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PH.D. THESIS

-SUMMARY-

**AGRICULTURAL INSURANCE SCHEMES:
BETWEEN TRADITIONAL APPROACHES AND MODERN ALTERNATIVES**

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KEYWORDS

Agricultural insurance, index based insurance, Common Agricultural Policy, risk management, agriculture, expert systems.

INTRODUCTION

In the present paper we study the ways in which agricultural insurance is a viable alternative to farmers needs imposed by weather conditions and climate change, whereas for the development of the agricultural sector insurances are meant to support farmers as a sustainable solution to the risks they face due to unpredictable and uncontrollable weather conditions.

As a result of the integration in the European Union, Romanian agriculture must respect the requirements of the Community acquis, facing the common agricultural policy instruments. In this way it determines the necessity for harmonization of practices in this area, which means compatibility with European structures and performance achievements that allows it to maintain on the common market.

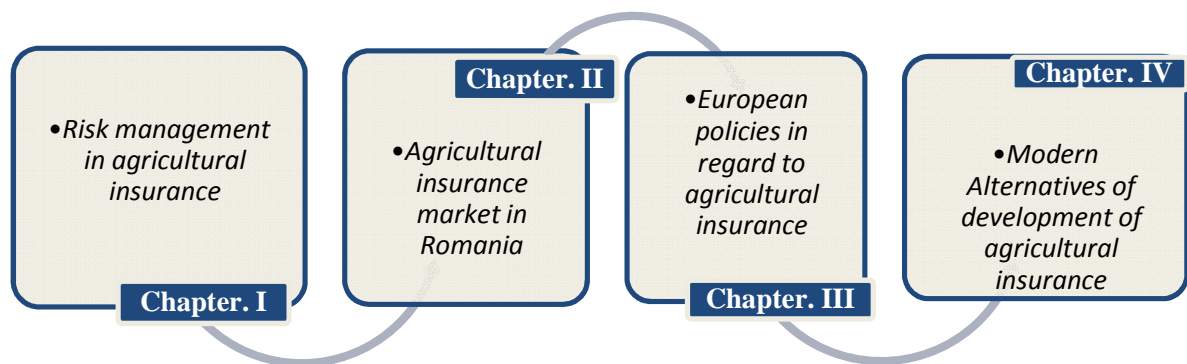
Many problems facing agriculture as a result of specific risks worsening of the land exploitation activity and livestock, of the current economic and financial context, of the alignment to the Common Agricultural Policy standards, by inclusion in a highly dynamics competitive market, led us to choose as research domain an area as vast as the agricultural insurance. Multidisciplinarity of this area is a challenge that requires a lot of research and dedication in order to achieve the objectives of fathoming the theme of agricultural insurance.

In this sense, we present a study on agricultural insurance, focusing on those in Romania, which both identify impediments that hamper the development of the insurance segment and its improvement solutions through the implementation and use of the expert systems and index based insurance. These are meant to aid the traditional agricultural insurance in order to create an agricultural insurance system customized to the needs and particularities of each farmer individually. Therefore, the purpose of agricultural insurance system proposed is to create complex and competitive insurance products to provide farmers and livestock farmers the market offer insurance that suits them best.

Therefore, **the main objective of the present research** is to investigate the agricultural insurance market in Romania, because this area is an important direction for economic development, especially due to the very high growth potential among EU countries. Although our country has great agricultural primary resources, due to both climatic conditions and arable land well above the European average, agriculture remains one of the most disadvantaged areas. We intend to identify and highlight existing deficiencies of agricultural insurance system, to propose solutions in order to solve them and to improve insurance products in Romania.

In order to achieve the above objectives, we organize the present paper entitled "*Agricultural Insurance Schemes: Between Traditional Approaches and Modern Alternatives*" in four chapters, presenting a developed analysis of the agricultural insurance market in a clear approach, having a logical sequence and aspect of continuity. Figure 1 highlights the scheme of the present Ph.D. thesis in order to have an overview of its content and structure.

Figure 1: Ph.D. Thesis Structure



Source: author own results

The agriculture of a country may be jeopardized by bad weather that can not be controlled only to a limited extent and can have major effects on production achieved.

Chapter I, entitled "*Risk management in agricultural insurance*", identifies specific jeopardies of the agricultural sector, emphasizing both risks present in local agriculture and in the European Union. Farmers are subject to a number of risks and

constraints that impede their socioeconomic development. The weather risk, in particular, is ubiquitous in agriculture. Climate change in recent years creates concerns about the exposure of farm/livestock, which are vulnerable to the impacts of extreme weather events whose frequency, intensity and complexity have increased causing considerable damage. Due to the current economic context which must face globalization and the economic financial crisis and volatility in market growth and sociopolitical environment, we take notice on one hand to the need of finding solutions of handling appropriate agricultural risks, both from the point of view of the interests of the public and private sectors, and, on the other hand, to the adoption of a risk management system in agricultural insurance through a series of activities rigorously organized and established, which, based on existing conditions and holding objectives, analyze the risk factors to which farmers are exposed in the work they perform in order to prevent or limit damage by the use of agricultural insurance system devices.

In Chapter II, entitled "*Agricultural insurance market in Romania*", we begin from the premise that agricultural insurance is a necessity and not an overhead, arguing its importance to achieve a modern agriculture, especially in the current structural and organizational changes. The present research points out the agricultural insurance evolution, from the first insurance archaic forms that were based on self-help mechanisms in village communities until our times, while pursuing legislation that governed the agricultural insurance industry. Rigorous foundation of some strictly parameter that must be followed in case of agricultural insurance is of primary importance. Therefore, it is analyzed the level of gross written premiums, gross indemnities paid, loss ratio and the competition on the insurance market. Due to the poor results recorded by agricultural insurance market, we identify obstacles that hamper the development of this sector, making a series of recommendations on how to develop agricultural insurance market.

Chapter III, entitled "*European policies in regard to agricultural insurance*", seeks legislative levers available to EU in order to manage risks and crisis in agriculture as climate change are one of the major challenges facing the world. Also, Romania's integration in the European Union puts the Romanian agriculture in the face of great challenges, i.e. alignment to the Common Agricultural Policy standards and the inclusion into a competitive market which is highly dynamics. Therefore, we present a brief

overview of the Common Agricultural Policy in order to identify agricultural insurance development tools, emphasizing at the same time, from a critical point of view, how to implement it in Romania. In a comparative manner, we analyze market conditions and characteristics of agricultural insurance in the European Union, pointing out the insurance system implemented by Spain, Austria and Italy (countries which have the most developed agricultural insurance markets in the EU) as models for Romania to improve structure of agricultural insurance and rural economic recovery.

In Chapter IV, entitled "*Modern Alternatives of development of agricultural insurance*", we propose two innovative solutions for development of agricultural insurance by expert systems implementation and index based insurance implementation, arguing their importance and necessity. For the development of agriculture and agricultural insurance, new tools are added to the current ones by using attractive features, namely eliminates many of the problems that exist for traditional agricultural insurances (for example, moral hazard, adverse selection, high transaction costs) making them more viable. Thus, they are useful tools in addition to those that the Romanian government has at its disposal to manage agricultural risks better and more efficiently. Therefore, we opt for an overview of expert systems because the solution could come from artificial intelligence. This is because, through the implementation of expert systems in agricultural insurances, we would promote the actual insurance products, farmers finding alternatives depending on their needs and possibilities. As a result of the responses received from farmers, systems can always be improved by a clear exposing of the acquirements, so that the processing of the results to be more relevant and farmers can decide which suits them best at the time. Another modern proposal to develop agricultural insurance is the implementation of index based insurance, which are different from other types of insurances because the benefits are not calculated from the individual farmer's loss but with an index that is independent of the farm. For that, we do a case study that follows the efficiency of index based insurance implementation in South Romania for wheat.

The present paper is intended to be a radiography of the Romanian agricultural insurance market which highlights the importance of insurances in order to achieve sustainable agriculture and the difficulty of selling their product in the current conditions

of market economy, proposing some solutions on how to promote and develop agricultural insurance.

The present research concludes with the presentation of final conclusions resulting from investigations that were done, while emphasizing the limits of survey research and future research perspectives of a niche segment of the Romanian insurance market - agricultural insurance.

