

FOOD SAFETY: TECHNOLOGIES AND GOVERNANCE

Dimitar Terziev¹, Pei Zhou²
Ralitsa Terziyska³, Dan Zhang⁴

Introduction

High public expectations are pinned to agriculture – to produce food and raw materials in sufficient quantity and fairly good quality, to preserve the available natural resources, to provide a lovely countryside, to solve social problems giving job and income to the underprivileged social groups, to contribute to economic growth, and etc. Moreover, to perform these tasks in a prompt and sustainable manner. To achieve these goals, society resorts to a wide range of sanctions (regulation, standards, monitoring) and incentives (direct payments, subsidies, tax reductions). The results are not very encouraging. Food crises, high price volatility, lack of agri-business in some regions and the deficiency of farm workers in other, low quality (even dangerous) products, hard (often impossible) entry, ineffective distribution of wealth, reluctance of young people to carry on with the family farming, and etc. negative effects could be seen all over the world. Moreover, all this happens after high spending of public funds. There naturally arises the question as to how to achieve the above-mentioned goals in a reasonable and effective way?

Food safety is a typical problem of this group. Modern society, the young generation in particular, are becoming increasingly sensitive to this issue. At the same time public thinking is dominated by the idea that changing or replacing traditional farming could cause food crisis and that the production of safety food could never be a normal business.

Two are the reasons for this assumption. The first one stems from the overall wrong understanding of agriculture. Most of the studies in the field are focused only on formal modes and mechanisms and on production costs, applying uni-disciplinary approaches that are purely economic or purely ecological in nature.

¹ Dimiar Terziev, Assoc. Professor, PhD, Department of Natural Resource Economics, University of National and World Economy, email: dterziev@unwe.bg

² Pei Zhou, Professor, PhD, School of Agriculture and Biology, Shanghai Jiaotong University, email: zhoupei@sjtu.edu.cn

³ Ralitsa Terziyska, Assistant Professor, PhD, Department of Natural Resource Economics, University of National and World Economy, email: ralica_rvt@abv.bg

⁴ Dan Zhang, Assistant Professor, PhD, Shanghai Jiaotong University, email: zhangdannjut@163.com

The second reason is that ecological initiatives (including food safety) are generally seen as a problem pertaining to life style only. There are no business studies on these issues.

Over the last few years a team of scientists from China and Bulgaria have pooled their efforts in an attempt to address such problems. Four research projects were carried out, several conferences organized, and some of the findings of these joint attempts have been published by prestigious publishers across the world. The present study aims to fill the aforementioned gap and present a real picture of both traditional and alternative agriculture in Bulgaria. Furthermore, it is an attempt to show that safety food production could be, and has already become, business as usual.

Technologies for food safety

China is among the countries with the most rapidly growing economy. It achieved significant results – reduced poverty, increased the prosperity of its people, became the second biggest economy in the world. Yet the country paid a high price to this effect. China suffered pollution of all natural resources – soil, water, air. That is why an intensive research to ensure environment protection and resolve the existing problems has been conducted in the country over the last two decades.

School of Agriculture and Biology and Bor S. Luh Food Safety Research Center at Jiaotong University in Shanghai work actively on the problem of food safety – detection of food-originated pathogenic microorganisms, safety quality control and management during storage, processing and circulation of primary products, dairy processing techniques, new product development and construction of consumption safety systems, new techniques of residual pesticide detection in primary products and pollution detection in different kinds of food, molecular detection of transgenic food and detection of residual pesticides & veterinary drugs. After a study on the state of affairs in Bulgarian agriculture, our partners – prof. Pei Zhou and Dr. Dan Zhang introduced some of the technologies developed in the school and in the centre for application in Bulgaria. These include the following technologies, among others:

- assessment of the role of various bacillus in agricultural processes (Weiwei Shi at all, 2014);
- appraisal of the effect of using antibiotics, especially tetracycline, for growth promotion of animals (Xuejia Zhan at all, 2018);
- investigation on accumulation of nitrate in soil, so called "salt stress" and soil secondary salinization (Shaohua Chua at all 2017);
- biological, especially enzyme, treatments approach of straw to deal with lignocellulose (H.-W. Fenga at all, 2016);

- development of functional nucleic acids (FNAs)-based sensors for detection of content of heavy metals in the soil (Shenshan Zhan et al. 2016);
- biological pretreatment of straw and production of reducing sugars by hydrolysis of bio-pretreated material with *Streptomyces griseorubens* JSD-1 (Dan Zhang et al. 2016);
- lowering the content of cadmium in the soil due to the use of phosphate-based fertilizers in agriculture (Xuejia Zhan et al. 2015);
- investigation of the impact on soil microbial activity during the processes of clearing the heavy metal polluted soil (Liang Mao et al. 2015);
- tool for copper absorbing (Shenshan Zhan et al. 2015a);
- mechanism for dealing with silver pollution caused by the increased use of silver in macro-usages such as battery, bearing, brazing and soldering production, as well as in the automobile, electronics, photographic, pharmaceutical and imaging industries (Shenshan Zhan et al. 2015b);

