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VALUE OF AGRICULTURAL EXTERNALITIES
ON THE EXAMPLE OF AN AGRITOURISM FARM

Key words: agricultural externalities, public goods, sustainable agricultural development, multifunctional agriculture

ABSTRACT. EU agricultural and agrienvironmental policies design is to improve the provision of environmental public goods and positive externalities (or to reduce negative externalities). In turn, the comprehensive identification and analysis of agricultural external economies involve a need for developing a dedicated valuation methodology. The aim of the article is to review methods of valuation of farm agritourism and an attempt to evaluate the farm's agrotourism value (based on a case study). Considerations were based on a study of scientific literature and own research. The study focuses on presenting valuation methods for external economies, and proposes a methodology for the valuation of some illustrative positive externalities of agricultural production and of natural environmental resources regarded as public goods. The novelty of the analysis concerns its approach – a transition from theoretical considerations to the operationalization of the problem – the article presents a sample of valuation of the agri-tourism value of a farm, defined as the value of a specific location resulting from the natural beauty of the landscape and leisure services produced by environmental assets. Research (surveys among tourists) was carried out in the selected farm located, in a small village by the Baltic Sea, on the outskirts of a National Park. Analysis of the results indicate that landscape features associated with agricultural activities positively influence the demand for rural tourism. The value estimated by the Travel Cost Method (TCM) amounted to PLN 3,767,325 (approx. EUR 876 thousand). The amount shows the importance of externalities generated by the farm.

INTRODUCTION

A characteristic feature of agriculture is the presence of multiple side effects of farming – externalities – which may either be positive or negative. Positive externalities (benefits) are related to the multifunctional and sustainable development of agriculture (in addition to foodstuff, agriculture delivers other "products" referred to above: non-tradable goods and services with a positive impact on the natural environment). Negative externalities, on the other hand, like external costs, may result in the degradation of natural resources (landscape, biodiversity or soil fertility), if, for instance, improper agricultural practices are used. [Baum, Śleszyński 2009].

On a European-wide basis, agricultural support tends to rely on intermediate measures, which means support for rural areas. A network of instruments for the protection of the

natural and cultural environment is being developed to improve the viability of rural areas. As prices will increasingly be strongly determined by the global market, direct support instruments (especially price support instruments) for farmers will become less and less important in the future. This explains the major and growing role of non-market functions of the agricultural sector in its further development. Therefore, the analysis of economic viability must go beyond direct microeconomic benefits determined by the market. It is in the public (macroeconomic) interest to protect the "silent" market players (future generations, social values, the environment), while also minimizing external costs and stimulating the delivery of public goods (external benefits) [Adamowicz 2005, Wilkin 2009, Zegar 2007, 2012].

If external costs and benefits are to be covered by production function models, the problem of how to appraise externalities requires addressing. Economists openly say: "it is difficult, if not impossible, to measure externalities; a Chicago economist is one who is only about to discover them" [Landreth, Colander 1998, p. 87].

Therefore, there is increasing demand for the appraisal of agricultural and rural externalities involving the following prerequisites: a complete analysis of the economic viability of agricultural production; the construction of financial support instruments for farmers to compensate them for the delivery of environmental services; an analysis of social costs and the benefits of municipal investments as well as an estimation of environmental penalties and duties, etc.

Increasing awareness of the farmers' role in the maintenance of rural landscapes may contribute to a reassessment of agriculture's role in society. This paper focuses on the importance of the rural landscape for tourists. In other words, is there a societal demand for external effects provided by the so-called multifunctional agriculture [Vanslembrouck et al. 2005]?

The purpose of this paper is to review valuation methods for externalities and an attempt to assess the farm's agrotourism value (based on a case study). Considerations are based on a scientific literature study and own research.

DEFINITION OF EXTERNAL ECONOMIES

External economies (externalities) is a term first used by Alfred Marshall [1890], a Briton and one of the founders of neoclassical economics. The research on external economies was developed and incorporated into economic sciences by Arthur C. Pigou (1887-1959), the co-author of welfare economics. In welfare economics, A.C. Pigou distinguished between private and social benefits and between private and social costs. He referred to the divergence between private and social benefits or costs as "external economies," which is consistent with today's definition of the term [Pigou 1932].