Research Motivation and Importance. Selection of area of interest and establishment of the research phases can be justified by the fact that the area of agricultural insurance documentation is complex, interesting and also very necessary in order to achieve a competitive agriculture which, although in recent years experienced an awareness of its need, its not achieved at its rightful importance. Under the circumstances of a free economy, undirected, any personal investment is under risk and uncertainty, especially in agriculture where due to the specific problems of the production process - the length of the production cycle, the slow rotation of capital, much lower rate of return compared to other economic sectors - requires a true investment protection. These characteristics of agricultural production are reasons for the development of agricultural insurance system and are meant to help farmers to resumes paused.

Our research highlights that entrepreneurial activity in agriculture insurance market has a long way to go before it becomes powerful and profitable. For Romania, agricultural development is essential, and in the context of climate change and their effects on agriculture, the approach of this economic environment must be changed. Therefore, insurance it is a key tool, on one hand, for the development and support of agriculture and, on the other hand, to protect agricultural producers and farmers. New risks in the agricultural sector and the creation of market infrastructure have radically changed the process of creating a national insurance market (its contents, its methods and forms of insurance services proposed to individuals and businesses).

Scientific and practical importance, the insufficient degree of research related to these national insurance system issues in the agricultural sector, have led us to choose for research this theme.

Literature review and the study of the situation in the insurance system practiced in Romania showed that, simultaneously with climate change, with thoroughness of the

reform process on agriculture and with the entry of the private owner, the problem of agricultural production to managing risks is even more acute. All these are significant obstacles to the development of agriculture and, hence, of the agricultural insurance market. Under present conditions, these circumstances confirm the necessity of solving the problems facing agriculture insurance system in Romania and the topicality of this research topic.

Research methodology is one of the vital keys to any study. Kothari (2004: 1.2) believes that research is an original contribution to the existing literature that contribute to its development. Therefore, the research methods are chosen according to the topics studied in an attempt to describe, explain and interpret events from the author's perspective.

The first step in the process of scientific research is to select the area of interest. Due to the complexity of the topic chosen, the study of agricultural insurance requires an interdisciplinary approach. This frames in several scientific fields: economics, finance, management, European policy and commercial law. Being framed mainly in the sphere of finance, the present research intercepts aspects of management (Chapter 1), commercial law (Chapter 2), economic sector (Chapter 1 and Chapter 2) and European policies (Chapter 3).

Next phase of the present research involves identifying the prevalent current research, which is one positively (characterized by a detached approach of research which examines the facts and causes that generated the current agricultural insurance market in Romania, but also contains interpretative approach by continuing concern of understanding and identifying current issues facing the agricultural sector in order to test the proposed development of agricultural insurance solutions), but not without critical aspects (referring to unexploited agricultural potential).

In order to achieve our objectives, the research undertaken focuses mainly on a deductive approach, from the general to the particular information, particularly in the qualitative research; however, using the inductive approach, from the particular to the general, and based on the results of quantitative and qualitative studies, we formulated general conclusions.

Also, one of the most important tasks in undertaking a research is the study of existing literature to assimilate the information already known and to find out the latest details of the field. Choosing journals included into analysis is essential in any research (Russell & Gurupdesh, 2010) because the impact and quality of research undertaken depends on the selection of journals and on their importance. In this context, in order to enroll the most representative journals into research, based on the rankings already done, we have documented about how to classify the journals and about the importance of the journals (Chang & Oxley, 2009: 326-361), (ISI 2011), (Chang & McAleer, 2011), (Anne Wil, 2013).

In order to attain an ample research of the literature dealing agricultural insurance area, without claiming to provide an exhaustive study, during our scientific research we used a series of collected citations (from articles published in international journals (ISI , B +), from specialized books related to agricultural sciences and from finance treating the topic approached in the present paper), matters of legal regulations of agricultural insurance and reports of the European Commission. Analyzes undertaken in Chapters 2 and 3 are based on the legal and normative documents of Romania, on the Insurance Supervisory Commission of agricultural insurance reports, on Agricultural Census 2010 reports and on EUROSTAT, FAOSTAT and INSSE databases. The study undertaken in Chapter 4 is based on the data collected from the ECAD - European Climate Assessment & Dataset database.

