EFFICIENCY OF INFORMATION MANAGEMENT BASED ON LONGITUDINAL EXAMINATION OF HUNGARIAN AGRICULTURE ENTERPRISES

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─**Abstract**─
Although there is no agricultural crisis, the financial crisis has an impact on the agricultural sector. The challenges the agriculture faces are partly determined by the effects of the crisis. The competition is fierce; therefore there is a need for continuous development in order to improve competitiveness. One way to do this is to make in-depth analysis based on experience from the recent years, thus, manage available information to enable drawing effective conclusions.
In our study we applied longitudinal analysis with the purpose of capturing and tracking changes relevant to our research. Theoretically it is important to use longitudinal data collection, because it can capture the individual changes of the analysed objects, the stability or volatility of the development may be demonstrated through collecting the input data on several occasions. In order to

successfully implement this, it is vital to have appropriate information management in place.

Key Words: *Information Management, Longitudinal, Enterprises, Agriculture*
JEL Classification: M15
1. INTRODUCTION

The information not only today, but a long time ago was important those who have been able to obtain, process, evaluate and what is the most important: use. En masse, as corporate demand only a few decades ago appeared and became prominent factor of the corporate strategy with the appearing of the human, organizational and technical infrastructure development. First it was spread in the U.S., after in the far East and West-European companies, later worldwide.

During our daily activities we make choices from the simplest continuing to the routine decisions through the more complex problems' answers. All decisions are judgment, choice between two alternatives: in a rare case these are good and bad. Most of the decisions are between the 'almost good' and the 'probably bad', but often between two courses of activity, none of them are demonstrably closer to good than the other (DRUCKER, 1991). Therefore it is essential to reduce the uncertainty of the decision-making to the minimum rate. The best device for this process is the information management, which is the most important and the most essential decision preparatory device. The decision and the information cannot be separated from each other, these are related concepts. According to FORRESTER (1961) the decision is not other that the conversion of the information to actions. Based on these the creation of a desired situation or at least to move towards can be achieved by decisions, then with the implementation and control of the decisions. MRS. SÁNTA (2008) and her co-authors identify the person as the decision's active participant, who want to solve the problems of the environment by detected them.

According to the UN(O) Population Foundation's report in 2012 the world's population crossed the seven billion and if this is continue to grow at this rate in 2100 there will be ten billion people in the world and at the same time the need have been also explosively grown. This automatically results a new decision situation. This automatically results a new decision situation. However, in order to survive the answer also automates: The agriculture must keep up with this growing to provide the correct quantity and quality food and raw material

production. The productivity of the natural endowments and the social structure are also affects the performance. First it is scary, especially if we know that the groundwater and the infields run out, the glaciers melt, the world fish stocks decay and almost a billion people do not have food to eat. Within a few decades there will be further 2 billion hungry people on the planet, especially in the poor countries. Newer billions of people will try to get out from the poverty; if they will follow the rich nations and they will exterminate the forests, burn coal and oil, use synthetic fertilizers and pesticides without limit the planet's natural resources will rapidly run out.

In order to eliminate the negative effects of the conventional agriculture in the European Union countries during the last decades the viewpoint of the sustainable economy and the multifunctional agriculture business development became more and more important. In order to become the environmental management an integrated part of the agricultural economy the economic practise have things to be done in many fields. The use of the completely new methods, the previously used or the renew of the existing technologies, the adaptation of the methods that been tested by others, all of these offer opportunities for a good-working multifunctional agriculture. One of the tasks of the modern agriculture is to integrate the biological processes and the technical terms as much as possible with the considering of the sustainability of the environment.

The precision plant cultivation technology can be one of the breakout points inter alia for the Hungarian agriculture, too. With the use of this the pesticides and fertilizers can be reduced with 30-40%. This will appear in the environment as positive externalities. This technology is not other than the effort to growing the plant cultivation's economy, and the need of the environment and environment-friendly management.

Our research result is that the precision plant cultivation has got a positive effect to the technology, economic and environmental management. The profitability of the agricultural production is determined by two factors: the cost of production and the selling price of the product. The selling price is determined by the market. The farmers have only limited options to influence this. The question is how they managing the farm in appropriate level of costs can. Every change that increases the efficiency can create the basis of the cost reduction. The introduction of the operational level precision plant cultivation can help in it.

To maximize the efficiency of plant cultivation important to ensure the adequate living conditions, which are as close as possible to the grown plant's optimum. The precision plant cultivation can provide a solution both the viewpoint of the environmental awareness and both the efficiency. With help of this we can deal the plants by its needs within board.

Young intellectuals may have an important role in the development process of agricultural firms. They may offer a solution for the cumbersome flow of information caused by the paper-based registers from the previous decades. Well-trained young professionals have adequate skill and knowledge of using computer applications. With their up-to-date and extensive knowledge, they may see the situation of firms in a new light, and they may aid the development of such firms greatly. This is further increased if they properly mix the practical knowledge they acquire during the years they spend at the company with the theoretical knowledge they acquire during their studies.

If the young professionals could cooperate with their more experienced colleagues, then they could take great leaps forward together. With collective work, redundant work can be automated. With this, employees can be freed

2. MATERIALS AND METHODS

From the methods of qualitative research, we used individual deep interviews. The individual interviews meant one-on-one conversations with the chosen interviewees. These conversations were about a given topic, among a given theoretical plain, but altogether uncontrolled ones.

Within the sample, we chose and interviewed exclusively the middle and upper leaders and developers of companies that have Hungarian plants, but are owned by Hungarians and foreigners. As for their sizes, all of the companies belong to the group of small and medium-sized enterprises.

Secondary data is that gathered by somebody else – not in order to solve the given problem. This data is important from the perspective of the research, because if the information is from a reliable source, and at the same time it is also up-to-date, it will help in the followings, when (MALHOTRA, 2009):

- Identifying the problem,
- Better defining the problem,
- Approaching the problem,

- Shaping the research plan,
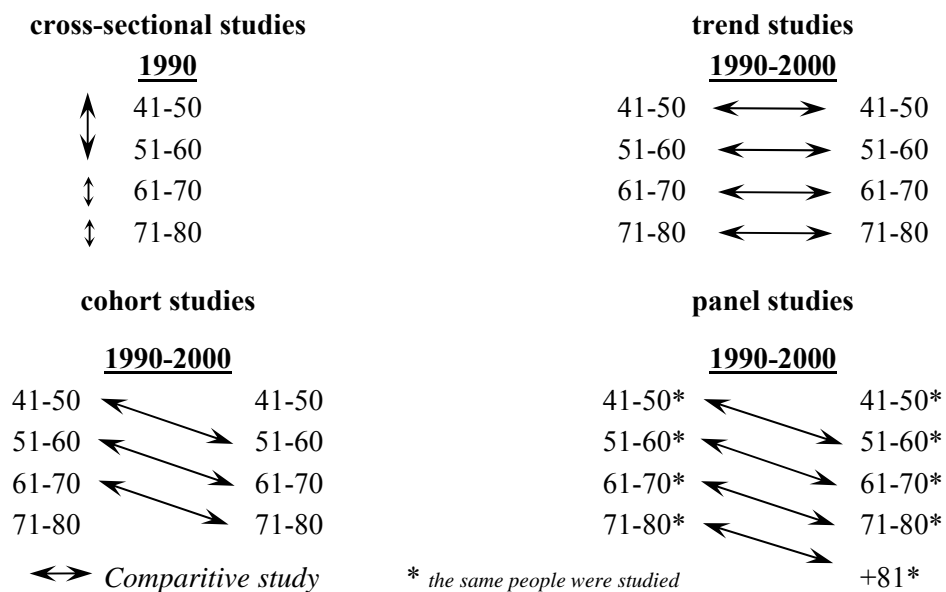- Answering the questions of the research (MALHOTRA, 2009)

As a secondary research, we used the database of EUROSTAT.

Since the aim of our research is the investigation of analytic potential, reached from the correct management of information, the analyzing of sample data, collected during the information management were demonstrated with longitudinal panel research. The methodological concept says that, the longitudinal research involves on different date as opposed to cross-sectional data. The panel research is a typical longitudinal study, in which we collect data at various times from the same sample (panel). (SZABÓ, 2006)

According to COLLINS (2000) the ideal longitudinal research needs the theoretical model of changing and schedule (temporal design) which is capable to investigate the clear and detailed image of development. We also need a corresponding statistical model to test the theoretical model. BABBIE (2003) says that, the longitudinal researches against the cross-sectional researches are created, to long time monitoring on the same sample.

Before discussing the study, we should recognize the three type of longitudinal researches: trend, cohort and panel studies. (1. Figure)

1. Figure: Aging and the time dimension

cross-sectional studies　　　　　　　　　**trend studies**

1990　　　　　　　　　　　　　　　　　**1990-2000**

41-50　　　　　　　　　41-50 ⟷ 41-50

51-60　　　　　　　　　51-60 ⟷ 51-60

61-70　　　　　　　　　61-70 ⟷ 61-70

71-80　　　　　　　　　71-80 ⟷ 71-80

cohort studies　　　　　　　　　　　**panel studies**

1990-2000　　　　　　　　　　　　**1990-2000**

41-50 　 41-50　　　　　41-50* 　 41-50*

51-60 　 51-60　　　　　51-60* 　 51-60*

61-70 　 61-70　　　　　61-70* 　 61-70*

71-80 　 71-80　　　　　71-80* 　 71-80*

⟷ *Comparitive study*　　* *the same people were studied*　　+81*

Source: Joseph J. