equipment, against the 32% of the husbands, the 5% of other men of the family and the 2% of external persons. The results of the interviews highlight that in the passage from the traditional farm to the agrotourism, in a situation where technological changes, activities and persons are more involved (agrotourism requires the existence of two enterprises), women participate both to the field works and to the activities connected to the agrotouristic sector: stable works (with the presence of smaller animals than in the traditional breeding) and transformations of the farm products (milk, vegetables, fruit, flowers). In order to understand which kind of women are involved in these farms, it is also interesting to explore the reasons that moved women to start this activity: to give new opportunities to the agricultural sector (15%), interest to the environment (14%), to remain in the country (13%), to evaluate the farm estate (12%), to gain more (12%), to know new people (8%), to face the economic difficulties (8%), to communicate with the world outside the rural world (7%), to give work opportunities to the sons and to the daughters (7%) and to start to live in the country (4%).

In this context it makes sense to promote finalised training courses and, in fact, a good experience in our region has been the organisation of some courses linked to this activity. For example, among 117 women selected, 75 ended the training courses and 53 accessed to special seminars of computer science, kitchen organisation, agrotourism farm management, public relations, environment evaluation.

4.   Conclusions

To promote women entrepreneurship in rural areas, appropriate technologies and suitable field training are necessary, but they must start from women strengths, not from their weaknesses. There are many related points among the women living and working in rural areas: for example the so called 'adapted technologies' are not gender sensitive nor in developed, neither in developing countries; women feel themselves as simple aid in the more sophisticated works where specialised equipments are used; rural women are not the target of the extension services; there is a lack of women in the extension service staff; women impact easier with new technologies if they are more involved in and when they feel themselves to manage the task. Both Italian and Malian rural women have a good approach toward the technology, whatever it is (agricultural machines or hand tools), if it belongs to their background, if it has been designed together and if an educational background exists. The ownership and the technology control make rural women more confident and empower them especially at the level of the farm decision making, improving their ability to develop businesses in their farm.

The technical knowledge seems to be related to the educational level, but it is not always true. Mali is among the five countries with the lowest education attainment index in the world (WEF, 2012), while in Italy the literacy rate is more than 99%. In Mali rural women are almost illiterate or with high literacy problems. In Italy 17% of rural women have a diploma (men: 14%) and nearly a 6% a university degree (men: 5%): nevertheless, only 20% of them attains a professional training certificate, to demonstrate a gender gap in the rural advisory services. Women learn differently from men (not in a biological but in a social sense), in reference to certain context, less abstractly, but rather concretely for specific situations. In this context to the advisory services is required to be sensitive to the relationships between the sexes and very participative, in the sense that women must be integrated from the very beginning, taking part in the planning, in the development phase and in putting the results into practice.

Advisory services have much to learn from rural women, although little has been done to investigate and build upon their knowledge and insights. Participatory methods of project planning and management can help to open a two-way communication between women farmers and extension staffs, so that more effective methods of cultivation and management of the environment can be developed and popularized. There are many situations where, also if training is provided to women, a high turnover of the teachers means that they have never received a gender training, which must be continuously refreshed and culturally sensitive,

also involving local women in the teachers' staff. This is more and more true for the rural women oriented advisory service, which must stimulate and encourage the women starting from their strengths, not from their weaknesses.

References

Appleton, H. (1995), *Do It Herself: Women and Technical Innovation*. Connecticut: Intermediate Technology Publications.

Adua, M. (2006), "L'agriturismo delle donne: dalla terra all'ospitalità", *Atti del Seminario: Donne della terra: i loro "numeri" per e nell'agricoltura*, ISTAT, Roma, 13 January.

Boserup, E. (1970), *Woman's Role in Economic Development*, London: Earthscan.

FAO, (2011a), Communicating Gender for Rural Development. Integrating gender in communication for development. Dimitra Project

FAO, (2011b), *The State of Food and Agriculture. Women in Agriculture. Closing the gender gap for development*, Rome: FAO.

FAO, (2011c), *The role of women in agriculture*, SOFA Team and Cheryl Doss (edited by), ESA Working Paper No. 11-02.

Fieldsend, A. (2008), "Out of the Shadows: Making Female Labour in Agriculture Visible", *Economics and Rural Development*, 4(2): 16-25.

Hazel, M. and Mc Ferson, A. (2010), "Poverty Among Women in Sub-Saharan Africa: A Review of Selected Issues", *Journal of International Women's Studies* 11(4):49-72.

Hillebrand, W., Messner, D. and Meyer-Stamer, J. (1994), "Strenghtening Technological Capability in Developing Countries: Lessons from German Technical Co-operation", *Working Paper n. 12, German Development Institute*.

INSTAT (INSTITUT NATIONAL DE LA STATISTIQUE), (2011), *4$^{\text{ème}}$ Recensement General de la Population tt de l'Habitat du Mali (RGPH)*, Bamako, Mali.

ISTAT (Istituto Italiano di Statistica), (2012), *Censagri. VI censimento dell'agricoltura 2010*. www.istat.it

Klasen, S. and Lamanna, F. (2009), "The impact of gender inequality in education and employment on economic growth: new evidence for a panel of countries", *Feminist Economics*, 15(3): 91–132.

Ilkkaracan, I. and Appleton, H. (1995), *Women's Roles in Technical Innovation*, London, Intermediate Technology Publication.

Lindley, W. (1999), "Constraints and potentials of training mid-career extension professionals in Africa", *International Workshop on Innovative Training Programmes for Mid-Career Agricultural Extension Field Staff in Sub-Saharan Africa*, Addis Ababa, Ethiopia, 6-8 July 1999.

Meinzen-Dick, R., Quisumbing, A., Behrman, J., Biermayr-Jenzano, P., Wilde, V., Noordeloos, M., Ragasa, C. and Beintema, N. (2010), "Engendering agricultural research", *IFPRI Discussion Paper No. 973*, Washington, DC: IFPRI.

Mehra, R. and Rojas, M.H. (2008), "A Significant Shift: Women, Food Security and Agriculture in a Global Marketplace", *International Center for Research on Women (ICWR),* Rome: FAO.

Puhlmann, A. (2000), *Summary Report of the Fourth International Conference: "Women in Rural Development. Knowledge, Education and Extension for Women in Rural Development"*, Humboldt-University, Berlin, 7-8 July.

Rad, S., Çelik Ates, H., Delioğlan, Ş., Polatöz, S. and Özçömlekçi G. (2012), "Participation of Rural Women in Sustainable Development. Demographical and Socio-Economic Determinants", *Sust. Dev.,* 20: 71–84.

SERA (Study on Employment in Rural Areas) (2006), *Final Deliverable. Edited by: Andrew Copus, Clare Hall, Andrew Barnes , Graham Dalton, Peter Cook, Peter Weingarten, Sabine Baum, Henriette Stange, Christian Lindner, Alexandra Hill, Gerd Eiden, Ronald McQuaid, Malcolm Grieg, Mats Johansson*

Sigliano, M. (2001), "Tecnologie appropriate e lavori delle donne in Mali", *Quaderni Donne&Ricerca*, Torino: CIRSDe.

Tinker, I. (1981), "New technologies for food related activities: an equity strategy. Women and technological change in developing countries", Washington DC: *American Association for the Advancement of Science*.

Vazzana, C., Moschini, V., Lazzerini, G. and Migliorini, P. (2010), "L'agricoltura biologica delle donne e la biodiversità in Toscana", *Atti del VI Convegno Nazionale dell'Associazione Donne e Scienza*, Torino, 1-3 July.