Stage of knowledge of the analysed domain is an essential element in developing a research. As a starting point for the bibliographic study on agricultural insurance in Romania we used the book entitled "Agricultural Insurance", authored by Ghiulea Nicolae and published in 1930. This book suggests a new way of thinking about strategic investments in agricultural insurance, manifesting displeasure regarding the indifference that dominated at that time concerning the agricultural insurance in Romania. Thus, it has the merit of being a "pioneer" in this field.

In the early stages of research we find out that the literature is poor, this topic being studied thinly in the past. For a long time the insurance sector was forgotten, but it is tackled increasingly nowadays mainly due to climate change.

The study of indigenous and foreign literature and the analysis of agricultural insurance system practiced in Romania have shown that with the deepening of the process of agricultural reform, the problem of ensuring risks in agriculture is becoming more stringent. Due to the fact that a modern agriculture can not develop in the absence of a comprehensive and effective system of agricultural insurance, identifying and promoting risk management practices are necessary in the context of increasing market volatility and worsening effects of agricultural risks.

CHAPTER I. SYNTHESIS - RISK MANAGEMENT IN AGRICULTURAL INSURANCE

*“You can't change the direction of the wind,
But you can adjust your sails to always reach your destination.”*

Jimmy DEAN

Agriculture is central risks which associated with variability and change climate, require a careful analysis of triggers and their management solutions. Farmers have a high degree of risk aversion, which is not surprising given the risk inherent in agriculture. The production of crops and livestock is complex, marked by pervasive risks such as uncertain weather conditions, price of commodities, plant and animal diseases and other events that can be controlled only to a limited extent.

Risk issues specific in agriculture are numerous and require special treatment, mainly to unpredictable weather conditions, because they exhibit a number of features compared to other economy sectors which is why identifying and understanding their way of act is essential in order to determine management solutions both from the point of view of the farmers and insurance companies.

Climate change in recent years show an increasing trend of agricultural risks both in intensity and frequency, with extremely damaging effects, which creates worries in Europe due to the vulnerability to extreme weather events.

Under these circumstances imposed by climate change, current agricultural insurance are not an appropriate tool for adapting agriculture, due to the fact that on one

hand insurance products are designed for risks with a low frequency and whose probability is known, and on the other hand they do not have the financial capacity to support these risks. However, insurance companies should find ways to introduce catastrophic risks into insurance portfolio through a partnership with the public sector, as Romania has a high risk of drought, floods, storms, earthquakes, landslides and a medium risk for forest fires.

The production of crops and livestock is complex, fraught on one hand with risks that are increasing due to climate change and on the other hand as a result of institutional changes due to globalization and the development of new technologies. Therefore, agricultural insurance is an essential part of risk management in agriculture and helps preserving the constancy of farmers' income.

In order to manage the agricultural risks, farmers can adopt, depending on the risks frequency and size of losses, various ways to combat random phenomena generating damage, such as: to prevent (involves taking measures to eliminate the contingency), to divide (by creating a mutual fund agriculture) and / or to transfer the risk to the insurance risk companies (by signing an insurance contract). Approaching risks in agriculture is complex and can be done from the point of view of public policy and in terms of private strategies. It aims to harmonize them in order to achieve a competitive agriculture.

We conclude that the risks subject to agricultural producers is certainly a challenge for *farmers* (who have to find risk management options that suit them best), for *insurance companies* (by designing complex and competitive insurance products depending on the needs of farmers) and not least for *the state* (which should improve rural infrastructure).

CHAPTER II. SYNTHESIS - AGRICULTURAL INSURANCE MARKET IN ROMANIA

We note an ample history of agricultural insurance in Romania, this being one of the first forms of self-help (insurance) of the Community members. This fact emphasizes the importance of the area of research, as farming and animal husbandry is the oldest profession whose exposure to uncontrollable weather phenomena and animal diseases

was understood by our ancestors long before, finding rudimentary measures to protect against them.

Weather conditions and infections spots have not diminished in time. Moreover, risks were amplified due to climate change and the policies imposed by the European Community. These conditions translate into an increased risk for farmers to maintain financial capacity, in whose aid agricultural insurance are coming as a useful tool to reduce economic uncertainty and a way of resuming an interrupted activity.