The *Dictionary of Economics* defines external economies as a benefit or cost resulting from an activity yet not assigned to a person or organization who performs it [Black et al. 2009, p. 160]. To put it in other terms, the result of external economies of market goods is that specific goods and services are not only used by those who purchase them but also by other consumers for whom such goods or services represent a benefit or disadvantage.

Therefore, external economies may be both positive or negative, depending on the circumstances [Samuelson, Nordhaus 1995, p. 91, Samuelson, Nordhaus 1996, p. 236, Stiglitz 2004, p. 254]. This is perfectly illustrated by the positive effects of preventive vaccination and the negative consequences of environmental degradation. Sometimes, external economies are mistakenly assimilated to side effects, i.e. epiphenomena of certain events or areas of human activity (for instance, occupational diseases and accidents at work are a negative side effect of production activities) [Wesołowska 2004].

OVERVIEW OF METHODS FOR THE VALUATION OF EXTERNAL ECONOMIES

Economic literature presents numerous methods for the valuation of external economies [Maciejczak 2009, Grzelak 2010, Graczyk, Kociszewski 2013, Novikova, Stulginskis 2014]. The most often mentioned methods are: travel costs, hedonic pricing, contingent valuation (WTP and WTA), production effects, human capital (illness cost method or health production function), cost minimization, declared preferences, action–reaction, costs of lost benefits (opportunity), the replacement (reinstatement costs) method and the preventive method. Based on the procedure for the valuation of non-market goods, generally, the above-mentioned methods may be classified into two groups: direct and indirect. In the first group, economic values are determined by assessing substitute markets, where people sell and buy goods that are complementary to the one in question. The second approach addresses a hypothetical market, where the good could be bought and sold. In this method, people are asked directly about their Willingness To Pay (WTP) for what they do not own or about their Willingness To Accept (WTA) compensation for abandoning something they have [Żylicz 2013].

These methods have their limitations and are mainly based on artificial structures and intermediate estimations which, in turn, involve many assumptions and an extended mathematical approach. As a consequence, different methods often provide different results. It is very difficult to estimate the human impact on growing environmental threats (today or in the future).

If the economic models fail to include negative and positive human impacts, some forms of activity may be overestimated or underestimated (as regards agriculture, this could be the case for industrial fattening or extensive grazing, for instance). Such errors will blur the image and distort the valuation in a general social perspective. Therefore, it seems imperative to identify the non-market functions of agriculture (in addition to identifying its market functions). Their identification is a multidimensional problem because of the complexity of interactions between agriculture and its environment [Wilkin 2009].

According to Aleksander Grzelak [2010], even though multifunctional agriculture is relatively inefficient from a microeconomic perspective (output/input ratio), it adds more value to the socio-economic system, if such external economies are taken into account. Finding the optimum between the maximization of microeconomic output (at a farm level) and the reduction of negative external economies (while promoting positive externalities) requires taking institutional measures to internalize the effects. The measures

include: disincentives in the form of fees (e.g. environmental fees), and penalties or taxes (Pigou tax) imposed upon exceeding certain norms; incentives which promote specific environmentally-friendly behavior, the implementation of the Code of Good Agricultural Practice, the establishment and refinement of property rights (the Coase theorem); and actions taken to include the above elements in the cost–benefit analysis.

VALUATION OF SELECTED EXTERNAL ECONOMIES OF AGRICULTURE – THE AGRI-TOURIST VALUE OF THE FARM

Below, one may find an example of a methodology for estimating the value of agricultural externalities. The positive effects (benefits) subject to valuation are related to the multifunctional and sustainable development of farms and are characteristic for the preservation of the rural landscape and biodiversity of agricultural ecosystems.

The agri-tourist value of a farm (defined as the value of a specific location as a result of the natural beauty of the landscape and leisure services produced by their environment (individual assets) was analyzed. The assumption was made that such activities as strolling, nature spotting, camping, barbecuing and smoking of meats etc. would be impossible without the land on which such activites take place (leisure services are enabled by the use of natural resources which are available within the farm ecosystem and are taken care of and preserved by the farmer).