Needed research

It is obvious that a big number of laboratory tests have been already performed. Practical solutions for more of the problems are now available. Some of these technologies are known in Bulgaria but are seen as too expensive. They require serious investments for their practical application, yet the return on investment is not guaranteed. What is more, there are differences in the social and economic regulatory framework in China and Bulgaria – with regard to property rights over agricultural land and some other resources, the powers of the government and of the formal and informal institutions, among other issues. Significant factors differ in the two countries that determine differences in farmers' decision making.

On the other hand (from a research perspective) the problem is relatively new. Researchers are forced to a) meet the relatively new challenges of environmental pollution and degradation, climate change, competition for natural resources and b) to carry out their activities amid the process of dynamic and fundamental institutional modernization (at the regional, national and international level and c) to make analyses in a situation of lack of relevant knowledge and long-term data.

That is why traditional approaches and methods dominated research work in the area (Bachev, 2016, 2018):

- studies are focused on the formal modes and mechanisms while the important informal institutions and organizations are ignored. Analyses of certain forms – contractual, cooperative, industry, public program, or at the management level – farm, eco-system, region, country, international dominated over considerations on interdependency, complementarities and/or competition of different governing structures. Widely used forms of

governance (multi-lateral, multi-level, reciprocal, interlinked, hybrid) are not taken into account;

- studies concentrate on technology related e.g. production costs ignoring significant transaction costs associated with the identification, assignment, protection, exchange and disputing of diverse property rights and rules. Following, a normative (extracted from standards for production cost) rather than a comparative institutional approach is employed;
- studies are implemented by uni-disciplinary approaches – pure economic, pure ecological, pure juridical, pure political, etc., which prevents a proper understanding of the logic and the full consequences (multiple effects, costs, risks) of a particular governance choice.

The attention and efforts in our study were directed to investigation on the economic mechanisms suitable for food safety activities. We tried to understand how Bulgarian farmers choose and develop governance modes for organisation of their transactions connected to production of safety food and other secure goods and services.

The study

Ecological or bio production is a controversial issue. There have been allegations of fraud and waste of public resources among all involved in the business – producers, traders, consumers and society. Hence it is not enough to examine just one part of the puzzle. Even studying the officially registered producers is not enough. To solve the problem, this paper presents the results of two field studies. The first one was targeted at traditional producers and more than 190 farms were studied. An attempt was made to assess their readiness to do their business as ecological producers, e.g. their environmental sustainability. Details on this study were already published (Bachev and Terziev, 2017). The second one covered producers that applied only organic farming. These were 36 projects following the ideas of bio-dynamic agriculture, permaculture, urban agriculture and others (for details see Terziev and Radeva, 2018).

The research interest was on ecological attitudes, i.e. on the way farmers organize and develop their activities and on the problems they face.

Theoretical framework

The study was based on the ideas of the New Institutional Economics. The major assumptions of this school of thought (Coase, 1972, 1984) are as follows: a) a single transaction is considered as an initial unit of analysis; b) associated costs are the basic motive for business decisions; c) these costs depend on three main factors (critical dimensions of a transaction) – asset specificity, uncertainty

and frequency, as well as some others – information asymmetry, behavioural characteristics of the economic agents, etc.; d) everything in the economic world happens within a predominantly institutional environment where institutions matter.

In this way the rich spectrum (fig. 1) of existing business form and governance mechanisms could be understood and explained. These include (Williamson, 1993):

- private modes ("private or collective order") – diverse private initiatives, and special contractual and organizational arrangements. Economic agents prefer them in case of high specificity (as a guarantee against loss of transaction investments), high uncertainty (contracts are impossible), and high frequency (costly exchange);
- market modes ("invisible hand of the market") – those are various decentralized initiatives governed by the free market price movements and market competition. They are typical for a situation of low specificity (no or low risk of transaction damages), low uncertainty (the progress of a transaction could be easily predicted), and low information asymmetry (traded good or service could be examined before the deal);
- public modes ("public order") – those are various forms of public (community, state, international) interventions in the market and private sector such as: public guidance, regulation, assistance, taxation, funding, provision, modernization of property rights and rules, etc. Their application is connected with high specificity mainly because of complicated character of social relations causing high transaction cost for the individual participants;
- hybrid forms – some combination of the above three like public-private partnership, start-ups, etc.;
- institutional environment ("rules of the game") – that is the distribution of formal and informal rights and obligations between individuals, groups, and organizations and the system(s) of enforcement of these rights and rules. People create institutions to cope with the problem of high uncertainty and improper behaviour. Tradition, reputation, good will, and etc. institutions often are more powerful barriers against opportunism, free riding and hostilities.