Under these circumstances, we examined the degree of development of agricultural insurance market in terms of indicators of gross written premiums, gross claims paid and damage rate. From this analysis we conclude that agricultural insurance market is dynamic, showing different trends in the analysed period, mainly due to the variability in weather conditions and the level of state subsidies. Outcomes are modest, their share in general insurance being between 2-3%. However, according to current trends, trends in agricultural insurance market are encouraging and make us confident in the agricultural insurance market maturity in the development of this segment, as it increasingly aware the need for effective risk management systems in order to stabilize income and economic development.

Nevertheless, currently, agricultural insurance segment is thinly valued in our country, which is why it must identify the disadvantages and limitations which hamper the development of agricultural insurance. According to the research undertaken, we identified the agricultural insurance impediments (fragmentation of land ownership, lack of specialized agricultural assistance and of accurate information concerning the importance of insurances, lack of effective support from the state and banks, the existence of a large number of farmers underperforming, the significantly reducing of farm incomes, the aging of the rural population) and limits (asymmetry of information, adverse selection, moral hazard, distorted incitations, administrative and transaction costs) whose understanding is essential in order to emphasize the solutions to solve them.

The main solution to strengthen the agricultural sector, and also for the sustainable development of agricultural insurance, is to establish a public-private partnership in which government and state authorities must range an organizational

framework for implementing risk management procedures in agriculture and damage assessment.

Nowadays, it is necessary to support the growth of agricultural production by stimulating voluntary land consolidation and efficient exploitation of it and by massive investments in infrastructure.

Therefore, implementation of an appropriate insurance program for agriculture is a complex and challenging task.

CHAPTER III. SYNTHESIS - EUROPEAN POLICIES IN REGARD TO AGRICULTURAL INSURANCE

EU integration is probably the strongest pressure factor for rapid reform of Romanian agriculture and rural areas, given the need for successful inclusion in European rural community. Local rural economy, vastly dominated by agriculture, is still poorly integrated into the market economy, which is why the wellbeing of rural and urban depends on the way of understanding and application of marketing technique.

The countryside importance is undeniable due to the owned resources, but it is not enough capitalized as it does not have a legislation and infrastructure that corresponds to the current realities facing farmers.

Thus, the agricultural sector is put through a difficult test due to the political reforms, the liberalization of the common policy, the international competition, the climate change which are more harmful and the sanitary measures as a result of animal diseases. Therefore, the Common Agricultural Policy should reduce the effects of crises in the agricultural sector by finding strategies for managing risk through insurances.

The comparative study undertaken between the Member States of the European Union regarding agricultural insurance schemes practiced, analyzed both in terms of features of agricultural insurance systems and of agricultural insurance market conditions, highlights that most states use the same types of agricultural insurance and that the existence and level of subsidies is relevant. Identifying the most developed agricultural insurance systems, which we can use as a role model in Romania, it is difficult based just on examining these issues because the policies implemented by each state should be

investigated in a wider framework of socioeconomic conditions as well as of its agricultural feature or climatic factors.

Spain, Austria and Italy have the most developed agricultural insurance markets, which is why we have undertaken a comparative analysis of the agricultural sectors of these countries with the ones from Romania, in order to highlight the underlying determinants of agricultural insurance systems evolved. Thus, according to the indicators studied, we conclude that due to the fragmentation of ground land, the large number of farmers underperforming, the technical equipment outdated, the aging population and the low level of education (techniques used were rudimentary, based on experience), agriculture done in Romania is not efficient.

CHAPTER IV. SYNTHESIS - MODERN ALTERNATIVES OF DEVELOPMENT OF AGRICULTURAL INSURANCE

The most popular method used to reduce risks in agricultural area is agricultural insurance. But this insurance product is not fully acknowledged, mainly due to poor infrastructure and low income levels in rural areas. The high degree of complexity of harvest, animal husbandry and agricultural conditions, determined that activity in this area to become more difficult, which is why new solutions to reduce / eliminate the risks facing farmers are seeking: the proposal of implementing the expert systems technology and index based insurance.

