

# **Technical and Organizational Factors Affecting the Operation of a Country Wide Information System for Land Valuation and Taxation: a Dichotomous Case in Estonia**

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## **Abstract**

To facilitate the transition of former centrally-planned Mid and Eastern European countries to a free market economy, the European Community initiates already over a decade aid plans in the form of PHARE programmes. Estonia is one of the countries that benefits from these programmes. Within this framework, the author headed a project in the time slot between October 1997 and March 1999 in which two Information Systems for land valuation and land tax collection purposes, respectively, have been designed, built and piloted. Once the piloting of both systems was completed in the beginning of 1999, it has been generally recognized that the two have been a technological success. Nevertheless, successful technological completion does not naturally guarantee successful operation in the long term. Now, after two years of completion, we confront ourselves –in order to arrive at insight in the good and the bad- with the question: are both systems in operation as envisaged and have the initial goals been achieved? The answer has both a sweet and a bitter taste. The first system, which operates at the Estonian Land Board – at both national and county level and designated Valuation and Transaction Information System (VTIS)- is operationally satisfactory. The other system, built for operation in the majority of municipalities and designated Municipality Information System (MIS), has not found acceptance. So, we face the rather unique circumstance that within one and the same project, two information systems have been developed, which appeared to be successful up to the stage of piloting. However, after that stage the success rate did diverge quickly. Why shows the one system a solid success rate, while the other ultimately shows so many deficiencies in its implementation and use? The present paper attempts to answer this dichotomous question. The overarching answer is that the success or failure of a system depends, first and foremost, on organizational issues and is also most importantly a matter of proper user involvement. The understanding of the rich and poor achievements of the above project are of interest for a larger, especially management oriented audience.

## **1. Introduction**

Presented in this paper are a number of considerations and issues which may set light on the reasons why the implementation of nation wide land information systems may become an operational success or why they become unexpectedly and regrettably a failure. We focus in particular on those systems, which are dedicated to land value, land use and land tax. Our considerations are based on our experiences gained during a project, financed from European Union resources and which lasted from October 1997 until March 1999. In the project two different land information systems -aimed at serving land value and land use determination, as well as land tax collection- have been designed, built and piloted. The country of operation was Estonia, a Mid-European country in transition, located at the northwest border of Russia. As a Mid-European country, Estonia is now in the midst of a process of transition from a centrally planned to the free market economy. The corner stone in such a process is the property market. During communism period, lasting half a century, Estonia was abandoned from private ownership. Land reform rapidly evolved after restoration of

independence in 1991. The aim of land reform is to transfer land from state ownership to private ownership taking into account the rights of former land users and their successors as well as of present land users, and to enable a more efficient use of land. The land reform process as well as the organization and supervising land valuation are performed by one nation wide organization, the National Land Board. The cadastre is also part of this governmental institute.

## **2. Two Goals - Two Systems**

A prerequisite for a free land market is the free availability of reliable information about tenure, use and value of land and property. Free does here not necessarily mean free of charge. Information about tenure can be retrieved from the Title Book and the Land Register of the Cadastre.

### **2.1 VTIS**

One of the two systems aims at collecting, storing and analyzing information about land use and land value. This system, designated Valuation and Transaction Information System (VTIS), is designed as an integrated part of the Land Register of the Cadastre, enabling sharing of data bases within the organization. The filling of the data base requires the collection of data stemming from many different sources. One set of necessary data is the market value, which can be derived from transaction acts coming from notary sources and from rent contracts accomplished by real estate agencies. Agricultural productivity information may form another resource for calculating land value in rural areas. The productivity may be derived from soil quality data sets.

#### *2.1.1 Main Tasks*

The main tasks of the VTIS are:

- To collect and analyze a variety of real estate data for land valuation purposes
- To disseminate land value and land use information to the general public, including the media and real estate agencies, in order to stimulate the real estate market

For the time being, the focus of the VTIS is on the dissemination of land use and land value information to the general public. To this end, Land Board distributes two times a year a bulletin about the real estate market in the country.

#### *2.1.2 Excelling Points*

The VTIS is also accessible over the Internet. The two main excelling points are:

1. The flexibility of its design enables to adopt the system easily to changing input conditions. In particular, the possibility to input data both from digital as well as analogue sources is valued much by the users
2. The emphasis on data quality aspects during the development stage has resulted in rigorous data checking procedures. In addition, the special attention given to a user-friendly screen layout and the menu hierarchy, carried out in close operation with the valuers, appears to be very beneficial. These efforts have paid off already now, because the data is reliable. This has remained not unnoticed by the general public. The users of the information provided by the VTIS have a great faith in the data and appreciate its high quality standards.