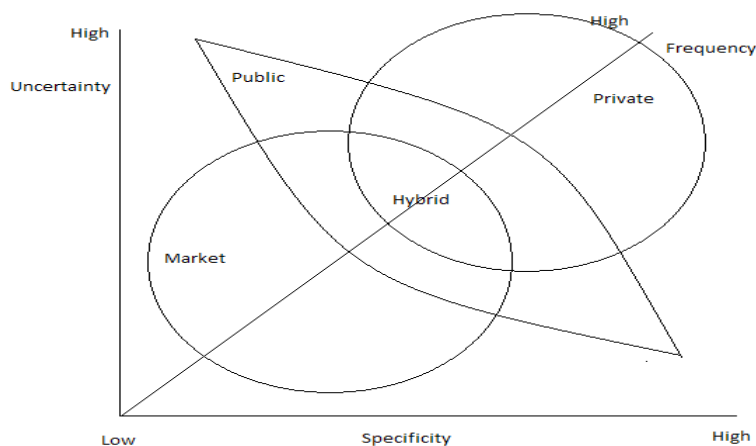


Fig. 1. Critical dimensions of transactions and alternative governance modes

Dominated governance modes in Bulgarian agriculture

This basic theoretical model is adapted by farmers and applied in Bulgarian agriculture (Bachev and Terziev 2018).

The main and most popular private mode is the naturally the firm (farm in our case). Economic agents privately organize some of their transactions within a business structure specially designed for this purpose. This is how transactions are internalized so this mode is usually referred to as internal organization. It is preferred for the core and the most repeated activities and transactions. They are governed by the will of the owner or manager ("the visible hand of the manager"). The advantages are: lowering the assets specificity and uncertainty, overcoming the opportunism and free riding, and finally – saving of transaction cost.

Private modes also include a set of various private initiatives, and specially designed contractual and organizational arrangements (long-term land, labour, and other input supply as well as marketing (output) contracts, voluntary eco- and social actions, codes of behaviour, partnerships, cooperatives and associations, brads and trademarks, labels, etc.). For instance, conservation of the natural resources is a part of the managerial strategy of many green (eco) farms. In the modern world there are numerous initiatives of farmer organizations, food industry, retail chains, and consumer organizations, which are associated with improvement of food quality. Individual agents take advantage of the economic, institutional and other opportunities, and deal with institutional and market deficiencies through selection or designing (mutually) beneficial private forms and rules for governing their behaviour, relations and exchanges. Private modes

negotiate "own rules" or accept (imposed) existing private or collective order, transfer existing rights or gives new rights to counterpart(s), and safeguards absolute and/or contracted rights of agents. A great part of the agrarian activity is managed by the voluntary initiatives, private negotiations, "visible hand of the manager", or collective decision-making. Nevertheless, there are many examples of private sector deficiency ("failures") in governing of a socially desirable activity not only in the field of food safety but also in environmental conservation, preservation of traditional structures and productions, protection and development of rural areas, etc.

Market modes cover a host of decentralized initiatives governed by the mechanisms of price movement and market competition. These could be spotlight exchange of farm resources, products and services; "classical" purchase contract, lease or sell contract; trade with high quality, organic, etc. products and specific origins, agrarian and ecosystem services, etc. Individual agents use (adapt to) markets, profiting from the specialization of activity and mutually beneficial exchange, while their voluntary decentralized actions "direct" and "correct" the overall distribution of resources between diverse activities, sectors, regions, ecosystems, countries. However, there are many examples for the lack of individual incentives and choice and/or unwanted exchange, and unsustainable development in agrarian sector – missing or underdeveloped markets, monopoly or political or administrative power relations, positive or negative externalities, disproportion in incomes, working and living conditions between rural and urban regions, etc. Free market often "fails" to govern effectively (the overall, some) activity and exchange in agrarian sphere, and leads to low socio-economic and ecological sustainability.

Public modes comprise various forms of public (community, government, international) interventions in the market and the private sector such as public guidance, regulation, assistance, taxation, funding, provision, property right modernization, etc. Widely applied are programs for agrarian and rural development aiming at "proportional" development of agriculture and rural areas, protection of incomes and improving the welfare of rural population, conservation of natural environment, etc. These programs are becoming increasingly popular because of the intensification and complication of agricultural activities and exchange, and growing interdependence of socio-economic and environmental aspects. In many cases, the effective management of individual behaviour and/or organization of certain activity through market mechanisms and/or private negotiation takes a long period of time, and is very costly, could not reach a socially desirable scale, or be impossible by various reasons. Thus a centralized public intervention could achieve the desirable state in faster, cheaper or more efficient way. The public "participates" in the governance of farming through provision of information and training for private agents, stimulation and (co)funding of their voluntary actions,

enforcement of obligatory order and sanctioning for non-compliance, direct in-house organization of activities (state enterprise, scientific research, monitoring), etc. However, there are a great number of "bad" public involvements (inaction, wrong intervention, over-regulation, mismanagement, corruption) leading to significant problems – incentives' damage, harmful behaviour, lack of risk-taking readiness, lowering the innovation thinking, and etc.

The hybrid modes encompass different combinations of the above three. Good examples are public-private investment partnership, procurement of fresh milk and fruits for public kindergartens and elementary schools, public licensing and inspection of private organic farms, public funds supporting private farmers for ecosystem services or rescue operations, and etc. Private agents are attracted to participate by a chance to use their free (during some periods of the year) resources and by guaranteed payments. Society (the public at large) benefits through low costs of control, high efficiency, and (some time) achieving goods and services which are unavailable in other way.

All the above modes emerged and have functioned within any institutional environment – that is the distribution of rights and obligations between individuals, groups, and organizations, and the system of enforcement of these rights. The spectrum of rights comprises farmers' assets, natural resources, intangibles, activities, working conditions and remuneration, social protection, clean environment, food and environmental security, fair justice, and etc. The enforcement of rights and rules engendered by them is carried out by: a) the law, regulation or court decisions (formal institutions); b) trust, confidence and reputation (informal institutions) determined by the tradition, culture, religion, ideology, ethical and moral norms, or c) self-enforced by agents (private institutional arrangements) – relatives' or friends' relations for example.

Institutional development is initiated by the public (state, community) authority, international actions (agreements, assistance, pressure, etc.), and private and collective actions of individuals and groups. It is associated with the modernization and/or redistribution of the existing rights, and evolution of new rights and novel institutions for their enforcement. For instance, agrarian sustainability 'movement' initially emerged as a voluntary (private) initiative of individual farmers, after that it evolved as a "new ideology" (collective institution) of agrarian and non-agrarian agents, and eventually was formally "institutionalized" as a "social contract" and part of the "new public order". Similarly, the European Union (EU) membership of Bulgaria is associated with adaptation of modern European legislation (*Acquis Communautaire*) as well as better enforcement (outside monitoring, and sanction for non-compliance by the EU). At current stage of development many of the institutional innovations are results of the pressure and initiatives of interests groups (eco-association, consumer organizations, etc.).

Institutions and institutional modernization create unequal incentives, restrictions, costs, and impacts for economic agents. In the specific socio-economic, institutional, natural etc. environment the "rational" farmers tend to design and use such ("most effective") market, private, collective, hybrid etc. modes of governance which maximize their benefits from exchange and minimize transaction costs. However, if property and other rights are not well-defined or protected, that leads to inefficient and unsustainable organization and exploration of natural and other resources, constant conflicts among interested parties, and low economic, social and ecological efficiency and sustainability, and vice versa ("Coase theorem").

Transactions for safety food

It is not an easy initiative to ensure safety food. What this requires in the first place is clean land and water, as well as healthy animals. Furthermore, organic seeds, seedlings and saplings are also needed. Proper technologies have to be chosen and strictly observed – minimal machine cultivation, no artificial fertilizers and chemical drugs, and etc. Storage, manufacturing, transport, and trade should be organised in accordance with ecological principles. Alternative farmers could achieve all these through a long list of transactions.

Under our study deeply were investigated (Terziev and Radeva, 2018) twelve types of transactions for: land supply, labour supply, machines and mechanical services, technologies and knowledge, transport, veterinary medicine services, seeds and sow materials, energy and fuel, long term assets, bank financial products, other financial resources, and marketing of the products.

Land supply and long term assets supply transactions are of two types – for buying or for leasing in. According to the farmers buying transactions face various problems: a) information – to find a proper piece of land or building and its owners; b) technological – to assess the quality of land and the level of its pollution or degradation; c) juridical – searching of needed documents (often owner are not capable to do it because of advanced age or bad relations), arrangement of a deal, signing a contract. Leasing in is also hard. It faces the same problems as well as an additional one – negotiating the term (time period) of the contract and fixing guarantees. These transactions are rare (low frequency) but farmers describe them as going in a situation of high specificity (transfer of time, efforts, and money invested in organisation of one transaction to another if the first fails is limited) and high uncertainty (mainly by behavioural reasons). In addition – information asymmetry is high for them (any time seller or rentier has better knowledge on the land or building before the deal).