Due to the fact that long-term forecast is hard to be done, the need of using new insurance instruments appears. Those instruments intended to get out some of the current limitations of traditional agricultural insurance. Internationally, new techniques are used and therefore the insurance indemnity payment is made only when it reaches a preset threshold based on statistical calculations realized by using index-based insurance, which can help to avoid adverse consequences of the specific risks of the agricultural sector. These, combined with other improved risk management instruments, either ex ante (better irrigation systems, better adapted races, better works for flood prevention, better counseling services) or ex post (improving the services offered by insurance companies), are powerful tools for efficient risk management in agriculture.

New tools are added to the existing ones for agricultural development and bring new attractive features namely eliminates many of the problems that exist for traditional crop insurance, making them viable and less dependent on public subsidies. Therefore, a new and useful alternative is added to those that the Romanian government has at its disposal to manage agricultural risks better and more efficiently.

Regarding index based insurance, it focuses on addressing traditional agricultural insurance such as moral hazard, high transaction costs, the adverse selection and asymmetric information, but most importantly, take an attempt to try to solve the problem of systemic shocks, particularly agricultural climate. In order to achieve the necessary degree of objectivity and transparency, there must be sufficient data, a strong correlation between the index and the losses at producer level and the lack of influence by any insurer or insured regarding moral hazard and adverse selection. As compensation payment is based on the deviation of the index and not on the individual losses, there is no need for individual assessments.

Applying the modern technology via expert systems in agricultural insurance is a solution as necessary as useful due to the farmers information on existing insurance products and expert judgments human reproduction in a comprehensible manner so that users, regardless of their training, to come to a decision which suits them best at the time. The use of expert systems is based on the premise that any problem can be solved by a sequence of reasoning that can be broken down into logical rules. Such a system becomes able to collect and store experience of highly qualified people and apply it in order to solve problems in different situations.

When deciding on the use of electronic data processing must stand first existing problem and their effectiveness can be measured by the results to be obtained, from which derives the decisions to be taken and their consequences for farmers and insurance companies.

FINAL CONCLUSIONS

The reaserch undertaken concludes with the exposure of the main conclusions and results obtained during the scientific endeavor. Due to the fact that the work was shaped

in such a way that at the end of each chapter we discussed preliminary conclusions of the analysed issues, in this last part of the paper we bring off an overall summary of the research undertaken. We also expose the boundaries inherent in any scientific endeavor, being confident that they will turn into future research directions.

Agriculture, unlike other sectors of the economy, is subject to uncontrollable weather conditions, difficult to predict and control, whose frequency and intensity were magnified in recent years due to climate change. Withal a distinctive character of agriculture is given. Therefore, it is necessary to identify and analyze the risks and their impact on agriculture in general and agricultural insurance in particular, as well as to find solutions to manage agricultural hazards. This goal was achieved in Chapter I, "*Risk management in agricultural insurance*" from which we highlight the followings:

- ❖ the current agriculture faces numerous risks specific to the activity of exploitation of land and livestock on one hand and, on the other hand, to catastrophic events. Romania comes off 4th place in Europe at risk of natural disasters;
- ❖ climate change in recent years came into notice of the European Commission which analyzes the agricultural risk and crisis management strategies through their integration into the Common Agricultural Policy, as agricultural crises are a recurrent phenomenon in the European Union;
- ❖ recent agriculture specific (due to climate change, disease outbreaks which have a frequently growing on animals, the lack of efficiency of agricultural production, the high volatility of prices) requires the use of an effective risk management so that to find anticipatory and adaptive strategies in order to reduce the vulnerability of farmers to the new conditions imposed by climate change;
- ❖ farmers are forced to find ways to protect agricultural crops and livestock. As a result, they must apply various practices, such as crop diversification, renouncing to the cultivation of certain varieties of crops or transferring insurance risks to the insurance companies;
- ❖ risk sharing by creating a mutual fund in agriculture will be a welcome solution for adapting the agricultural sector as a result of the new conditions of climate

change and the requirements of the acquis community, as agricultural insurance do not cover catastrophic risk towards insurance;

- ❖ creating a public-private partnership in which government and state authorities can constitute an organizational framework for implementing risk management procedures in agriculture and damage assessment, would also be a useful measure.

Given that agriculture is one of the most important economic sectors and that it has a large exposure to risks (both due to climate change and as a result of policies imposed by the European Community), in Chapter II we analyzed the "*Agricultural insurance market in Romania*" because, in the current context, the agricultural insurance products are a lever for development of agricultural sector. We conclude the followings:

- ❖ agricultural insurance is particularly necessary since risk occurs due to uncontrollable weather conditions. Therefore, modern agriculture related with insurance services, can be achieved only through a strong development of agricultural insurances;
- ❖ agricultural insurance plays a significant role in stimulating investment in agriculture and stabilizing farmers' income;
- ❖ agricultural insurance market in Romania is inconsistent, its variation being influenced by the availability and level of subsidies granted by the state, so that it can be considered nascent, but with a great perspective into the insurance industry;
- ❖ agriculture transition to a market economy has determined major changes (in the form of property, farm structures) which has resulted in fragmentation of farms and the creation of a large number of underperforming farmers, who in the absence of specialized agricultural assistance, of limited financial possibilities and lack of correct information concerning the importance of agricultural insurance, had the effect of creating a subsistence agriculture, creating a climate unsuitable to the agricultural insurance market development;
- ❖ success of the rapid growth of this segment of agricultural insurance depends on agriculture legislative consistency and on ability and willingness of insurance companies to provide quality products adapted to the needs of

- farmers. This requires insurance products adapted to the farmer's needs and possibilities and a balance between the contract price endured by the insured and the crops risk, increasingly higher in recent years, supported by the insurer;
- ❖ subsidies for agricultural insurance premiums may be the path of sustainable development of agricultural insurance class and agriculture in Romania, in a difficult economic context.

Due to the poor results of agriculture and agricultural Romanian insurance market, we intend to study European policies in relation to agricultural insurance, analysed in Chapter III of the present paper, in order to shape the characteristics of the most developed agricultural insurance markets from which we can draw a lesson. Agriculture and hence agricultural insurance should be addressed in a large context as lining and integration to the requirements imposed by common policies of the European Union creates special conditions. Under these circumstance, we should answer to the following question: is insurance an effective tool to meet the new requirements imposed by climate change and the Common Agricultural Policy?

This is because agriculture involves restructuring and convergence of European agriculture. Member States are forced to conform to the imposed requirements, but due to significant differences in the characteristics of agriculture and socioeconomic framework, this goal is difficult to achieve by countries that do not have a developed infrastructure, as is the case in Romania, which deepens the long gaps between EU countries.

The most developed agricultural insurance markets in the European Union are in Spain, Austria and Italy. Therefore, we did a comparative analysis of the agricultural sectors of these countries with the Romanian ones, from the perspective of the overall framework of agriculture of each state and of the agricultural insurance system. We conclude the followings:

- ❖ Romania has a huge agricultural potential due to the agricultural area and the number of people involved in rural areas. However, the lack of efficient organization of agriculture through major investments, coherent infrastructure, consistent measures and systematic policies which involves consulting the farming, determined agriculture area to remain unexploited and inefficient, with adverse economic challenges;

- ❖ degree of development of agriculture and agricultural insurance is determined by many factors in which both the general farming and agricultural insurance system practiced are important. But the stage of development of agriculture, its natural and social characteristic, sizing farms and technical equipment are mandatory. This fact has been confirmed by Austria, which area is 4.62 times smaller than Romania, but has a developed agricultural sector due to good logistics, of high technologies, automation, thus achieving competitive production;
- ❖ huge gap between yields meager recorded in Romania and high performance of EU countries is determined by technical, economic and financial factors, by management and marketing in agriculture.

