



## SELECTED LAND MARKETING TOOLS. PART ONE: A METHOD OF ASSESSING IMPACT OF LINEAR- -INVESTMENTS ON ARABLE LANDS

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### Summary

The first part of the paper presents a method of assessing impact of a motorway on arable lands, which can be used as a tool for estimation of losses resulting from a motorway's construction. The method of simplified assessment of impact of linear investments on the spatial structure of arable lands is analysed in detail. The losses were determined in a detailed analysis of variations in land use, soil quality class, layout of access roads leading to lands situated along the axis of a planned motorway. The accepted measure of multidirectional impact of a motorway on arable lands is expressed in change of lands' value. This method can be applied as a tool for selection of optimal motorway route and its preparation for buying or exchange of part of lands designated for investment.

### Keywords

value of arable lands • motorway impact • farm's layout • land marketing

### 1. Marketing in trade of land

The marketing in trade of land corresponds to the following laws: The Real Estate Trading and Management Act (Ustawa o gospodarce nieruchomościami), Construction Law Act (Ustawa Prawo budowlane), The Act on the Acquisition of Immovable Properties by Foreigners (Ustawa o nabywaniu nieruchomości przez cudzoziemców), The Act on Premises Ownership (Ustawa o własności lokali), The Act on Land and Mortgage Registers (Ustawa o księgach wieczystych i hipotece), The Act on Geodesic and Cartographic Law (Ustawa Prawo geodezyjne i kartograficzne) and others. The legislator introduced a term of "agricultural property" not covered by spatial development plan. Regardless of their location, whether it is in the city or in a country, the land plots are subject to trade control. The lawmaker also introduced a notion of a "farm", which means an area no smaller than 1 ha of arable lands. In case of sale of arable land that is a part of a farm, the approval of the Agricultural Property Agency is required.

The most important changes in the land trading system impose restrictions on sales of agricultural properties, if the purchase leads to division of a farm. The rules concerning pre-emption rights are changed too. From this year, not only a leaseholder, but also a farmer – if he or she owns an agricultural real estate bordering on the property which is on sale – is granted the pre-emption rights. The acreage enabling the Agricultural Property Agency to claim pre-emption rights has also been changed – from 5 to 1 ha. Other significant changes brought about by the new regulations are the measures restricting the possibility of purchasing an Agency property by all entities, if after the purchase they would possess more than 500 ha and in case of individual farmers – more than 300 ha. The current rules have been complemented by the requirement that any agricultural property ever purchased from the Agency should be included in these limits. The regulation granting pre-emption rights to former owners or heirs of an agricultural property belonging the Treasury has been repealed. The amended provisions significantly increase the role of social factor in land distribution, both on the general and state level. Among the factors influencing the value of a land property are: a status of Land and Mortgage Register, a study on the conditions and directions of spatial development, development conditions, infrastructure development. The amendment to the act, defining the rules on preparation and realization of investments in national roads and motorways, has created a new legal situation for the administrators of public roads and certified property valuers. Thus the problem arose of assessing value of land and its components for the needs of calculating the amount of compensation for expropriation of citizens' property and preparation of road investments.

## 2. The simplified method of impact assessment of linear-investments on spatial structure of arable lands

### 2.1. Introduction

The negative impact of a motorway on farms located in its vicinity can be assessed by numerous methods of valuation of arable lands [Cymerman 1992, Wilkowska et al. 1993, Harasimowicz 1996]. In the majority of cases a detailed analysis of each farm is required, which means that the process is very laborious. However the assessment of changes in values is necessary to determine adequately the amount of compensation for losses caused by the construction of the road. The simplified methods of assessing motorway's impact may be used at the initial phase, when various variants of its route are considered. The methods can be used to determine the impact of a motorway on agricultural lands, and they are less labour-intensive and sufficiently accurate [Bacior 2013].

The developed method of assessing motorway's impact on arable lands allows for the determination of the damages related to: the loss of arable lands designated for motorway construction, lower quality of arable lands located in the vicinity of the roadway, increased expenditures on agricultural transport and worse distribution of land plots. In each case the outcomes are obtained through an analysis of variability

of land use, quality of their soils and position of agricultural roads along the planned motorway. The obtained value of land would be approximate to the market value only in typically agricultural regions, where main attributes shaping the price of lands are their production potential. The computational procedure is carried out by means of a calculation software written in a Visual Basic programming language, in which Microsoft Excel spreadsheets are used.

The process of impact assessment of motorways can be divided in three stages, leading to the final outcome:

- 1) estimating input parameters obtained through an analysis of a motorway's route put on a cadastral map,
- 2) determining variability of features of lands located within the reach of motorway's and roadway's impact, because these attributes determine their value; the features characterise the area and the quality of lands designated for a motorway construction and those affected by its harmful impact, the prolongation of access roads leading to lands and deterioration in lands layout,
- 3) calculating the decrease in value of agricultural lands caused by motorway construction.

## 2.2. Determining input parameters for assessment of motorway's impact on arable lands

In order to determine the parameters it is necessary to put motorway's route on a cadastral map. Along the motorway axis one needs to single out and number points in which the class or use of lands would change. Intersections of motorway axis with roads leading to lands need to be taken into account as well as all access roads to lands, including those classified as arable lands and those significant for local transport.

The calculated sums of lengths of sections passing through the marked arable lands and their quality of soils allow to determine the diversity of classes and quality of lands located along the motorway's route.

Determining the lengths of gathering basin identifying areas that can be accessed through the motorway is an important part of the process. The product of length and width of gathering basin equals the area, the access to which requires crossing a motorway lane. In this column the sections of roads with planned motorway flyovers should be ignored. The number of land plots crossed by the motorway axis and the characteristics of their layouts will allow to assess the motorway's impact on the shape and size of land plots.

Determining the occurrence of protective green belts is also important. The presumed width of the belt is 30 m on each side. The information about the occurrence of protective green belts is used to calculate the area of construction and the decrease in value of lands in the vicinity of the motorway.

### 2.3. The area and the quality of lands reserved for motorway construction

The size of lands reserved for motorway construction is usually determined by a direct measurement taken on a map with the motorway project. The sizes of these areas can be estimated on the length of the sections passing through the marked kinds of arable lands and their soil quality measured along the motorway axis. The total width of the a motorway lane ranges between 70 and 130 metres.

The size of lands is calculated as the sum of the products of the sections measured on the motorway axis and its width of a given section.

Examination of changes in quality of lands located along a motorway axis can be used to evaluate the quality of lands situated within the zone of motorway's impact. The area of lands exposed to harmful impact of traffic pollution includes two belts of lands on each side of the motorway of 50–100 m width [Curzydło 1994, Wilkowski 1995].

The size of lands situated in the zone of negative motorway's impact is the sum of products of lengths of measured sections along the motorway axis and the width of the motorway's impact belt, which depends on the occurrence of protective green belts – and their width is 15–30 m. In places where there are green belts the zone of the motorway's impact is reduced from 90 to 50 m [Bacior and Harasimiowicz 2002, Bacior 2013].

It is estimated that the drop in quality and productive and profit-making potential of lands in the zone of motorway's impact is a half or one soil class, and expressed in percentage points the drop is between 20 and 40% [Curzydło 1994, Wilkowski 1995].

### 2.4. Prolongation of access roads to lands

The motorway crosses many local roads causing considerable disturbances in access roads leading to lands, which means they can be reached through diversions in the form of flyovers constructed in key sections of local roads.

In order to assess the change in agricultural transportation caused by the construction of a motorway, it is necessary – in each case of a road intersected by a motorway – to quantify the scope of lands that can be accessed through the motorway, and the increase of length of road leading to that area.

The increase of distance to lands, access to which leads through a motorway, can be easily estimated as an average distance between the roads intersecting motorway. The area is determined for roads intersected by a motorway's lane and having no flyovers.

The length of part of road's gathering basin, access to which requires crossing the motorway, ranges from 100 to 600 m [Harsimowicz 1998]. To adequately assess the width of belt of lands that require passage through a motorway the knowledge of regulations governing the agricultural transport is necessary. A detailed analysis of farmsteads layout, the arrangement of agricultural roads and boundaries of their gathering basin is also requisite.

The size of lands, access to which requires crossing the motorway, is the product of the length of an examined motorway's section and average width of that area.

### 2.5. Deterioration in the land plots layout

The motorway intersects the existing arrangement of land plots and thus has a negative influence on their layouts. The land plots crossed by motorways are usually shorter and smaller. In order to assess the scope of deterioration in land plots layout, one identifies a number of land plots with changed layout and an average extent of the change. The proposed method of assessment requires calculating the number of plots intersected by a motorway axis, and their length and width.

### 2.6. Determining a decrease in value of arable lands in the sphere of a motorway's impact

The presented method of assessing changes in value of arable lands due to a construction of a motorway takes into account only productive aspect of these lands [Harsimowicz 1996].

In this method all essential directions of a motorway's impact on arable lands are taken into consideration, such as:

- taking over of lands for construction of a motorway,
- the increase of expenditures for agricultural transport and deterioration in land plots layout,
- drop in the value of lands located within direct vicinity of a motorway.

The value of lands calculated by this method is not related to their market value and is not an information that can be used in purchasing these lands for investment. It should be regarded as an indicator of productive usefulness of arable lands, determined on the basis of a parcel's and farmstead features. The object of interest here is not the scope of the change in the value caused by the construction of a motorway and its negative impact.

The decrease in value of lands as a result of constructing a motorway is directly linked to the change of their characteristics significantly affecting their agricultural productive usefulness. The decrease is estimated as a difference in value of arable lands measured before and after the construction of a motorway [Harasimowicz 1998].

## 3. Conclusions

The presented method takes into account all major directions of a motorway's impact on arable lands. The simplified method of assessing the impact of linear investments on the spatial structure of arable lands is not labour-intensive, due to simplifications introduced in the evaluation of a motorway's impact. These modifications reduce the scope of output data used for the analysis of a motorway's route and automatize the calculations by means of a software written in Visual Basic language in which Microsoft Excel spreadsheets are used. The method can be helpful in the preliminary

assessment of a motorway's impact on arable lands, carried out already in the stage of taking decision about a motorway's route and it can be useful in the evaluation of considered route variants of motorway's sections.

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