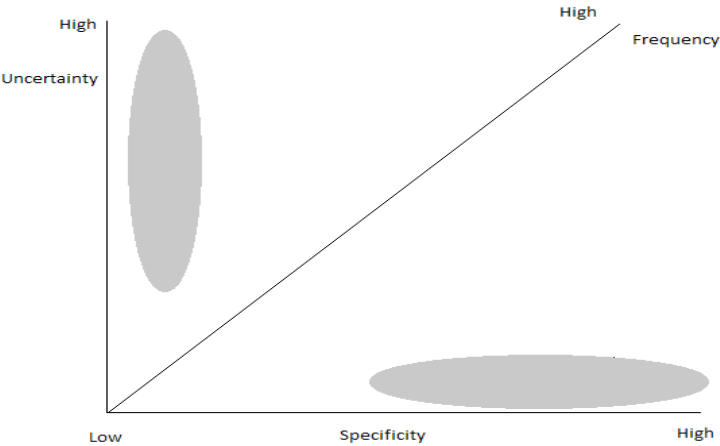


Fig. 2. Critical dimensions of land supply transactions

Labour is a critical factor for successful organic agriculture but in a specific way. All respondent farmers of this group say that for the production they rely on their own knowledge. In most cases the technologies are developed by themselves and in this respect – unique. That is why a highly qualified labour (in the traditional meaning) is not needed, considering that such is non-existent. Farmers need responsible and caring workers devoted to green ideas. They hired labour for short periods but each year (relatively high frequency), having no chance to be sure for the workers’ behaviour (high uncertainty), and without any or very low spending (low specificity).

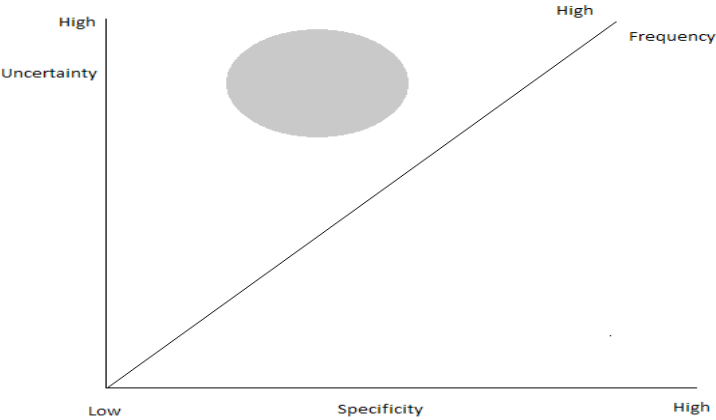


Fig. 3. Critical dimensions of labour supply transactions

Transactions for technologies and knowledge transfer and for seeds and sow materials supply are similar among alternative farmers in two respects. Firstly – these

transactions are defined as very hard. Available knowledge is rare and expensive (lack of literature and training programs in the country) as well as the seeds are. That is why, secondly, they give up of them in fact. By individual experiments year after year and by shared (in very narrow groups) experience they try develop further their skills. Also the most of them prefer to produce their own seeds and sow materials for the next agricultural year.

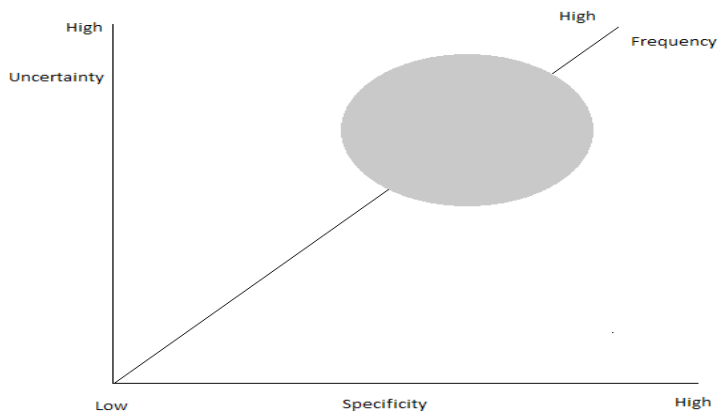


Fig. 4. Critical dimensions of technologies seeds supply transactions

Machines and mechanical services, transport, energy and fuel form another group of similar transactions. Alternative farmers apply minimal mechanical cultivation of the soil, prefer to sell their products on the gate of the farm, and try to not use fossil fuel. Low frequency is the main character of this group of transactions. Two also significant are information asymmetry (modern machines are complicated devices and assessment of their features for the specific needs is difficult) and behavioural problems in the process of transport and storage the production.