The Travel Cost Method (TCM) may be expected to be one of the most suitable methods for the valuation of the leisure and tourism functions of farms. As a main advantage, it is based on observable human behavior, which makes it a reliable approach. TCM is the oldest method for the valuation of environmental resources. It was first proposed by Harold Hotelling (1949), an American economist, and was broadly used in the US to determine the value of recreational venues, such as parks and areas of high landscape values. The method is essentially based on the assumption that the value of the area under consideration is reflected in travel costs incurred by consumers: the more they value the destination, the more they are willing to pay for traveling there (their interest is driven by specific real services provided by the environment: trekking, swimming, fishing etc.). Therefore, the costs incurred may be considered as the value of the area or the probable price the public is willing to pay to preserve its usability [Shechter 1996, Panasiuk 2001].

Two versions of the Travel Cost Method exist: costs of traveling from a given zone and individual travel costs. This paper proposes the use of the second approach which is based on a survey asking tourists (people who traveled to and stayed in an agri-tourism farm) about the number of visits per year and the travel costs incurred: transport costs, the value of time spent on leisure activities, accommodation costs and other local expenses.

The detailed questions included in the survey should address the following: the number, age, gender and degree of relatedness of people traveling as a single group; the number of visits to the farm within a year (and the total number of visits); the place of residence of the tourists; the distance traveled (km); information on the route traveled (direct or indirect); the means of transportation (e.g. vehicle type and engine capacity [cm3]); the

estimated cost of traveling (including fuel, tickets etc.); the time and estimated cost of traveling; the duration of the stay (number of overnights); accommodation and catering expenses (an increase of expenses in eating-out compared to households); and the potential loss of remuneration, if any, related to the holiday trip (obviously, the best option would be to survey all visitors to an agri-tourism farm within a year) [Baum 2014].

Travel costs (C) are calculated as:

$$C = (Ct + Ctl + n \cdot Cda + Cc + Clr) \tag{1}$$

with:
Ct – transport costs,
Ctl – costs of time lost (when traveling to the farm),
n – number of overnights,
Cda – daily accommodation costs,
Cc – catering costs incurred during the stay (excess over catering costs incurred at home),
Clr – costs of lost remuneration.

The value calculated above may be regarded as the agri-tourism (service) value of the farm. If the farm (a house building with guestrooms and infrastructure) is considered to be an object with a limited lifetime, the present value of the annual flows of agri-tourism service values may be calculated for the expected further lifetime (the year of construction needs to be determined, and the remaining lifetime has to be estimated based on expected operational life). Next, under the assumption that the interest in spending holidays at the farm will remain at a base year level, the *Net Present Value* (NPV) may be calculated for that period. Since it is still difficult to reliably assess the inflation rate in subsequent years, the best option is to adopt a simplified approach with constant prices and a discount rate which does not include inflation. In this case, the real interest rate on secure assets (e.g. 10-year bonds) may be used as the discount rate. For example, if the annual (year 2018) interest rate on these assets was 2.8% and the inflation rate was 1.8%, the real interest rate would be 1%. Once the discount rate is set, the agri-tourism value of the farm may easily be calculated [Baum 2014].

The calculations do not require any tourists to be excluded, unlike the valuation of national parks or natural reserves (e.g. children from a school trip who do not make an independent decision to come) where traveling costs should not be calculated. Combined trips are a methodological difficulty in the TCM because the location considered is only one part of the journey. One way to solve it is to specify the percentage share of the farm in total trip costs which, however, may be difficult for the interviewees. Another problem emerges if the tourist trip involves visiting other destinations located nearby (which often happens). It also remains debatable whether accommodation costs should include fees related e.g. to entrance tickets for national parks and museums, beach parking costs etc., (it seems this should not be the case because these expenses do not add to the tourist value of the farm under consideration).