### **2.2 MIS**

Every municipality determines, based on the valuation information provided by the Land Board by means of the VTIS, the taxable land value of individual parcels and collects information about its owners and users. Based on the information brought together by the municipalities, the Tax Board collects the taxes. To facilitate the tasks of the municipalities with respect to land value determination of the individual parcels, we built the second information system, designated Municipality Information System (MIS).

#### *2.2.1 Ineffective Information Streams*

The building of this system appeared to be necessary, because it has been generally recognized that one of the main technical bottle necks in the collection of land tax is the ineffective information streams between municipalities and Tax Board operating at county level. Why is that so, when the tax records of the larger municipalities are all in digital format and the printing of the tax bills is fully computerized? The problem is located at the pivoting point, where the data delivered by the information systems of the municipality enters the information systems of the County Tax Board. At this pivoting point, a direct link is often not possible because of incompatible data formats, i.e. lack of standards on the exchange of data. Consequently, most municipalities convert their digital information to paper format. Next, they send the paper forms to the County Tax Board. Here the data carried by paper is manually transferred in digital format. It goes without saying, that such a procedure is a labor intensive process, a waste of time, and inappropriate in the present ICT era.

### *2.2.2 Options for Solutions*

Several solutions to solve the deficiency in the information flows are possible, including:

1. Definition of a standard on the exchange of data in combination with obliging the delivering and receiving instances to use this standard. It is obvious that those instances, which have adopted the "wrong" exchange standard, may not be willing to co-operate. The amount of resistance, debate and obstruction, such a measure may create, may fuel a long, fruitless process, doomed to fail. This is particularly so, because, although being the most simple solution from the viewpoint of national authorities, the same authorities lack the means to force the municipalities to move to the standards
2. The Tax Board may accept all the present data formats in use. Next, conversion programs are developed to transfer the data to the formats County Tax Board can work with. To prevent that municipalities will adopt in the future new data formats, when changing system, the measure should be accompanied by the regulation that these formats are the only ones acceptable. At municipality level, such a measure will not encounter much resistance, because it will not affect significantly the already existing working processes. However, the pain lies at the county and national level, because there it will induce costs and efforts to design, build, and disseminate conversion software, while a plethora of non-uniform systems will stay into existence.
3. A third option is to start from scratch, and to provide a standard system preferably to be used by all municipalities. From a national viewpoint, the advantages of this option are many. The tax data delivered to the county tax board are in the proper uniform format, while a nationwide standardization of valuation procedures of the individual parcels is physically fixed in the software of an information system. On the long run such a harmonization will not only result in a fairer and more uniform land tax system, but it will also enable better analysis of the land use and land value developments. In addition, it will enable easy adaptation to changes in the land tax procedure, because the changes can be incorporated into the system by one single organization, which is operating at national level. Next, the new release of the system is disseminated to the municipalities, possibly over the Internet. This is very beneficial for a country, where the real estate market is still heavily developing and as a result, the procedures are under continuous revision. It is even likely that the procedures will change in a major sense. This is because a shift from a land tax to the more complicated real property tax, which may deliver higher revenues while being considered to be fairer, is under continuous political discussion. A final argument which supports the choice of this solution, is the cost effectiveness from a macro-economic perspective of creating and maintaining a single system

Added to the above reasons, that some rural small municipalities still were lacking a computerized system, resulted in the choice for the last option, i.e. to build a system from scratch. In order to persuade municipalities to install and use the system, it was decided to provide it free of charge to all municipalities of the country.



### 3. Dichotomous Case

Now, after two years of completion, we confront ourselves –in order to arrive at an understanding of the good and the bad- with the question: are both systems in operation as envisaged and have the initial goals been achieved? The answer has both a sweet and a bitter taste. The VTIS is still after two years of piloting full and satisfactory in operation. The MIS, at the contrary, has not at all found acceptance, notwithstanding that shortly after completion of the piloting stage, about 40 municipalities installed the systems. This appeared to be a very promising number, in particular when taking into account that an inquiry showed that about 50 per cent of all municipalities were interested in installing the system. However, after a while the number of users did not grow anymore, and finally declined rapidly. At present, the number of users closely approaches zero.

So, we face the rather unique circumstance that within one and the same project, two information systems have been developed, which appeared to be successful up to the stage of piloting, which was carried out during early spring 1999. Why is the one successful, while the other shows deficiencies in its implementation and use? To find answers to this intriguing question, we pose a number of hypotheses. In particular, we scrutinize the following hypotheses, which seem to be appropriate in the framework of the design and the landscape in which the systems have been giving birth:

- The fundamentals underlying the design philosophy of VTIS were appropriate, while those of the MIS did not meet the technical requirements to carry out the tasks it was meant for
- The Oracle Database Management System, chosen for the VTIS, did fit very well to the tasks and environment the system had to operate, while the Microsoft Access Database Management System, running under Windows 95 and Windows NT did not
- For VTIS sufficient attention was given to data quality issues and user-friendliness, while this was not the case for MIS
- The support of the future users by means of training and help desk was sufficient for VTIS users, but not for the MIS users
- User involvement of VTIS was high while the system received appropriate support from key decision makers in the political arena and senior government officials, while the user involvement of MIS was low and MIS did not receive backing from the management board

Before scrutinizing the above hypotheses, we first have a look, in the next section, on the landscape in which both systems had to operate.

## 4. Landscape

### 4.1 Land Market

Estonia, with about 1,5 million inhabitants of which a third part is living in the capital Tallinn, has a population density of 34 inhabitants per sq. km. The territory is divided into 15 counties and 254 municipalities. The costs involved in becoming the owner of real estate property are on average two to three per cent of the value; broker's commission range between five and seven per cent. In order to buy real estate property, foreigners require a County Governor's permission. At the border and on small islands Government permission may be required. Forests, covering half of the land area, are used productively. Timber and wooden products make up 12 cent of total exports. Although the price is only ca. US\$ 340/ha, there are only few transactions involving agricultural land.

### 4.2 Land Tax

Land tax, introduced in Estonia in 1993, is not only a financial instrument, but also an instrument in the land reform process and the economic use of land. This is because owners, who use their land unproductively, may be encouraged to sell their land when the tax money, to be disbursed, exceeds the actual profits. To simplify the valuation procedure, a land tax was introduced, i.e. the object of valuation is land from which buildings, facilities, forest, and crops are virtually removed. The tax



rates lie between one and two percent of the land value. The limits are determined by law. Municipalities are free to determine the actual rate within these limits. Three agencies are involved in the land valuation, taxation and tax collection process. These are Municipalities, Land Board, and Tax Board, the last two both at national as well as county level.

#### *4.2.1 Land Board*

The Land Board is involved because organisation and supervising Land Valuation is one of its four main tasks. The other three tasks include co-ordination of land management in urban and rural areas at national level, keeping of the Land Cadastre and organisation and supervising Geodetic and Cartographic Works. The organisation and supervising Land Valuation results in the following Land Board duties:

- Determination of the assessment methodology
- Preparation of assessment schedules
- Approval of assessors
- Ensuring a country-wide uniform approach
- Co-ordination and control of the assessment process

#### *4.2.2 Municipalities and Tax Board*

Each municipality determines, based on the valuation information provided by the Land Board, the taxable land value of individual parcels and collects information about the owners and users. Based on the information brought together by the municipalities, the Tax Board collects the taxes. Presently, all revenues are going to the municipalities. On average, land tax accounts for one percent of the entire national state budget, whilst it provides seven percent of the local revenues. However, for some municipalities land tax forms a more substantial part of their financial budget. The first general assessment took place in 1993, the second one in 1996, while the third one is scheduled for the year 2001.

### **4.3 Land Value**

Basically, two approaches exist to determine land value:

- Use the market value as basic parameter
- Use the ability of the land to produce value to the owner as basic parameter

The ability to produce value to the owner is mainly a function of what is on the parcel (e.g. building, living house, forest, harvest), its location, production potential in the (near) future, state of national economy, and costs to rent money. Initially one wanted to use the productive capacity of the land. The assessment can be done directly or indirectly. The direct way involves for example the survey of a farm at harvest time. The indirect way uses productivity parameters such as soil quality parameters. Soil types are in principal used in the assessment of land value. This approach resulted in an extensive soil mapping, of which presently about 80 per cent has been completed. However, today the use of soil maps for valuation purposes is minimal because the soil quality does not affect the price much. Because one expected that the real estate market would evolve in the near future, especially in urban areas, it was decided in 1993 to introduce also the market value as a decisive valuation parameter. The primary sources providing information about the market value of land are transaction acts and rent contracts. Since both the market value and the productivity potential of land are involved, the Estonian valuation process can be characterized as being of a hybrid nature.

## **5. Scrutinizing the Hypotheses**

### **5.1 Design Aspects**

In general terms an Information System (IS) is defined as the structured ensemble of people, means, procedures and data sets directed towards the collection, processing, storage and distribution of data for obtaining reliable and accurate information. Accordingly, an Information System consists of

components including: hardware, including peripherals and network, software, data sets, procedures or processes, information derived from the data sets using procedures, and people. We focused within the project on the hardware, software and the people components. At least the following aspects are crucial to consider:

- Necessary hardware, software and data
- Role of the Information System within the organisation
- Need for changing the organisational structure
- Logical and physical model of the data
- Choice of database and programming environment
- Legislation
- Data protection issues
- Privacy aspects of data available to the public
- Inventory of the needs of the future users both internal and external
- Training and supporting the future users
- Continuous feedback from the future users
- Inventory of the processes that need to be carried out to extract the required information from the collected data

The main design considerations for both systems have been:

- Using extensively the capabilities of the expanding Information, Internet, and Telecommunication technology
- Using as much as possible off-the-shelf software
- Anticipation on the on-going computerisation of society and consequently the increasing availability of governmental and other data in digital form, possibly resulting in a National Spatial Data Infrastructure

The consequences of this design philosophy are:

- Much emphasise on safety and protection aspects of the systems
- To warrant high quality data, rigorous data checks have to be carried out
- Relevant commercial software packages have to be evaluated for their suitability

The design criteria for both systems have been in mainstream the same. Consequently, they can't be the basic reason for the good news of the one and the bad news of the other.

## **5.2 Choice of Proper Database Management System**

The VTIS is built around the Oracle database. Off-the-shelf software has become part of the system for performing statistical analysis on the data available in the VTIS and other data bases. Studies have been carried out to connect also a Geographical Information System (GIS) to the system. The choice of the Oracle database arises naturally from the condition that the system has to co-operate closely with the Land Register, which is also built around the Oracle database.

The MIS is built using Microsoft Access. It can run under Windows 95 and Windows NT. The main reason to use a popular Database Management System has been to enable the users at municipalities to implement the system on existing PCs, reducing considerably the necessary investment in ICT to render the MIS operational.

As a result, the database management systems underlying the two systems serve the intended tasks and the operation environment properly. So, we have to reject the hypothesis that improper choice of a Database Management System would be central in the non-acceptance of MIS.

### 5.3 Data Quality

The biggest investment in any information system is the data. Capturing, updating and management of data is very time-consuming and costly. The quality of an Information System depends significantly on the rate in which mistakes in the information is avoided. Mistakes occur during input, processing and distribution of data and information. The later errors are discovered the more time-consuming and expensive it is to resolve them, when at all possible. Because operators have to input large amounts of data manually by keyboard, for both VTIS and MIS, a high degree of robustness against miss-use and malfunction is required. In addition, it has been anticipated that the MIS will be used by inexperienced operators. Therefore, especially for the MIS robustness has been an integral part of its design. The mechanisms included to avoid/remove errors are:

- Avoidance of entrance of errors during the input process
- Self-diagnoses by the system
- Check of output

Avoidance of errors is not only achieved by inserting as less data as possible but also by good user interfaces. A critical look at the amount of planned input data types has been carried out, because there exists a natural tendency to store an overkill of data. A user interface is of high quality when it is user-friendly. That means, the operator can concentrate as much as possible on the actual task (i.e. the input of data) without worrying too much about the particular issues and peculiarities of the system. The user-friendliness of a user interface depends far and most on the background of the users. The cost of a good design is paid back from savings in training and help desk during operation of the system. The design of the screen lay-out and the menu hierarchy has had special attention and has been done in close operation with the future users. This was especially the case for VTIS, while for MIS the future users were less involved. Since most users are unfamiliar with English, communication between system and user is done in the user's native language. Self-diagnoses are incorporated by consistency checks, using the correlation among redundant data. By formalizing the correlation among the data by algorithms, checks are carried out during the input stage.

For VTIS as well as MIS much attention has been given to arrive at high data quality standards. Their design has resulted in systems, which are able to identify input errors by self-diagnoses. Consequently, the input of erroneous values by the operator is largely avoided. Because of the heterogeneous users group of MIS, actually for this system more attention has been given to user-friendliness and self-diagnoses than for VTIS. As a result, wrong computation of land tax will be minimal and consequently the number of complains of tax payers will be negligible. This will reduce the costs of treating appeals to notices of assessment. Provisions for data quality assurance and the degree of user-friendliness are therefore beneficial properties of the MIS, which should have contributed to inclining use.

### 5.4 Training and Help Desk

Much more than for the VTIS, the development of training courses and the establishment of a continuous functioning help desk have been put central in the development of the MIS. High priority was given to and much effort has been spend to these features because of the anticipated heterogeneous users group employed at the wide diversity of municipalities. Centrally given training courses, covering two days, have been provided in Tallinn free of charge during the piloting stage of the MIS to representatives of 20 municipalities. All participants, without exception, qualified the training course as being well designed and at an appropriate knowledge level. In addition, to inform the municipalities about the progress and status of the MIS, regular newsletters were disseminated, also over the Internet. Well-trained people were continuously available at a central help desk to answer questions. The questions and answers were communicated by both telephone and email. Since, during the training courses the employees of different municipalities



came together, opportunities were created and stimulated for the establishment of informal user groups.

### **5.5 Management Support**

It is well known that lack of backing and commitment from politicians and key decision makers will greatly influence the effectiveness of the implementation of information systems. However, less known but equally true is the introduction of damages caused by over-involvement. Many governments are aware that we are living in the information age. As a result, governments are actively involved in improving the development of the Information Society in their country. This is because, amongst other reasons, governments need Information and Communication Technology (ICT) to improve their internal working processes and their services to others. Many governments are therefore working on the concept of ICT for All or Internet for All.

In the sketched framework, the MIS was not the first attempt of the Land Board to build a Land Tax system for operation at municipalities. Actually, it was already the third attempt. The first attempt was based on the system in operation at the capital of Tallinn. This system, developed with, besides land tax collection, additionally agendas in mind, operated satisfactory in a community of half a million habitants. The users there are well ICT literate. However, the system appeared too complex, especially for operation in the many small municipalities of less than 10,000 inhabitants.

The negotiation about the purchase of a second system, developed by a commercial firm and in use by a number of mid-sized municipalities, proceeded troublesome because of financial disagreement. These set-backs caused time-delays, leaving the Land Board management with the problem of political pressure to release the system soon. As a result, much strain was put on the project team to build in a short time span an operational system. Due to this time pressure, the involvement of municipalities during every stage of the development of the system has been minimal or even non-existent. Consequently, the question how the system should harmonize with the other tasks of municipalities and how the municipality would benefit from the use of MIS could not at all be addressed. The central goal of the system, i.e. to solve the data exchange problems at central level to improve the weak information streams from municipalities to Tax Board, particularly serves the central authorities and not necessarily the municipalities.

From the municipality viewpoint, the MIS should communicate well with related systems in the entire organization. Notwithstanding awareness of these vital conditions, the system has been developed by the project team, because of time pressure, as a rigid, take it or leave it system. As a result, it did not fit well in the other tasks and work processes of many local authorities. The prospect of customization abilities to local needs and conditions was accordingly low. The resulting system is so to say the highest common factor, without flexibility to adjust to particular circumstances. In addition, municipalities are in different information stages. At one end of the spectrum, we may find municipalities where the incorporation of ICT in every day work processes is non-existing or in the pioneering stage, while at the other end we may find a high degree of computer literacy. So, for some the MIS appeared too complex, while for others it was too rudimentary in view of the available knowledge and level of automation.

The one-way perspective from which the MIS has been developed, as described above, and the striking lack of involvement of the future users has been a crucial omission in the entire development of the MIS. The absence of user involvement has finally resulted in the complete reluctance of municipalities to use the system.

## 6. Conclusions

We developed within one and the same project two different information systems aimed at land valuation and land tax collection, respectively. The one appears, after being two years in operation, to be a success while the other failed to arrive at the stage of its envisaged widespread. Nevertheless, the initial potential success rate of both has been judged equal after successful completion of their piloting stages. There are many reasons why implementation and continual use of an Information System may fail. From the lessons learnt from the above project, we may readily state that it is first and foremost an organizational issue and a matter of understanding the needs, environment, perspective and culture of the user. The VTIS user community consists of a small, clearly defined network of specialists. They are well aware of the benefits an automated system can bring to improve the quality of their products. This community was involved during every stage of the project, from the very beginning, in the design process and up until implementation. This involvement warranted close co-operation with the future users and resulted in the final operational success.

The MIS, on the other hand, although designed according to the same technical design principles as used for the VTIS, has been developed from the top down, with minimal user involvement, particularly as a consequence of permanent time constraints put by the management and political forces on the project. The design and development of the MIS has been entirely carried out from the perspectives of the Land Board at national level and the National Tax Board. Involvement of the future users, i.e. municipalities, was limited to inquiries about available equipment, willingness to use the system, visits to a restricted number of municipalities, and the involvement of eight percent of the municipalities during the piloting stage. When future users stay on the sidelines, the result is communication mismatch and finally a wide non-acceptance of the information system. To date, no attempts are undertaken to shove the MIS towards a postponed success.