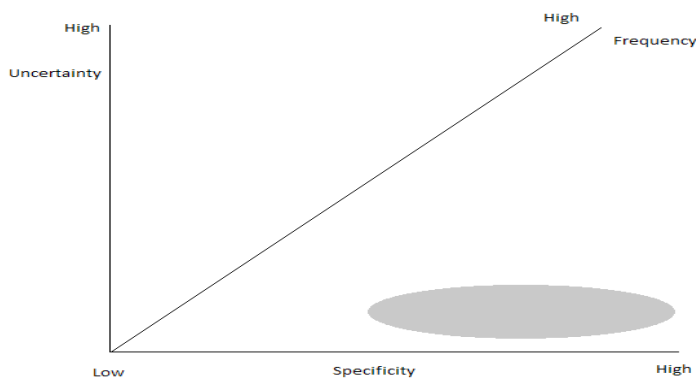


Fig. 5. Critical dimensions of machines and mechanical services supply transactions

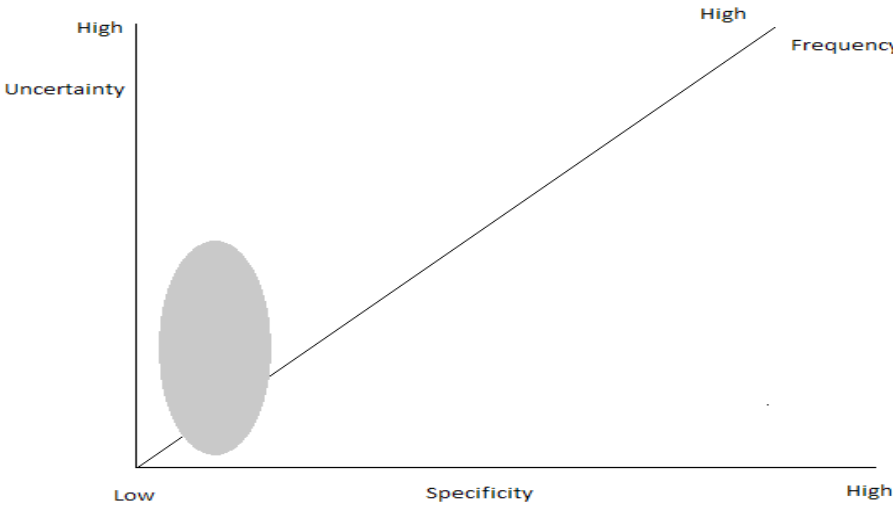


Fig. 6. Critical dimensions of transport, energy and fuel supply transactions

Transactions for veterinary medicine services are important in livestock breeding but in specific way again. Alternative farmers seek regular and attentive care for their animals but do not accept traditional cure (rely on natural style of living of their animals and medical goods prepared by herbs). Veterinary doctor must understand and share their ecological ideas.

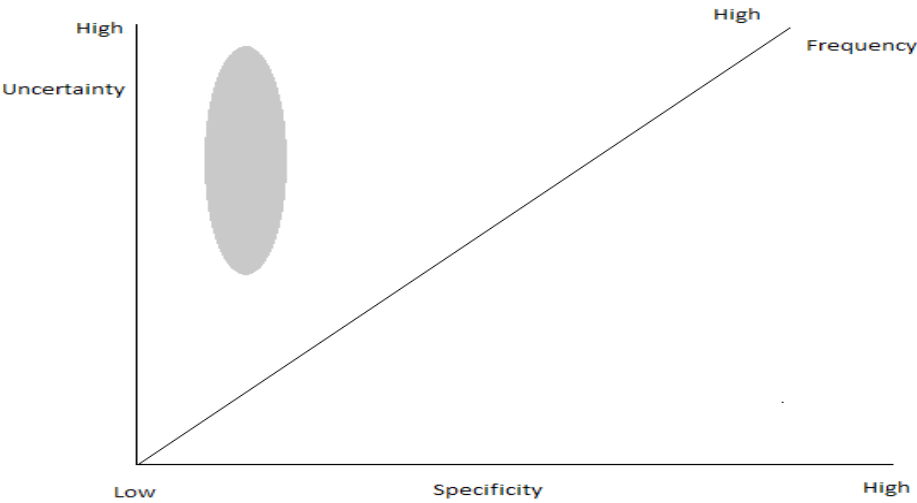


Fig. 7. Critical dimensions of veterinary medicine services supply transactions

Financial supply transactions are the main concern of alternative farmers. They are relatively small and not highly profitable. Production processes are dynamic and depend on many out of control factors. Farmers often change their plans during the year. As the future is not predictable it is hard for them to prepare business plan, to follow it, to keep the obligation of a contract (in case of public support programs), or to be sure for their repayments (in case of bank credit). The most significant critical dimension of financial supply transactions for alternative farmers is their high uncertainty.