WEF (World Economic Forum) (2012), *The Global Gender Gap Report*, Hausmann R., Tyson L.D. and Zahidi S. eds., Cologny/Genev

Silvana Paratori

Identifying non-economic determinants of farmers' willingness to produce healthy and safe food products

Abstract

A theoretical academic work found that profit-maximising producers have strong incentives to falsely claim that their products are healthy and safe when the probability of not being discovered is high enough, and when consumers are willing to pay a premium for these goods. The aim of the current article is to show empirically that the assumption of profit-maximising is too strong to reflect the real decision making process of small farmers. For this purpose, a behavioural approach designed to determine whether farmers' willingness to produce healthy and safe food products depend on non-economic drivers (e.g. social or psychological drivers) was adopted. Our findings suggest that conclusions obtained from theoretical works that assume profit-maximising behaviour should be considered with caution.

Author Contact Details: Postgraduate Student, School of Psychology, University of Keele, United Kingdom.
E-mail: v6o94@students.keele.ac.uk

1. Introduction

According to McCluskey (2000), consumers have increased their demand for healthy and safe food which in turn has led to an increased offer of 'quality-differentiated products' (p.1) by the food industry. These 'quality-differentiated products' (Q-DP) include food that has nutritional and/or safety characteristics as well as food that were produced with environmental or animal welfare practices, among others. In addition, the positive effects of Q-DP on the population has led to a number of recommendations to establish regulations to ensure the adoption of beneficial practices in rural and even in urban areas (Brown and Jameton, 2000; and Bast, *et al*., 2002).

A main concern regarding the production of healthy and safe agricultural products is that governments' regulations are not well defined (McCluskey, 2000).This would make it difficult to monitor the productive process of these goods. As a consequence, there is a problem of asymmetric information between producers and consumers: while producers

know whether or not they have used appropriate methods to guarantee food quality, consumers can only trust the producers' claims that their products are quality-differentiated. In this paradigm, McCluskey (2000), argues that profit-maximising farmers have strong incentives to falsely claim that their products are quality-differentiated when the probability of not being discovered is high enough and when consumers are willing to pay a premium for these goods.

The conclusions of McCluskey (2000) were obtained from a theoretical analysis based on a game theory modelling approach. However, empirical works developed in other contexts have revealed that farmers' strategic behaviour can be influenced by non-economic drivers that include social-psychological variables (Carr and Tait, 1991; Beedell and Rehman, 1996; Austin *et al*., 1998a; Austin *et al*., 1998b; Burton, 2004; Edwards-Jones, 2006; Zubair and Garforth, 2006; May *et al*., 2011; and May, 2012). The results obtained by these studies suggest therefore that farmers are not necessarily profit-maximisers. If this is also true for the case of Q-DP, then regulations designed to encourage farmers to produce these goods might fail if they are based purely on the assumption of profit-maximising behaviour. In other words, there may be social-psychological considerations (e.g. family tradition) that prevent farmers from producing healthy and safe food products instead of the problem of asymmetric information identified by McCluskey (2000).

The objective of this article is to prove empirically that farmers' willingness to produce healthy and safe food products is influenced by non-economic drivers. That is, the aim is proving that farmers' incentives to produce these goods are not characterised by profit maximising behaviour. The reason for using farmers' willingness as a variable reflecting decision making is because the decision to produce healthy and safe food products is a form of 'behavioural innovativeness'(i.e. the individual's, teams' and managers' incentives to change or willingness to change) (Wang and Ahmed, 2004). Willingness to change, in turn, is influenced by socioeconomic and behavioural considerations (Morgan, 1986; and Metselaar, 1997). Consequently, behavioural drivers (i.e. socio-psychological variables) affecting farmers' willingness to produce healthy and safe products indirectly affect the decision of producing these goods which is materialised as a specific behaviour.

2. Behavioural Approach Adopted in the Current Investigation

In order to identify economic and social-psychological factors that might influence farmers' willingness to produce healthy and safe food products, a behavioural framework was designed. The proposed framework is based on the contributions of Bergevoet *et al*. (2004) and Willock *et al*. (1999). These researchers developed a model that integrates two different approaches with the objective to including a large range of valid variables that can explain farmers' decision making: (i) the multiple goals approach; and (ii) the theory of planned behaviour.

The multiple goals approach postulates that farmers do not only consider economic variables when making their optimal decisions, but also non-economic targets that can affect their behaviour. The pioneer researcher in this area was Gasson (1973) who showed that some of the variables considered by farmers when making their decisions constitute goals (i.e. ends or states related to what the individual desires to be or what they wish to accomplish) and values (i.e. any aspect of a situation, object or event that has a preferential implication of being good or bad, right or wrong). The author, based on her empirical findings, identified four types of value orientations. They were (1) *instrumental*, in which farmers view farming as a means of

obtaining income; (2) *social*, in which farmers farm for interpersonal reasons; (3) *expressive*, in which farming is considered as a means of self-expression; and (4) *intrinsic*, in which farmers value farming as an activity in its own right. The seminal work of Gasson has been adopted by other researchers who have found evidence supporting the hypothesis that non-economic goals and values also explain farmers' behaviour (Kliebenstein *et al*., 1980; and Smith and Capstick, 1976). It has also been found that the types of goals considered by farmers depend on specific characteristics such as age, educational level and size of the farm, among others (Solano, *et al*., 2001; and Gasson, 1973). Consequently, value orientation is a function of a range of demographic and other situational variables.

The theory of planned behaviour, on the other hand, was developed by Ajzen (1985, 1991) and establishes that intention is a good predictor of behaviour, and that intention is determined by attitudes, subjective norms and perceived behavioural control. Figure 1 shows a graphical representation of this theory.
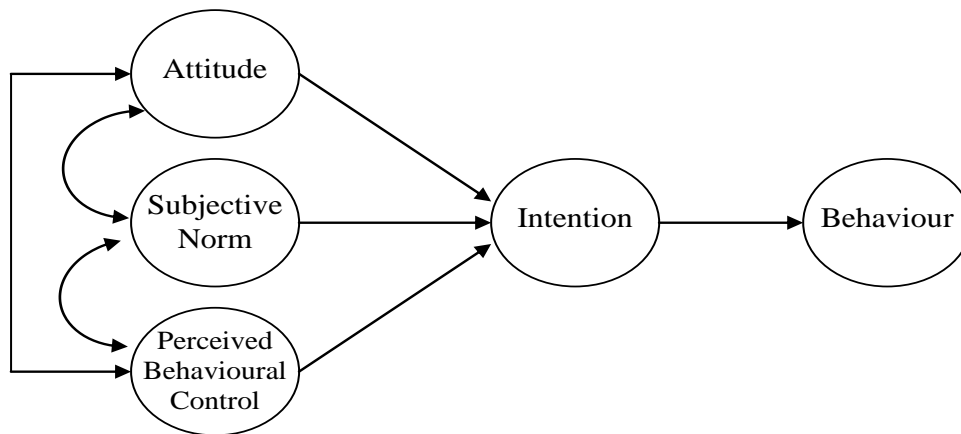

Figure 1 Theory of Planned Behaviour (Adapted from Burton, 2004)