Under these circumstance, wherein the Romanian immense agricultural potential is not exploited, it is necessary to find new ways to develop agricultural insurances which we analyse in Chapter IV "*Modern Alternatives of Development of Agricultural Insurance*". Two innovative solutions are proposed: to implement expert systems and index based insurance as a tool for development of traditional agricultural insurance. The research results highlight that:

- ❖ index based insurance are not affected by farmers or insurance companies, eliminating adverse selection and moral hazard. Unlike the current insurance system, index based insurance are market based, minimizing the need for government involvement. The compensation process should be quickly and inexpensively. These insurances are very promising for developing countries, since most of them have a high level of exposure to risks of bad weather;
- ❖ implementation of expert systems in agricultural insurance should be a stimulus for development of agricultural insurance. In order to achieve a modern agriculture, it is necessary to maintain funding opportunities under the conditions required by the agricultural production. For that purpose, the use of expert systems security is a primary lever to protect farmers. Therefore, the agricultural sector must be developed since recently new risks appeared due to climate change.

We conclude that the agricultural insurance sector has a long way to go before becoming profitable. Pronounced disintegration of agricultural holdings, lack of developed technologies, lack of funds for farmers and the poor information of farmers regarding the importance of insurance are significant obstacles to the development of agriculture and hence agricultural insurance market.

As agricultural insurances represent true "weapons of weather control", we believe that their correct evaluation by the PAC is of paramount importance but indifference that dominates at the moment concerning agricultural sector can only displease us. Whereas Romanian agriculture potential exceeds most European Union member states, its results are limited.

In order to improve agriculture we must make major investments in infrastructure as agriculture, currently, is inefficient due to farmland disintegration, population aging and poor markets. The main solutions in the development of autochthonous agriculture are to create appropriate legislation, to administer subsidies to insurance premiums in a differential manner so as to be accessible to small farmers and public private partnerships and to create an infrastructure for agricultural reinsurances.

The importance of the present paper is given by approaching a very important sector of the economy "agriculture" and proposing immediately viable solutions that meet the current needs of farmers. The contribution of the author consists in proposing innovative solutions such as implementing the index based insurance and the expert systems in agricultural insurance as a way to adapt to the prevailing market conditions and to promote the insurance products. The interest in this kind of insurance occurs due to lately climate change which are extremely damaging and due to the need to improve agricultural competitiveness on the common market as a result of the liberalization of agricultural trade, since agriculture is a branch of economics that can add value if we know how to properly use our resources.

RESEARCH BOUNDARIES

Any scientific approach, in addition to the obtained results, brings in some boundaries which constitute future research directions. Therefore, the research undertaken identified the following limits:

- ❖ lack of actual and complete data within comparative analysis of the overall agricultural sector in Romania, Spain, Austria, Italy. The study had as a reference year 2010, as it was the year in which we found the complete information for all indicators analyzed. The informations from *Farm Accountancy Data Network (ec.europa.eu)* statistical database displays the most recent information from 2009, while *Food and Agriculture Organisation of the United Nations (fao.org)* database contains data from 2011, but not for all analyzed indicators;
- ❖ lack of current data regarding information concerning the agricultural insurance schemes applied by Member States of the European Union. Therefore, the comparative study of these schemes was realized in 2008, being the latest data published in the literature by (Bielz and all 2008), (Mahul and Stutley 2008). The individualistic collection of such information is nearly impossible, being accessible only to big organizations (European Commission, World Bank) which send of questionnaires to each state in order to fill it;
- ❖ lack of data regarding the structure of the concluded agricultural insurance portfolio products (crop insurance, livestock insurance) in order to pursue their composition and coverage. It would be interesting to embody a map of counties wherein agricultural insurances are concluded according to their agricultural potential.

RESEARCH PERSPECTIVES

Due to its multidisciplinary, the researched field is inexhaustible and there exists many directions for further research undertaken. Moreover, the limitations of the present

paper are issues that can be converted into future documentation. Under these circumstances, we introduce the following future research directions:

- ❖ updating information concerning the particularities of agricultural insurance systems applied by the Member States of the European Union. Therefore, a basic report is the one published on 01 November 2012 by Bielz et al., entitled *Agricultural insurance schemes*, which is not yet available;
- ❖ expanding the analyzed sample within the study which concerns the use of index based insurance in other areas of analysis selected, taking into account other crop varieties and other adverse events.

Due to the fact that the main theme is a less studied at national level, the research undertaken is a challenge. Notwithstanding, we consider that the present research has achieved its main aim: studying the agricultural insurance market in Romania. We are confident that the boundaries and perspectives of this work represent future research directions for us.

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