RESEARCH RESULTS

The preliminary surveys were carried out between June and September, in a selected farm, located in a small village by the Baltic Sea (on the outskirts of a National Park). The proximity of the sea, the forest and a lack of industrial plants within a radius of several dozen kilometers, affect and constitute the landscape and health values of the place. At the disposal of holidaymakers, the farmer offers a renovated house from the 1930s with three independent apartments (two, two-room apartments and one, one-room flat) with separate entrances and bathrooms. Each flat is equipped with a fireplace and a kitchen (annex), which provides freedom to prepare meals. There are parking spaces outside the house, and, on the farm, it is possible to put up tents (up to three at the same time) or a caravan/camper van. The campsite is equipped with electrical connections and sanitary facilities. The farmer provides agritourism services throughout the year, including holidays. In winter, the rooms are heated. The guests can arrange bonfires on the farm, use the grill and smokehouse fish. The opportunity to play in the garden (sandpit, pony, rabbits) is an attraction for children. The owner can organize carriage rides and rent bikes, too. The area offers a lot of opportunities for active recreation. The biggest attractions include: the sea beach, moving dunes, the open-air museum, the natural museum, bicycle routes and viewpoints.

The survey was completed by 38 people. This number corresponded to the number of groups of tourists (the size of individual groups ranged from 1 to 5 people), in a total of 105 visitors travelling in groups. The vast majority of the surveyed groups (about 92%) came to the farm directly from their place of residence. Only 3 groups did not come from home (they combined a holiday trip to the farm with an earlier visit elsewhere). Most of the groups (30) came from Poland (including 1/4 from the Wielkopolska province) and 8 groups came from abroad (6 from Germany and 2 from the Netherlands). Foreign groups were, at the same time, the least numerous (most people were retired, lonely, traveling without children) – there were only 16 people (approximately 15% of the total number of vacationers). Most people came from large cities (Warsaw: 5 groups, 14 tourists, Poznań: 4 groups, also 14 people).

The average distance traveled by tourists arriving at the farm was 441.4 km (due to the participation of groups from Germany and the Netherlands). The largest distance was 1051 km and the smallest 33 km. The respondents most often came by car (25 groups – 77 people). This group also included the largest number of children under 18 (25 – 23.8% of all tourists). Five people (in 3 groups without children) traveled on motorcycles, five other groups (10 adults and a child) came to the farm by camper van, three families (9 people, including 3 children) by car with a caravan. Students and one solo traveler chose the following combination: train + walking or train + bicycle access.

The duration of stay of tourists ranged from one day to two weeks (the average time is about 7 days: 7.4 for tourists using apartments and 6.4 for vacationers on the campground). Two groups of tourists among the surveyed stayed in the summer for the second time in the analyzed farm. Among campers, the vast majority (76.3%) declared that they had already been on the farm earlier (some come every year, others every few years).

The survey shows that the total cost of travel for all groups (38 visits) amounted to PLN 16,295.74 and the average cost per trip (PLN per one person) was PLN 155.20 (in apartments: PLN 99.91, on the campsite: PLN 307.24). The length of the journey was also very diverse and varied from less than three hours to even two days. Of the 38 respondents, only two determined the value of the time spent on the trip. Lack of response from other respondents indicates that most tourists do not attach much importance to the value of time allocated for access. Another cost incurred by visitors was the cost of accommodation. Accommodation prices in apartments depend on the solution chosen (level of equipment and room category), duration of stay, number of people in the group and season. The total cost of all nights in the analyzed period (62 days) in question amounted to PLN 25,264. The average cost of accommodation per one person (for the whole stay) amounted to ~PLN 241 (PLN 298 – flat, PLN 84 – camping). The costs related to the increase in spending on meals during holidays (PLN 13,025 in total) were defined by respondents at PLN 124 per 1 person (PLN 154 in apartments; PLN 41 at the campground). Out of the respondents, only one tourist from the capital (representing the so-called freelance occupation) stated that a stay on the farm (4 days) resulted in a reduction of his income by PLN 1.5 thousand. Other people rested during paid holidays, were already retired or were not yet earning (students).

