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The integrated use of digital aerial orthophotos, satellite images and cadastral data in aid applications control in the frame of Polish IACS

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ABSTRACT: ACS / LPIS in Poland can be established with the use of aerial orthophotos and satellite images supported by cadastral data. The spatial pattern of parcels and farms shows that it is difficult to choose between "ilot" and cadastral system as parcels of reference. The best practice recommended by JRC is to use actual and recent digital orthophotos for LPIS implementation. On the other hand the whole country area is covered by cadastral maps connected to parcel registers. Unfortunately cadastral data formats and quality are not suitable for direct use in the IACS. In this paper some remarks on data integration in one well designed IT system are presented.

1 INTRODUCTION

One of the crucial elements permitting the proper implementation of the Common Agricultural Policy in the new Member States is the creation of the Integrated Administration and Control System (IACS). IACS is the main tool in area-based subsidies management and farmer aid application control. This system is composed of some basic parts like Farm Register, Land Parcel Identification System (LPIS), etc. Each part of IACS can be established using the source data originating from other databases related to agricultural and geodesic administrations or insurance and taxation offices. Therefore IACS is an information system, the complex system composed of many elements, often mutually conjugated and in major part “geographically referenced”. There are many features distinguishing IACS from other information systems.

2 SPECIFIC FEATURES OF IACS RESULTING FROM ITS TASKS

The features of IACS result from:

- types of tasks;
  - farm and livestock register management, aid application database management,
  - carrying out the aid applications control,
  - allocation of subsidies.
- complexity of tasks;
  - some tasks can be considered to be the processes,
  - attendance of some tasks must be based on modules and subsystems,
- multi-institutional interoperability in the system functioning;
- use of data issued from other information systems for aid applications control;
- aid applications management considered to be a “mass-process”;
- cyclic and periodic character of the tasks;
- external control and audit.

In the EU Regulation No. 1258/99 it is stated that only payments carried out through the accredited Payment Agencies can be financed by EAGGF (European Agricultural Guidance and Guarantee Fund). The national Payment Agencies can be accredited only if they can prove that:

- aid applications are controlled before the payment transfer and they conform to EU rules,
- payment is well-registered in an accountancy register,
- the necessary documents are delivered to the European Commission in due time.

As it results from above-mentioned conditions the accreditation (certificate) can be attributed to the Agency equipped with the IACS system guaranteeing the conformity of the payment procedures to EU regulations. The main condition to fulfil to maintain

this accreditation in force is the open access for external control.

IACS is an IT system and it must therefore evolve together with dynamically developing computing technologies (e.g. Internet technology). From this point of view it is advisable that the IACS system has the properties described in the next chapter.

3 EXPECTED PROPERTIES AND REQUIREMENTS

It is desirable that the IACS-IT system should adapt to the newly developing IT technologies and tools. These requirements can be met with:

- modular architecture of the system ("physical" separation and independence of tables and entities for "Area" and "Livestock" part of the Farm Register conserving however its functional relationships establishing the "link" between both parts of Register for the same farmer),
- modern programming environments – for ex. RDBMS, separation of data resources from application program which can evolve together with programming tools development,
- LPIS built in GIS environment,
- flexibility of the system, open access to input of changes in algorithm of payment calculation.
- report generating flexibility (modification of report content following changes in administration needs and competencies),
- application program creation using three-layer architecture and client-server technology.

4 LEVELS AND STEPS OF THE CONTROL

The authors postulate the realization of the control on several levels and in few stages. Two levels of control are proposed:

- first level (aggregated) – verification whether the declared crop areas do not exceed the whole area of arable land within the farm,
- second level (detailed) – verification whether the applicant for subsidy is the entitled user of declared cadastral parcels (this can be stated on the basis of the cadastre) or leaseholder.

The proposed steps of the control:

- formal control of the applications,
- administrative (semantic) control of conformity of the applications with cadastral data,
- field visits for checking of randomly chosen applications (verification of declared crop and parcel area with the "ground truth".

The aggregated and administrative control should be carry out for *all* applications. On the spot inspection and check can be then done on the basis of risk analysis. The risk analysis consists in comparison of the application with those declared in the past years. The risk increased is observed for the declared parcels with the large areas.

5 DATA INTEGRATION FOR MINIMIZING OF THE SYSTEM FAILURE RISK

A well designed system will produce the proper results and the system operator will be sure that the control process is well done on each level and in each stage. If the cases of discrepancy between the results of detailed control and aggregated control of an application sample appear it means that it is very probable to detect the same cases during external (EU) control in other sample applications. This is a case of the evident system failure leading to the penalties not only for the farmer but first of all for the Member State.

The effectiveness of the control on detailed level depends on the chosen control methods. In the case of on-the-spot check the control means simple land use check and parcel area measurement. But the effectiveness of the control on aggregated level depends on quality of source data like coherence of data, completeness and up-to-date.

Data quality depends on used database models and principles of database updating. Lack of on-line access to the database leads to increase in databases redundancy and decrease of data coherence. As mentioned in the title of this paper the sources of data are very diverse (cadastre, farm register, maps, LPIS, orthophotos) and are stored in the resources of different institutions (IACS bureau, Cadastre Offices, Cartographic Offices,...)

The tasks of IACS are executed via processes like:

- data acquisition,
- data transfer,
- data exchange,
- data sharing.

The effectiveness of these processes grows if a Relational Database Management System is used for data handing. The failure in data exchange can be avoided by proper access to the data. The proper access means:

- technical access depending on hardware and software used, data and database models and possibility of access via the Internet;
- formal and legal access.

The effectiveness of the above-mentioned processes can be improved by means of ***data integration procedures*** aiming at a higher level of accessibility and cohesion of data issued from different systems. This integration takes place on two levels:

- formal and administrative level,
- technical level.

The first level gives the legal basis for sharing and exchange of data. The second one includes data structure standardization for data quality assurance. IACS-IT system should be able to integrate well-prepared multi-source data "physically" in the application program at the right time during the use of the system.

Presently many ideas of IACS implementation in Poland can be encountered. Some of them suppose that the system will be built with the use of cadastral databases. Unfortunately the Polish cadastral system is based on several software packages and the cadastral data are not easily dissociated from the main application. It means that there is no possibility to do the queries to cadastral databases and to use the ***cadastral data directly into the IACS***. To use these data in another system requires the data conversion and transfer. Furthermore, the majority of cadastral maps for rural areas is in analogue or raster form (recently scanned outdated maps). The preparation of cadastral maps in vector form and updating the content of cadastral databases is a time and money consuming process.

In this situation it seems reasonable to use the suitable part of cadastral data (cadastral register with alphanumeric semantic data) to create the farm register and it seems inevitable to build the LPIS upon aerial photos or satellite very high-resolution imagery. The option taking into account the use of very high-resolution satellite imagery for LPIS creation is rather costly and it seems that it is "the eleventh hour" for exploitation of recently taken aerial photos on the scale 1/ 26 000 for almost the whole country area in the frame of PHARE program (1995-1999). The relevant administration has to balance the pros and cons.

6 CONCLUSION

Regardless of the solutions adopted in IACS / LPIS creation for the Country it is highly recommended to pay particular attention to the trends in IT technologies development. A well designed system with well defined models and structures of data and databases can easily be modified in the future. Even if the hardware and software platforms are changing the stored data (current, recent, archived) can be properly exploited without the major risk of system failure.

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