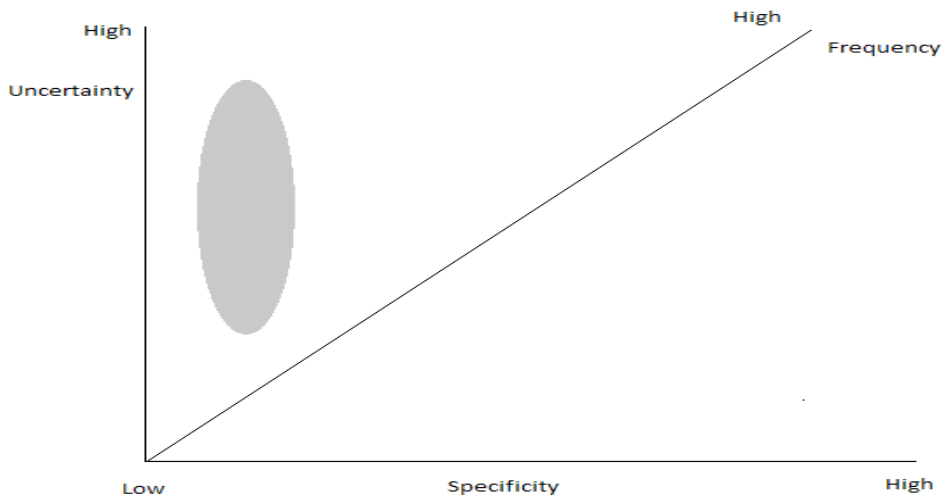


Fig. 8. Critical dimensions of financial supply transactions

Alternative farmers are not self-sufficient. They work to sell. Their output (marketing) transactions are interesting. From one side – all interviewed farmers consider these transactions as easy. Often (which is almost always the case) demand is higher than supply. From other side, alternative farmers usually work for permanent clients. If they lose one (or some) of them, it is not easy to find new ones. Replacement of a buyer is hard and expensive because of the high specificity. From a third side they are hardly able to guarantee stable and long lasted production (because of reasons discussed above). It means high uncertainty.

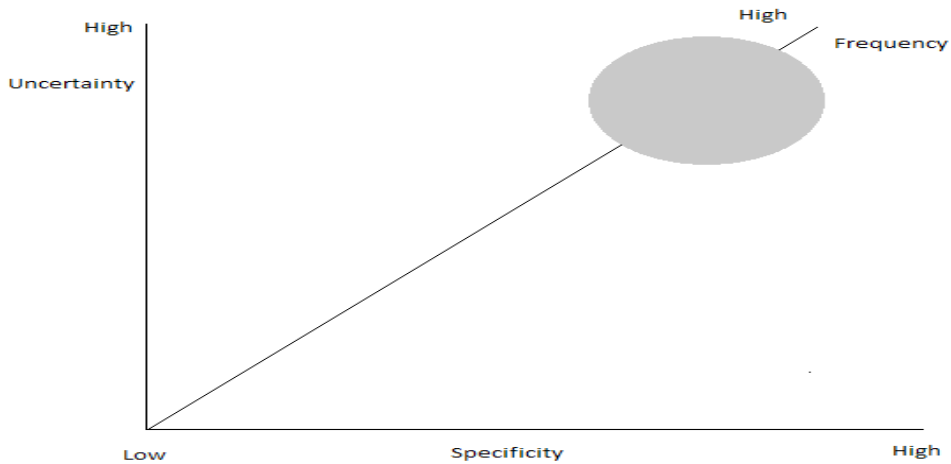


Fig. 9. Critical dimensions of output transactions

Governance modes of transactions for safety food

Bulgarian alternative farmers are not acquainted with the theory of Transaction Costs Economics. Yet they are confronted with transaction-related problems every day and by intuition find good solution. Not surprisingly they choose proper transaction cost saving mechanisms to govern their activities (Table 1).

Private modes. The most used form here is internal organisation. Farmers use this mode by various reasons. They apply specific technologies and produce specific products. Seeds with guaranteed quality for the more of them could not be found on the market. Often own production is the only chance. Also highly specific is the needed knowledge. Even sometimes it is an individual secret. Such knowledge could not be supplied from outside or it is very expensive. To follow ecological (organic) principle farmer need of a proper agricultural land and buildings, for a long period of time. Obviously using own land and buildings is the only solution. Alternative farmers hate bureaucracy – administrative or those of big organizations, including banks. That is why they prefer to mobilize own financial resources (or those of relatives and friends) instead of applying for credit or public financial support. Special case here is crowdfunding. In terms of its economic characteristics it is more close to internal organisation. We could conclude that alternative farmers internalize within the farm some of their input transactions in order to cope with the problems of high specificity (labour and knowledge), high uncertainty (land and seeds), or to save directly transaction costs (financial products).

Other forms of private mode. This governance mechanism requires strong organization, enforcement power, and (more often) huge financial resources. Bulgarian alternative farmers are small and relatively poor. They have no capacity to initiate and realize sustainable private modes. But some other – have it. For example – national and international organizations for voluntary labour. In fact, 89% of hired labour in alternative farms is voluntary. Applicants are selected and chosen by trusted organizations which know the exact needs of the farmers. Obviously private mode is expensive and impossible at that moment for Bulgarian alternative farmers. They could only joint existing mechanisms of this type.