According to information, obtained from the owner of the agritourism farm, on the use of rooms and camping throughout the year (average every year), the total number of groups (and tourists) of visitors and vacationers on the farm was established. Next, the annual travel costs (C) of all tourists were determined. They amounted to PLN 218,699.67 (total of 442 tourists in 150 groups). This value can be considered to be the agritourism value (services) of the farm. If we treat the farm (including a building with rooms for vacationers with infrastructure) as an object of limited durability, we can calculate the current value of the stream of annual values of agrotourism services in the anticipated, further period of operation. The estimated – by the expert method – further life of the building for vacationers is 19 years. Assuming that, in the following years, interest in leisure on the farm will be maintained at its current level, the NPV was calculated for this period (with the previously described assumptions regarding the discount rate). The farm's agritourist value amounted to PLN 3,767,325 or EUR 876,122 (according to the average exchange rate of the National Bank of Poland from the beginning of 2019, EUR 1 = PLN 4.30)

FINAL CONSIDERATIONS

Today, highly developed countries pay less and less attention to the need for food security, while increasingly focusing on the protection of agri-ecosystems. This is particularly important for agriculture since it generates considerable externalities, both positive and negative (the externalities depend on the agriculture model underpinning the production of agricultural commodity). The market mechanism automatically triggers excessive production of negative externalities and insufficient production of positive externalities to address social needs. Therefore, it is imperative to implement political measures to narrow

the gap between economic competitiveness and social competitiveness which result in attaining economic and social optimums, respectively [Zegar 2012].

Some attempts to regulate externalities of economic activity can be seen in EU policy and intentional measures taken by particular countries to reduce or internalize external costs and support public goods. The CAP reforms, including the introduction of instruments for the restoration, preservation and enhancement of ecosystems dependent on agriculture, have a potential impact on the occurrence of external economies (a reduction of external costs) and on the support for (creation of) public goods, especially as regards soil protection, agricultural biodiversity and the health quality of food.

The valuation of environmental resources and external economies generated by agriculture is becoming a major challenge for economists. Continuously improving scientific methods for the valuation of non-production functions (including public functions) of agriculture are not yet fully accepted in economic practice for various reasons (subjective ratings, absence of relevant legal regulations or the inability to use the relevant legal regulations in agricultural accounting). Therefore, it is imperative to disseminate the broad range of tools for the analysis of public goods, including valuation methods.

The research confirmed the usefulness of the chosen valuation method. The value estimated by the Travel Cost Method (TCM) amounted to PLN 3,767,325 (approx. 876 thousand EUR). The amount shows the importance and "preciousness" of externalities generated by the farm. Analyses of results indicate that landscape features associated with agricultural activities positively influence the demand for rural tourism.

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WARTOŚĆ EFEKTÓW ZEWNĘTRZNYCH ROLNICTWA NA PRZYKŁADZIE GOSPODARSTWA AGROTURYSTYCZNEGO

ABSTRAKT

Unijna polityka rolna i rolnośrodowiskowa zmierzają do poprawy dostarczania środowiskowych dóbr publicznych i pozytywnych efektów zewnętrznych (lub zmniejszenia negatywnych efektów zewnętrznych). Kompleksowa identyfikacja i analiza efektów zewnętrznych generowanych przez rolnictwo nasuwa z kolei potrzebę opracowania metodyki ich waloryzacji. Celem artykułu jest przegląd metod wyceny efektów zewnętrznych oraz próba określenia wartości agroturystycznej gospodarstwa (na podstawie studium przypadku). Rozważania oparto na studium literatury naukowej oraz badaniach własnych. W pracy skupiono się na przedstawieniu metod wyceny efektów zewnętrznych oraz zaproponowano metodykę wyceny przykładowych korzyści zewnętrznych produkcji rolnej oraz zasobów środowiska przyrodniczego, mających charakter dóbr publicznych. Novum analizy polega na przejściu od rozważań teoretycznych do operacjonalizacji problemu – przedstawiono próbę wyceny wartości agroturystycznej gospodarstwa, rozumianej jako wartość miejsca, wynikająca z walorów krajobrazu oraz usług rekreacyjnych produkowanych przez dobra środowiska. Badania (ankietyzacja turystów) przeprowadzono w wybranym gospodarstwie agroturystycznym, położonym w niewielkiej miejscowości nad Bałtykiem na obrzeżach Parku Narodowego. Analiza wyników wskazuje, że cechy krajobrazu związane z działalnością rolniczą pozytywnie wpływają na popyt na turystykę wiejską. Wartość ustalona przy wykorzystaniu metody kosztów podróży (TCM) wyniosła 3 767 325 tys. zł (około 876 tys. euro). Kwota obrazuje znaczenie efektów zewnętrznych generowanych przez gospodarstwo.

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