Ajzen (1991) explains that each of the three components of this theory is associated with a specific belief. Attitudes towards different behaviours, in particular, are determined by behavioural beliefs. In relation to this point, Ajzen (1991) argued that individuals form beliefs about an object by associating it with certain attributes, with other objects, characteristics, or events, and each belief links the behaviour to a certain outcome, or to some other attribute such as the cost incurred by performing the behaviour. Because the attributes linked with behaviour are already valued positively or negatively, individuals automatically and simultaneously acquire an attitude toward the behaviour. Subjective norms, on the other hand, are assumed to be associated with normative beliefs. In relation to this point, Ajzen (1991) explained: "*Normative beliefs are concerned with the likelihood that important referent individuals or groups approve or disapprove of performing a given behaviour* (p. 195)". Finally, regarding the perceived control component of the theory of planned behaviour, it is assumed to be linked with control beliefs. In relation to this point, Ajzen (1991) explains that control beliefs are the beliefs that individuals have in terms of their resources and opportunities they possess, and the fewer number of obstacles or impediments they anticipate. If an individual believes that they have resources and the opportunity to succeed when performing a particular behaviour, then the greater should be their perceived control over the behaviour. The theory of planned behaviour assumes that the behavioural intention toward a

particular behaviour is the result of these three forces. That is, this theory argues that a person will have an intention (motivation) to behave in a particular way when they have an attitude toward this behaviour (positive attitude), when the people who are important to them think that they should perform this behaviour (positive subjective norms), and when the person has the conviction that they will successfully execute a behaviour leading to a particular outcome (positive behavioural control).

The original multivariate model of Bergevoet *et al.* (2004) was developed with the objective of determining whether the size of the farm of Dutch dairy farmers in terms of milk quota was determined by farmers' goals, farmers' attitudes toward farming, perceived control, and subjective norms. The present investigation extends this model to determine farmers' willingness to produce healthy and safe products. This model is shown in Figure 2.
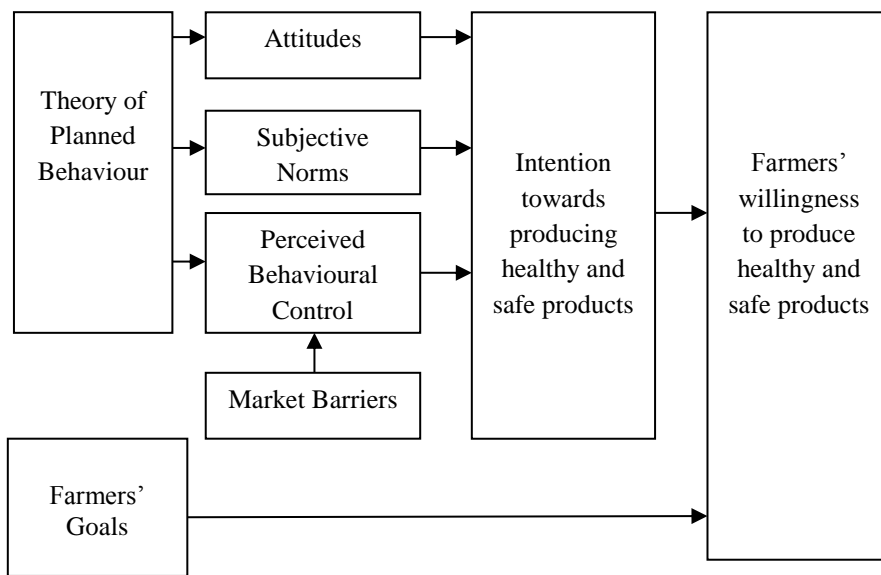
Figure 2 Behavioural model

3. Material and Methods

The methodology used in this research is closely related to that developed by Bergeovet *et al.* (2004). This methodology is explained as follows.

3.1 Questionnaire

A questionnaire was used to collect relevant data on: (*i*) farmers' willingness to produce healthy and safe products; (*ii*) different social and geographical variables; and (*iii*) statements on farmers' goals, attitudes towards farming, perceived behavioural control, subjective norms, and market barriers. A five-point Likert scale was used in these statements. In order to capture willingness to produce produce healthy and safe products, the farmers in the sample were asked to use a five-point Likert scale ((1) Strongly disagree; (2) Disagree; (3) Indifferent; (4) Agree; (5) Strongly Agree) to express their opinion with respect to the statement "I am willing to produce healthy and safe products".

3.2. Sample

The current research considered a sample of ex-sugar beet farmers of the West Midlands region of the UK. According to DEFRA statistics, the number of sugar beet growers in the West Midlands region in 2005 was 592. The sample of the ex-sugar beet farmers considered in the study consisted of 49 farmers which correspond to 8.3 per cent of this total, and this sample was visited in a period of six months.

3.3 Statistical analysis

The statistical analysis conducted in the current investigation was based on two steps. The first step involved a factor analysis with varimax orthogonal rotation employed with the objective of reducing the data concerning farmers' goals (Bergeovet *et al.*, 2004). Only Factors having an eigenvalue larger than one were considered (Bergeovet *et al.*, 2004, and Kobrich *et al.*, 2003). According to Stevens (1992), for a sample of 50 observations a loading of 0.722 is considered significant. In line with Stevens' recommendation, the present research considered a loading of 0.73 because the sample used in this study had 49 farmers. In order to carry out regression analysis, goals that resulted to be related were replaced by variables created from the factor scores (Bergeovet *et al.*, 2004). On the other hand, the second step of the statistical analysis involved stepwise linear regression analysis adopted with the purpose of identifying non-economic drivers that might influence farmers' willingness to produce healthy and safe food products. The econometric model is described as follows. Let G_i, A_j, P_k, and N_l be the Likert scale variables obtained from the statements on farmers' goals, farmers' attitudes toward farming, perceived control, and subjective norms, respectively. The regression model used to test these hypotheses was defined as:

$$WHS = \beta_0 + \sum_i \beta_i G_i + \sum_j \beta_j A_j + \sum_k \beta_k P_k + \sum_l \beta_l N_l \tag{1}$$

Where *WHS* is a Likert scale variable describing farmers' willingness to produce healthy and safe products.

4. Results

4.1. Results of Factor Analysis

The factor analysis identified six factors with eigenvalues greater than 1. The total variance explained by them was 71.92% which is considered satisfactory (Bergevoet *et al.*, 2004). The factors loadings for each of the six factors are presented in Table 1.

Table 1 Factorial analysis on farmers' goals

Goal statements	Average	Standard deviation	Factors					
			F1	F2	F3	F4	F5	F6
Maintaining the family tradition	3.26	0.99	**0.87**	0.23	-0.05	0.14	-0.05	0.02
Working with other members of the family	3.51	1.10	**0.87**	-0.10	0.08	-0.07	-0.03	0.02
Have independence and freedom from supervision	4.32	0.78	0.04	**0.91**	0.01	0.08	0.01	0.12
Have the control in a variety of situations	4.21	0.78	0.05	**0.79**	0.00	0.26	0.14	0.14
Enjoyment of work tasks	4.43	0.50	-0.05	-0.03	**0.79**	0.20	0.04	0.10
Enjoy my work	4.06	0.53	0.02	-0.01	**0.84**	-0.06	0.03	0.04
Achieve an income as high as possible	4.36	0.76	-0.05	0.02	-0.21	**0.80**	0.15	0.13
Have sufficient time for leisure	3.89	0.87	0.02	0.21	0.20	**0.75**	-0.21	0.00
Gaining recognition and prestige as a farmer	3.51	0.91	0.08	0.15	-0.11	-0.03	**0.87**	0.07
I enjoy having a purpose and value hard work	4.26	0.64	-0.03	0.32	0.04	0.00	0.20	**0.82**
Factor analysis results								
Initial eigenvalues			3.25	2.24	1.78	1.66	1.43	1.15
Rotation sums squared loadings			2.22	1.99	1.95	1.95	1.73	1.68
% of variance explained			13.86	12.42	12.18	12.16	10.82	10.48
Cumulative % of variance explained			13.86	26.28	38.46	50.62	61.44	71.92

The factors identified in the factorial analysis correspond to: (i) *Family farm* composed of the statements "Maintaining the family tradition" and "Working with other members of the family"; (ii) *Farm control* composed of the statements "Have independence and freedom from supervision" and "Have the control in a variety of situations"; (iii) *Farming as a way of life* composed of the statements "Enjoyment of work tasks" and "Enjoy my work"; (iv) *Quality of life and income* composed of the statements "Achieve an income as high as possible" and "Have sufficient time for leisure"; (v) *Status* composed of the statement "Gaining recognition and prestige as a farmer"; and (vi) *Self-realization* composed of the statement "I enjoy having a purpose and value hard work".

4.2. Results of the Regression Analysis

The results of the regression analysis are presented in Table 2.

Table 2 Results of the regression analysis.

Variables	Coefficient
Constant	5.43***(6.28)
Family farm	-0.15**(-2.33)
Status	0.32***(4.71)
Achieve low debts on my farm	-0.26***(-3.04)
Farming is still fun and satisfying	0.18**(2.40)
Before I take important decisions I thoroughly inform myself	-0.30**(-2.33)
Administrative duties consume a lot of time on my farm	0.50***(3.52)
Age	-0.02**(-2.51)
Agricultural training	-0.62***(-3.13)
R-squared 0.54	
Adjusted R-squared 0.45	
S.E. of regression 0.43	

*$P < 0.05$, **$P < 0.01$, *** $P < 0.001$, *t*–ratios in parenthesis.

According to this table, only non-economic variables were statistically significant in explaining farmers' willingness to produce healthy and safe products: the factor goals "Family farm" and "Status"; the attitudes "Achieve low debts on my farm" and "Farming is

still fun and satisfying"; the perceived behavioural controls "Before I take important decisions I thoroughly inform myself" and "Administrative duties consume a lot of time on my farm"; and the personal characteristics "Age" and "Agricultural training". The coefficient of determination was 54% which is considered acceptable given the fact that the research was based on cross-sectional data. This finding reveals therefore that farmers' involvedness in the production of health and safe products is not governed by the objective of maximising profits. In fact, the economic goal factor *Quality of life and income* was not statistically significant.

5. Discussion

A discussion on the significant variables identified in the regression analysis is provided as follows.

a) *Family farm*: The negative coefficient of this variable (-0.15) means that farmers who assigned higher value to this factor goal were less willing to produce healthy and safe products. A possible explanation to this result is that farmers who cared about family tradition had incentives to maintain their traditional productive systems. Consequently, they were less motivated to introduce innovative agricultural practices for the production of healthy and safe food goods.

b) *Status*: The positive coefficient of this variable (0.32) means that farmers who assigned higher value to this factor goal were more willing to produce healthy and safe products. This result suggests that the production of healthy and safe food goods can help farmers to gain prestige and recognition among their reference group. This proves that profit maximisation is not the only objective that farmers consider when making farming decisions.

c) *Achieve low debts on my farm*: The negative coefficient of this variable (-0.26) means that farmers who assigned higher value to this attitude were less willing to produce healthy and safe products. This result might indicate that the adoption of practices that allow farmers to produce healthy and safe food goods was perceived as a type of innovation that requires high levels of debts in order to be implemented (e.g. longer conversion periods) . As a result, farmers who cared about achieving low debts were less motivated to adopt these practices.

d) *Farming is still fun and satisfying*: The positive coefficient of this variable (0.18) means that farmers who assigned higher value to this attitude were more willing to produce healthy and safe products. This is an interesting result because it suggests that the decision to adopt practices that contribute with the production of healthy and safe food goods is positively influenced by farmers' satisfaction at work. This finding implies that enjoyment and satisfaction can be considered as key drivers for the adoption of these practices.

e) *Before I take important decisions I thoroughly inform myself*: The negative coefficient of this variable (-0.30) means that farmers who assigned higher value to this perceived behavioural control were less willing to produce healthy and safe products. This result might indicate that farmers who were more risk averse (i.e. farmers who need to inform themselves when making decisions) were less willing to produce healthy and safe products implying that the adoption of alternative practices were probably considered by these individuals as risky.

f) *Administrative duties consume a lot of time on my farm*: The positive coefficient of this variable (0.50) means that farmers who assigned higher value to this perceived behavioural control were more willing to produce healthy and safe products. This result suggests that

farmers who were working in time consuming activities were willing to adopt alternative practices because they probable were perceived as involving less administrative duties.

g) *Age*: The negative coefficient of this variable (-0.02) means that older farmers were less willing to produce healthy and safe products. This result is surprising because is not consistent with the results obtained by other researchers. For example, Ondersteijn *et al.* (2003) found that older farmers were more concerned about expressive goals (i.e. farming is seen as a means of self-expression) such as feed the world and care for a clean environment. Perhaps this contradictory result is associated with the factor goal "family farm" discussed above. That is, older farmers were probably more interested to maintain their traditional productive systems and to enjoy their current activities rather than adopting innovative practices considered as risky.

h) *Agricultural training*: The negative coefficient of this variable (-0.62) means that farmers who received agricultural training were less willing to produce healthy and safe products. A possible explanation to this result is that farmers who had formal agricultural training received training involving traditional productive techniques. Consequently, this knowledge prevented them to some extent from exploring less traditional practices (i.e. practices associated with the production of health and safe food goods) that escaped from their domain.

6. Conclusions

The aim of this article is to prove empirically that farmers' willingness to produce healthy and safe food products is not determined by profit-maximising considerations. The results revealed that willingness to produce these goods was positively affected by the following non-economic drivers: status within the rural community; satisfaction at work; and the level of administrative duties at work. In contrast, the variables that exercised a negative influence on farmers' willingness to produce health and safe food products were farming tradition; levels of debts, risk aversion; age, and the type of agricultural training that they received. This finding is used in this article to conclude that results obtained from theoretical academic works based purely on the assumption of profit-maximisation behaviour should be considered with caution.

References

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

Ajzen, I. (1985), "From intentions to actions: a theory of planned behavior," In J. Kuhl & J. Beckman (Eds.), *Action-control: from cognition to behaviour*, Heldelberg: Springer, pp. 11-39.

Austin, E.J., Willock, J, Deary, I.J., Gibson, G.J., Dent, J.B., Edwards-Jones, G., Morgan, O., Grieve, R., and Sutherland, A. (1998a), "Empirical models of farmer behaviour using psychological, social and economic variables. Part I: lineal modelling," *Agricultural Systems* 58(2), pp. 203-224.

Austin, E.J., Willock, J. Deary, I.J., Gibson, G.J., Dent, J.B., Edwards-Jones, G., Morgan, O., Grieve, R., and Sutherland, A. (1998b), "Empirical models of farmer

behaviour using psychological, social and economic variables. Part II: nonlinear and expert modelling," *Agricultural Systems* 58(2), pp. 203-224.