Market mode. Farmers are not able to produce machines, fuel or vaccines. The only option is to by these resources form the market. It is important to mention here that these are rare transactions for alternative farmers – 87% of them never use any veterinary medicine services, 33% apply only manual operations (no machines), 75% – predominantly manual labour, 13% do not use any fossil fuel, energy for 25% of the rest come from renewable sources. The situation with output transactions is different. All of interviewed farmers declare that they produce to sell. Market is a natural canal in this case. But they use it in specific way as it will be shown below. Summary: market mode is preferred for standardized resources (low uncertainty), and final goods (high frequency);

Public modes. The results of our survey show that this is the most undesired governance mode. 73% of the farmers have never received subsidy (80% of them declare that they do not want it), no one trust in government standards, only 8% have registered themselves officially as organic producers, even they are in fact. The situation is the same for hybrid modes. Farmers of our group have neither willingness nor power to initiate such forms;

Institutional modes. The situation here is contradictory. From one side, farmers do not like formal institutions. Problems in registration of the land, in access to water for irrigation or to electricity, in communication to local and central administration have faced 84% of the farmers. On the other hand, they use intensively informal institutions. Their business is based mainly on reputation and trust. As it was mentioned above, they use market for some of their input and for the most of their output transactions. But this usage is in special way. They insist that they need of unique resources (seeds and labour for example) and produce unique products. Try to avoid competition and to replace it by stable, long term contacts with suppliers and buyers built upon full confidence and best faith. Thus alternative farmers solve the problems with high specificity and uncertainty, with information asymmetry and hostile official institutional framework.

Table 1. Governance modes of Bulgarian alternative farmers

	Reasons to use or not use of governance modes				
Transactions	Private		Market	Public, hybrid and formal institutions	Informal institutions
	Internal	Other			
Land supply	High specificity& uncertainty			Lack of capacity	
Labour supply	High uncertainty	High uncertainty			Need of trust and confidence
Machines, mechanical services			Low uncertainty		
Technologies, knowledge	High specificity, uncertainty& frequency				
Transport			Low specificity& uncertainty		
Veterinary medicine			Low specificity		
Seeds and sow materials	High specificity, uncertainty& frequency				
Energy and fuel			Low specificity& uncertainty		
Long term assets			Low uncertainty		
Bank financial products	High transaction cost				
Other financial resources					
Marketing of the products			In specific way		Need of trust and confidence

Conclusion

The production of safety food is business as any other that does not require special public financial support. Our study showed that this business follows the common economic logic. As Adam Smith once argued, business people need only *peace, easy taxes, and a tolerable administration of justice: all the rest being brought about by the natural course of things*¹.

The main lesson researchers and policymakers should bear in mind is that the people involved in this business (both producers and consumers) are different. From a mainstream economic perspective, they could be described as non-rational and following profit (or utility) maximization principle. Yet this view is wrong. Simply they have different values. Once this concept is understood and embraced, the people involved in agriculture will be seen as economic agents in the traditional sense.

The results presented in this paper are by no means the end of the journey. As our evidence suggests, ecological farmers resort to a common governance mode in doing business. Yet, along with their partners and clients, they also develop specific modes to manage their relations. Moreover, the institutional modernization that has been underway is a unique and challenging issue for further research. These issues have been the research topic of our ongoing study and will soon be published. They naturally comprise a research area for other studies and theories.

Acknowledgments

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¹ Smith wrote the famous "1755 paper" fearing that his ideas (on invisible hand mainly), presented during his lectures at the University of Glasgow, might be plagiarized. Dugald Stewart (Smith's first biographer) quotes the article in his presentation to the Royal Society of Edinburgh in 1793 three years after Smith's death. Unfortunately, the original paper was later destroyed. For more, see Kennedy, 2005, p. 241

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FOOD SAFETY: TECHNOLOGIES AND GOVERNANCE

Abstract

This study is a result of collaboration between Chinese and Bulgarian researchers during the last few years in the field of environmental economics and food safety. Suitable technologies in the area are developed. Yet proper economic models for their practical applications are still missing. The so called ecological agriculture is a tale of frauds and wasted public funds. Most of the studies and research in field are also not good enough. In our analysis we apply the methodology of the New Institutional Economics School in order to interpret and outline the economic logic of the manner in which real ecological farmers manage their business relations. We describe the economic sense lying behind their activities that could be improve their understanding of their essence and guide them how to carry out the much needed institutional modernization. This would will be useful every individual and for the society at large. This paper, as well a few others published over the last two years, is an early attempt for modern, economic examination of environment-friendly agriculture (with a special focus on food safety) and its sustainability.

Key words: China, Bulgaria, food safety, transaction cost, governance modes.

JEL: H41, N54