Bast, A., Chandler, R.F., Choy, P.C., Delmulle, L.M., Gruenwald, J., Bart, D., Halkes, A., Keller, K., Koeman, J.H., Peters, P., Przyrembel, H., de Ree, E.M., Renwick, A.G., and Vermeer, I.T.M. (2002), "Botanical health products, positioning and requeriments for effective and safe use," *Environmental Toxicology and Pharmacology* 12, pp. 195-211.

Beedell, J., and Rehman, T. (1996), "A meeting of minds for farmers and conservationists? some initial evidence on attitudes towards conservation from Bedfordshire," *Farm Management* 9(6), pp. 305-313.

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

Brown, K.H., and Jameton, A.L. (2000), "Public health implications of urban agriculture," *Journal of Public Health Policy* 21(1), pp. 20-39.

Burton, R.J. (2004), "Reconceptualising the behavioural approach in agricultural studies: a socio-psychological perspective," *Journal of Rural Studies* 20, pp. 359-371.

Carr, S., and Tait, J. (1991), "Differences in the attitudes of farmers and conservationist and their implications," *Journal of Environmental Management* 32, pp. 281-294.

Department for Environment Food and Rural Affairs (DEFRA). (2010), *Statistical database*
http://www.defra.gov.uk/evidence/statistics/foodfarm/landuselivestock/junesurvey/results.htm (accessed).

Dattalo, P. (2008), *Determining sample size: balancing power, precision and practicality*, New York , Oxford University Press.

Edwards-Jones, G. (2006), "Modelling farmer decision-making: concepts, progress and challenges," *Animal Science* 82, pp. 783-790.

Gasson, R. (1973), "Goals and values of farmers," *Journal of Agricultural Economics* 24, pp. 521-537.

Kliebenstein, J.B., Barrett, D.A., Hefferman, W.D., and Kirtley, C.L. (1980), "An analysis of farmers' perceptions of benefit received from farming," *North Central Journal of Agricultural Economics* 2(2), pp. 131-136.

Kobrich, C., Rehman, T., and 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, pp. 141-157.

May, D.E. (2012), *Do non-economic drivers explaining farmers' incentives to cooperate remain robust through policy and market changes?,* Second eRNAC (Electronic Research

Network for Agricultural Cooperatives) conference on Cooperative values in internationalized operations, Helsinki, Finland.

May, D.E., Tate, G.J., and L. Worrall. (2011), "Understanding innovation in a dynamic agricultural business environment: a multivariate approach," *International Journal of Agricultural Management* 1(1), pp. 7-15.

McCluskey, J.J. (2000), "A game theoretic approach to organic foods: an analysis of asymmetric information and policy," *Agricultural and Resource Economics Review* 29(1), pp. 1-9.

Metselaar, E.E. (1997), *Assessing the willingness to change: construction and validation of the* DINAMO. PhD Thesis, Vrije Universiteit.

Morgan, G. (1986), *Images of organisation*, Sage Publications, Inc.

Ondersteijn, C.J.M., Giesen, G.W.J., and Huirne, R.B.M. (2003), "Identification of farmer characteristics and farm strategies explaining changes in environmental management and environmental and economic performance of dairy farms," *Agricultural Systems* 78, pp. 31-55.

Rural Business Unit of the University of Cambridge and The Royal Agricultural College. (2004), *Economic, Social and Environmental Implications of EU Sugar Regime Reform*, Department of Land Economy, University of Cambridge.

Salganik, M.J., and Douglas, D.H. (2004), "Sampling and estimation in hidden populations using respondent-driven sampling," *Sociological Methodology* 34, pp. 193-239.

Smith, D., and Capstick, D.F. (1976), "Establishing priorities among multiple management goals," *Southern Journal of Agricultural Economics* 2, pp. 37-43.

Solano, C., Leon, H., Perez, E., and Herrero, M. (2001), "Characterising objective profiles of Costa Rican dairy farmers," *Agricultural Systems* 67, pp. 153-179.

Stevens, J.P. (1992), *Applied multivariate statistics for social science*, Second edition, Hillsdale, NJ, Erlabaum.

Wang, C.L., and Ahmed, P.K. (2004), "The development and validation of the organisational innovativeness construct using confirmatory factor analysis," *European Journal of Innovation Management* 7(4), pp. 303–313.

Willock, J., McGregor, M.M., Sutherland, A., Edwards-Jones, G., Morgan, O., Dent, B., Grieve, R., Gibson, G., and Austin, E. (1999), "Farmers' attitudes, objectives, behaviours, and personality traits: the Edinburgh study of decision making on farms," *Journal of Vocational Behaviour* 54, pp. 5-36.

Zubair, M., and Garforth,C. (2006), "Farm level tree planting in Pakistan: the role of farmers' perceptions and attitudes," *Agroforestry System* 66, pp. 217-229.

Omid Karami

Mina Mahmoudi

Estimating Trade-Related Adjustment Costs in the Agricultural Sector in Iran

Abstract

Tariff liberalization and its impact on tax revenue is an important consideration for developing countries, because they are increasingly facing the difficult task of implementing and harmonizing regional and international trade commitments. The tariff reform and its costs for Iranian government is one of the issues that are examined in this study. Another goal of this paper is, estimating the cost of trade liberalization. On this regard, imports value of agricultural sector in Iran in 2010 was analyzed according to two scenarios. For reforming nuisance tariff, a VAT policy is used in both scenarios. In this study, TRIST method is used. In the first scenario, imports' value decreased to a level equal to the second scenario and higher tariff revenue will be created. The results show that reducing the average tariff rate does not always result in the loss of tariff revenue. This paper is a witness that different forms of tariff can generate different amount of income when they have same level of liberalization and equal effect on producers. Therefore, using a good tariff regime can help a government to generate income when increases social welfare by liberalization.

1. Introduction

Measuring the benefits of trade reform has been a frustrating endeavor. Although the discussion of trade policy at times gives the impression that a liberal trade regime can do wonders for a country's economy, and most observers believe firmly that trade reform is beneficial, yet systematic attempts at quantification fail to single out trade policy as a major factor in economic growth. The channels through which trade liberalization could bring benefits are broadly these: improved resource allocation in line with social marginal costs and benefits; access to better technologies, inputs and intermediate goods; an economy better able to take advantage of economies of scale and scope; greater domestic competition; availability of favorable growth externalities, like the transfer of know-how; and a shakeup of industry

27

that may create a Schumpeterian environment especially conducive to growth (Dornbusch, 1992).

On the other hand, tax revenue and tax policy are used to obtain national objectives. Normally, governments use tax revenue to provide the goods and services required to enhance economic growth and development, correct market failures, redistribute income and wealth and maintain macroeconomic stability. The latter is particularly important in small open economies which are highly dependent on the world economy such as developing countries (IMF, 2009).

In developed countries, the personal income tax raises a large share of total tax revenue. In developing countries, however, it encounters serious difficulties as they are often characterized by large informal sectors. A large part of the labor force is employed in the agricultural sector or in small informal enterprises where incomes fluctuate and records are not accurately kept (Tanzi and Howell, 2001). The relative size of this informal sector is often three or four times larger in developing countries than in developed countries (Bird et al, 2008). Since ways of effectively taxing the informal transactions has not yet been found, the base for personal income tax is narrow in developing countries and levying high taxes on that base may enhance the existing distortions. The large informal sector, which also complicates the taxation on consumption, is one of the factors restricting the tax policy design of developing countries (Tanzi and Howell, 2001).

Liberalizing trade and reforming the domestic tax system in order to recover the resulting government revenue loss could be a growth-enhancing process if carried out successfully. Trade theory tells us that trade liberalization leads to increased GDP and trade flows, which raises welfare through increased consumption opportunities. If the tax system is efficient enough, tax revenue grows in the same proportion and captures the gains from trade in the state budget. Generally, developing countries are advised to substitute their import duties with indirect taxes. As the tariff elimination leads to lower import prices, provided that there is competition keeping the producer from maintaining a higher price level, a commodity tax can be added without making the consumer worse off (Baunsgaard and Michael, 2005). Moreover, overall domestic consumption is broader than imports, implying that a shift from trade taxes to consumption taxes on substantially all commodities broadens the tax base and enhances horizontal equity in the system.

The need of domestic tax reform in the context of trade liberalization is a result of tariff revenue being reduced. As tariffs are eliminated, revenue has to be collected from other sources. However, when tariffs are not eliminated but reduced, some of the resulting fiscal impact may be offset by an increase in imports (Hallaert, 2008). Even the revenue loss from an elimination of tariffs can be offset by the increase in imports when a VAT is levied on the import good and the increased import flow hence increases VAT revenue. This reasoning stems from the general assumption of trade liberalization leading to increased trade volumes. This assumption is in turn based on the assumption that tariff reductions lead to price reductions, boosting domestic demand for import goods. It should be noted that in order for this to be true, the import goods need to be somewhat price elastic. Moreover, one should keep in mind that lacking competition could hinder the tariff reductions from turning into price reductions; such market failure may allow companies to increase profits instead of lowering prices. In the cases where insufficient competition allows the import price reduction to accrue to the companies in the shape of profits, consumption is left unchanged and hence, so is VAT revenue. However, if the taxation is effective enough, the enterprises' increased

profits could contribute to an increase in revenue from the corporate income tax, reducing the revenue loss (Ferreira, et al, 2006).

In particular, tariff liberalization and its impact on tax revenue is an important consideration for developing countries, because they are increasingly facing the difficult task of implementing and harmonizing regional and international trade commitments. For many developing countries, tariffs and other import taxes provide significant sources of revenue. Having the capacity to equip policymakers with the means to project the adjustment impacts of trade reform is thus integral to developing effective trade reform strategies (Hamolton, 2010).

In Iran, as a developing country, because of government intervention in economic activities specifically in the field of trade policies, tariff as a trade instrument has not been applied correctly. Government usually uses non-tariff instruments for controlling imports and dealing with other countries has some rules which included in tariff applying too. Tariff regime in Iran is characterized by high average tariff (nominal and import-weighted tariff), an extremely high dispersion of tariff levels across tariff lines and a significant amount of tariff escalation (Chemingui and Dessus, 2008). Iranian economic history has been influenced by import substitution industrialization approach to develop and consequently agriculture sector, which a large part of the labor force is employed in, has been ignored compared to industry sector. Therefore, knowing the effects of trade adjustments in Iran is important especially in the large agricultural sector.

Many general equilibrium studies have assessed the economic impacts of tariff reform and domestic complementary policies in developing countries. In a static general equilibrium model for Syria, B. Lucke (2001) studies different scenarios of preferential trade liberalization with the EU, and focuses on the effects of tariff reform on government budget. The study finds that government revenue losses caused by reduction in the EU import duties are fairly large, but still manageable. Omar Feraboli (2003) in a study on the effects of Jordan Association Agreement with the EU on macroeconomic variables found that the impact of trade liberalization on welfare is positive under all scenarios and also trade liberalization reduces government revenue, due to foregone import duties. Nashashibi (2002) provided a detailed outlook of revenue performance in Southern Mediterranean Arab countries. He acknowledged that there is higher trade protection in these countries than in other regions and pointed to the expectation that trade liberalization would lead to further decreases in revenues. Tosun (2005) in a study on Middle East and North Africa countries indicated that none of the major tax revenue sources were significantly impacted by the increased trade openness in the post-1986 period. In this paper, evidence is provided to show that there was a statistically significant move to domestic taxes on goods and services in trade liberalizing non-OECD countries. While this finding is supported for non-OECD countries in general and for other non-OECD countries excluding the MENA countries, it failed to materialize for the MENA countries. This suggests that the composition of available tax instruments in the MENA countries did not change in favor of those taxes that are thought to be welfare improving compared with international trade taxes. This could pose several problems for the MENA countries, such as lower economic growth, lower revenue available for economic development and high unemployment due to lack of job opportunities.

In this paper, we want to assess the effects of trade liberalization and changes in tariff regime on the import of agricultural products in Iran and also its impact on tax revenue as a large part of government income.

2. Methodology

In this paper we used a methodology that Work Bank has published in 2009. The name of the methodology is Tariff Reform Impact Simulation Tool (TRIST). The trade model in TRIST is based on the standard Armington (1969) assumption of imperfect substitution between imports from different sources. The model does not allow for direct substitution between products. The trade response to a change in tariffs for a given product from a given exporter is calculated based on the resulting percentage change in the duty inclusive price. One of the advantages of TRIST is that it uses actual import transactions data at the tariff line level to project trade reform adjustment costs. As such, it distinguishes between collected tariff revenue (which is calculated based on applied tariffs) and statutory tariff revenue. This allows for projections to be made using data on actual revenue collected as opposed to using revenue data based on statutory rates which do not reflect the tariff exemptions that are applied.

Another feature of TRIST is that specific country groups can be developed to reflect relevant trading blocs and agreements. This enables tailored scenarios to be created for specific country groups while leaving trade with other partners unchanged. The trade model in TRIST is based on five core assumptions: First, the model is derived from standard consumer demand theory and utilizes elasticities to determine the magnitude of the demand response to the price changes that result from a tariff reform. Second, the calculations are based on the standard Armington (1969) assumption of imperfect substitution between imports from different trading partners since consumers distinguish products by the place of production. Third, the model does not allow for direct substitution between different products. Fourth, it is assumed that all changes in tariffs are fully passed on and that the world price remains unchanged. Fifth, the trade model in TRIST is a partial equilibrium model that treats demand for each product in isolation from the rest of the economy (Fernandez and Rodrik, 1997). TRIST is an Excel based tool that predicts the impact of tariff reform scenarios on the basis of a simple partial equilibrium model. It consists of two Excel files: the first is the Data Aggregation Tool which organizes and appropriately formats the data to be imported into the second, the Simulation Tool. It is assumed that all changes in tariffs are fully passed on and that the world price remains unchanged (infinite supply elasticity). The calculation of the price change depends on how a country applies its tariffs, excise and VAT. In most countries, tariffs are collected as a percentage of the C.I.F import value, excise taxes on the tariff inclusive C.I.F import value and VAT on the tariff and excise inclusive C.I.F import value. Thus, for a change in the tariff (with VAT and excise rates unchanged), the percentage change in the price of good i from exporter j is calculated as follows (subscript i is omitted on all arguments in the formula (Brenton et al, 2009):

$$\frac{\Delta p_j}{P_j^{old}} = \frac{[P_j^{new}/P_{wld}] - [P_j^{old}/P_{wld}]}{[P_j^{old}/P_{wld}]} = \frac{\left(1+t_j^{new}\right)(1+ext_j)(1+vat_j) - \left(1+t_j^{old}\right)(1+ext_j)(1+vat_j)}{\left(1+t_j^{old}\right)(1+ext_j)(1+vat_j)}$$

$$= \frac{t_j^{new} - t_j^{old}}{(1+t_j^{old})} \tag{1}$$

Where:
  -change in price of imports from country j
  -price of imports from j before tariff reform
  -price of imports from j after tariff reform
  -world market price
  -tariff rate applied to imports from country j before reform
  -tariff rate applied to imports from country j after reform
  -excise tax rate applied to imports from j
  -VAT rate applied to imports from j

The trade response for a particular product is modeled in three consecutive steps: (1) the substitution between different exporters following changes in relative prices of different suppliers due to preferential tariff or duty changes, (2) the substitution between imports and domestic output as the relative price of overall imports of the product changes relative to domestically produced goods, and (3) a demand effect whereby consumption of the product changes in response to a change in the overall price of the product[8]. In this survey only first effect is calculated and others are supposed fixed.

In the first stage we model the allocation of given expenditure on imports of a product across different country suppliers and how this allocation changes when tariffs and duties are amended (Brenton et al, 2009):

$$q_j^{ES} = \left[\frac{\Delta P_j}{P_j^{old}} * Y_j^{ES} + 1 \right] q_j^{old} * \frac{\Sigma_{j=1,\dots,n}(q_j^{old})}{\Sigma_{j=1,\dots,n}(\left[\frac{\Delta P_j}{P_j^{old}} * 1 \right] q_j^{old})} \quad (2)$$

Where:
  -imported quantity from j after exporter substitution step
  -imported quantity from j before reform
  -exporter substitution elasticity for imports from country j

3. Results and Discussion

Required data for this study includes: the import quantity of products from partners, C.I.F prices of import products, added value of products, substitution elasticity between domestic and import products and substitution elasticity between exporters. We have used imports and tariff statistics data of Iran for the year 2010. Elasticity of substitution between different exporters is supposed to be 1.5.

Two scenarios are assessing in this paper:
  1. Fixing tariff rates above 40% at 35%, fixing tariff rates above 20% and below or equal 40% at 30%, raising bands above 10% (5%) and below or equal 20% (10%) to 20% (10%), and fixing all nuisance tariffs at 5%.
  2. Eliminating tariff rates above 40%, fixing tariff rates above 20% and below or equal 40% at 35%, fixing bands above 10% (5%) and below or equal 20% (10%) to 20% (10%) and increases all nuisance tariffs to 5%.

Table1 Ranges of Tariffs in Two Scenarios

Existing tariff	First scenario	Second scenario
Above 40%	35%	0%
Between 20% & 40%	30%	35%
Between 10% & 20%	10%	20%
Between 5% & 10%	5%	10%
Below 5% (nuisance)	5%	5%

Unlike the papers done in this area, this paper doesn't suggest to eliminate nuisance tariff. We can use an added-value instead of them. Importing of agricultural products in Iran is based on "political considerations" not "economic considerations". So, in this survey another scenario for assessing the effects of a Preferential Trading Arrangements (PTA)is not studied. Now we want to see that between two scenarios which can change imports of agricultural products by the first effect in TRIST.

The value of agricultural import products and the trade partners are presented in table 2. UAE is the country that exports the most agricultural products to Iran. It is clear that these products have not produced in UAE and there is no statistics to understand what the origin countries of these products are. Customs in some countries separate goods that are imported for re-export from that are for domestic consumption. For example, Lim and Saborowski(2010) in a paper on estimating trade related adjustment costs in Syria used CPC code for separating these two kinds of goods, but Iran's customs does not separate these goods. HS code is used in Iran.

Table 2 Value of Agricultural Products Imports and the Share Of Trade Partners

Country	Export to Iran(1000 Billion Rials)	Share (%)
UAE	34.9	37
Swiss	11.9	13
Nederland	10.7	11
Brazil	6.1	6
Germany	4.9	5
Total	94.1	100

Table3 shows tariff income for different range of tariffs. The most income is generated from above 40% tariff rates. Nuisance tariffs are generated 19.8 percent of tariff incomes. This income doesn't cover its costs. So, one of the changes should be done in nuisance tariff, a change from which this income can be generated without any costs.

Table 3 Tariff Income in Different Ranges of Tariffs

Tariff ranges	Income (1000 billion Rials)	Share (%)
Above 40%	6.95	54.1
Between 20% & 40%	1.27	9.9
Between 10% & 20%	1.95	15.1
Between 5% & 10%	0.15	1.1
Below 5%(nuisance)	2.54	19.8
Total	12.86	100

Using TRIST method, changes in imports of agricultural products in different scenarios can be calculated as presented in table 4 and 5.

Table 4 Results of First Scenario in TRIST (values are in Billiards Rial)

Variables	Value
Import value (before)	94.1
Import value (after)	119
Changes	24.9
Tariff income (before)	12.9
Tariff income (after)	64.8
Changes	51.9
Average tariff (before)	24
Average tariff (after)	16
Changes	-8

Table 5 Results of Second Scenario in TRIST (values are in Billiards Rial)

Variables	Value
Import value (before)[*]	94.1
Import value (after)	119
Changes	24.9
Tariff income (before)	12.9
Tariff income (after)	0.2
Changes	-12.7
Average tariff (before)	24
Average tariff (after)	12
Changes	-12

As it can be seen in Table 4 and 5, values of agricultural product imports in both scenarios is equal and it is more than before. This shows that both scenarios have equal effects on producers and have lowered average tariff than before. So, both have a degree of liberalization. Also, the first scenario shows an increase in government income while the second one decreases it. This shows that different types of tariff are important for government income. Considering that both scenarios have equal import changes and the first one generates more income for government, the first scenario is better than the second one. Increase in government income when average of tariffs is decreased (according to the first scenario), is a surprising result. It is known that especially in developing countries openness has harmful results on economy and would decrease government income, but openness to international trade helps increasing tax incomes possibly by increasing employment, wage level, and corporate profits. It also has a contribution to the consumption tax possibly by spurring flows of goods within the country. In many studies, positive relationship between the degree of trade openness and trade tax means that openness possibly is a stimulus to higher volume of trade between countries and consequently increases trade tax receipts at the current level of the tariff rate. These are some of the papers that have obtained the same result: Brenton et.al (2007) used a partial equilibrium to estimate revenue impacts of tariff reform in COMESA. Their study seeks to contribute to discussions concerning the potential impacts on tax revenues resulting from a move to a customs union CU and the

implementation of an EPA. Results of this study showed that if all tariffs were to be removed on imports from EU, tariff revenue would be increased by 24.6% for Zambia and 26.2% for Malawi. Pupongsak (2009) investigated the trade and revenue impact of trade liberalization and argued that the effect of trade openness on both trade tax and domestic taxes emphasizes the fact that, for low and middle income countries, not only is their trade sector highly dependent on international sector, but also their entire economic structure will be affected if there is any change in countries' international trade system. Also a change which leads to an increase in trade volume will consequently benefit these countries' taxation. Thus, although overall results suggest that trade liberalization via increasing trade openness generally has a contribution to taxation in all countries; the degree of its benefit depends on the country's level of economic development and economic structure. In the lecture review, there are also some studies that have vice versa results. For example, Andriamananjara et.al (2009) assessed the economic impact of an EPA on Nigeria and showed that an EPA will decrease tariff and VAT revenue at least -13.5%. So, effect of liberalization differs from one country to another and also from one scenario to another. Decreasing in tariff amount can decreases government income in a country or increases that. Our results show that for Iranian economy, a decrease in tariff according to the first scenario can increase the government revenue, while by the second one it will decrease the government income.

4. Conclusion

Governments in developing countries usually believe that liberalization and decreasing tariffs amounts has a big cost. So, some studies are needed for estimating these costs. Word Bank suggested a method named TRIST for using different scenarios. The trade model in TRIST is based on the standard Armington (1969) assumption of imperfect substitution between imports from different sources. The trade response for a particular product is modeled in three consecutive steps in TRIST: (1) the substitution between different exporters, (2) the substitution between imports and domestic output, and (3) a demand effect whereby consumption of the product changes. In this study, trade related adjustment costs for Iran is estimated. From the three effects that are mentioned, only first one is estimated. Others are supposed fixed. Two scenarios were analyzed for changing tariff amounts. Two scenarios were assessed:

1. Fixing tariff rates above 40% at 35%, fixing tariff rates above 20% and below or equal 40% at 30%, raising bands above 10% (5%) and below or equal 20% (10%) to 20% (10%), and fixing all nuisance tariffs at 5%.
2. Eliminating tariff rates above 40%, fixing tariff rates above 20% and below or equal 40% at 35%, fixing bands above 10% (5%) and below or equal 20% (10%) to 20% (10%) and increases all nuisance tariffs to 5%.

Both of them had an equal tariff average.

After using TRIST, results showed that values of imports in both scenarios are equal and they are more than before. This shows that both scenarios have equal effect on producers. First scenario shows an increase in income of government when second one decreases it. So, different forms of tariff are important for generating income for the government. Both scenarios have an equal import changes and the first one generates more income for government, so the first one is better. Both scenarios have lowered average tariff than before. So, both of them have a degree of liberalization. This paper is a witness that different forms of tariff can generate different amount of income when they have same level of liberalization

and equal effect on producers. Therefore, using a good tariff regime can help a government to generate income when increases social welfare by liberalization. So, according to the results these suggestions are for the government:

1. All kind of liberalizations don't have a decreasing effect on government revenue. This effect should be estimated before implementing every policy.
2. Nuisance tariffs don't generate revenue for the government. A policy that eliminates them and uses VAT should be implemented.

As mentioned above, in this paper only one of the effects in TRIST model is estimated. It can be a weakness of this paper. So, estimating other two effects can be estimated by other researchers. It can be a good subject for other papers.

References

Abedini, J. and Péridy, N. J. (2008), "The Greater Arab Free Trade Area (GAFTA): An estimation of its trade effects," *Journal of Economic Integration* 23(4), pp. 848–872.

Andriamananjara.S, Brenton.p, von Uexküll.J.E, and Walkenhorst. p. (2009), *Assessing the Economic Impacts of an Economic Partnership Agreement on Nigeria*, The World Bank Africa Region Africa Technical Families.

Armington, P. S. (1969), "A theory of demand for products distinguished by place of production," *IMF Staff Papers*, 16(1), pp. 159–178.

Atici, C., and Kennedy, P. L. (2005), "Tradeoffs between income distribution and welfare: The case of Turkey's integration into the European Union," *Journal of Policy Modeling*, 27(5), pp. 553–563.

Baunsgaard, T. and Michael K. (2005), *Tax Revenue and (or?) Trade Liberalization*. IMF Working Paper.

Bevan, D. L. (1999), "Trade liberalization and the budget deficit," *Journal of Policy Modeling* 21(6), pp. 653–694.

Bird, Richard M. and Zolt, Eric M.(2008), *Technology and Taxation in Developing Countries: From Hand to Mouse*. Mimeo.

Brenton, P., Saborowski, C., Staritz, C., and von Uexkull, E. (2009), *Assessing the adjustment costs of trade policy reform using TRIST (Tariff Reform Impact Simulation Tool)*, World Bank Policy Research Paper 5045.Washington, DC: The World Bank.

Chemingui, M. A., and Dessus, S. C. (2008), "Assessing non-tariff barriers in Syria," *Journal of Policy Modeling*, 30(5), pp. 917–928.

Davidson, C., Matusz, S. J., and Nelson, D. R. (2007), "Can compensation save free trade?," *Journal of International Economics* 71(1), pp. 167–186.

Dornbusch, R., (1992), "The Case for Trade Liberalization in Developing Countries," *Journal of Economic Perspectives* 6(1), pp. 69-85.

Feizabadi.Y, (2007), *Political tariff protection in Iran's Agriculture Sector*, Paper prepared for presentation at the 106th seminar of the EAAE.

Fernández, R., and Rodrik, D. (1991), "Resistance to reform: Status quo bias in the presence of individual-specific uncertainty," *American Economic Review* 81(5), pp. 1146–1155.

Ferreira, A. Miranda, R., António C., Malta, J. C. (2006), *Estudo de Impacto de um Acorde de ParceriaEconómica*, SociedadeNacional de Empreendimentos, Portugal.

Gaitán, B., and Lucke. (2007), "The Barcelona initiative and the importance of NTBs: A dynamic CGE-analysis for Syria," *International Economics and Economic Policy* 4(1), pp. 33-59.

Grossman, G. M., and Helpman, E. (1994), "Protection for sale," *American Economic Review* 84(4), pp. 833–850.

Hallaert, J-J, (2008), *How does a domestic tax reform affect protection against imports? The case of the Republic of Madagascar*, IMF Working Paper.

Hamolton.A, (2010), *Discussing Existing TRIST Tools for Twelve Developing Countries: Bolivia, Burundi, Ethiopia, Jordan, Kenya, Madagascar, Malawi, Mozambique, Nigeria, Seychelles, Tanzania and Zambia*, World Bank Policy Research Paper 5045.Washington, DC: The World bank.

Hosoe, N. (2001), "A general equilibrium analysis of Jordan's trade liberalization," *Journal of Policy Modeling* 23(6), pp. 595–600.

Ianchovichina, E. (2004), "Trade policy analysis in the presence of duty drawbacks," *Journal of Policy Modeling* 26(3), pp. 353–371.

IMF (2009), *Cape Verde: Seventh Review Under the Policy Support Instrument, approved by SharminiCoorey and Aasim Husain*, IMF Country Report No. 09/328, Washington D.C.

Kouparitsas, M. A. (2001), "Should trade barriers be phased-out slowly? A case study of North America," *Journal of Policy Modeling* 23(8), pp. 875–900.

Lim.J.J and Saborowski.C, (2010), "Estimates of trade-related adjustment costs in Syria," *Journal of Policy Modeling* 32, pp. 843–864.

Lloyd, P. J. and Zhang, X.-G. (2006), *Thearmington model*. StaffWorking Paper 31921. Melbourne, Australia: Australian Productivity Commission.

Lucke, B. (2001), *Fiscal impact of trade liberalization: The case of Syria*, Proceedings of the 75th International Conference on Policy Modeling Brussels, Belgium.

Mayer, W. (1984), "Endogenous tariff formation," *American Economic Review* 74(5), pp. 970-985.

Mitra, P. (1992), "The coordinated reform of tariffs and indirect taxes," *World Bank Research Observer* 7(2), pp. 195–218.

Romagnoli, A., and Mengoni, L. (2009), "The challenge of economic integration in the MENA region: From GAFTA and EU-MFTA to small scale Arab unions," *Economic Change and Restructuring* 42(1–2), pp. 69–83.

Pupongsak, S. (2009), *The effect of trade liberalization on taxation and government revenue*, A thesis submitted to the University of Birmingham, Department of Economics.

Tanzi, V., and Howell Z., (2001), *Tax Policy for Developing Countries*, IMF, Washington D.C., 2001. Preface available at: http://www.imf.org/external/pubs/ft/issues/issues27/index.htm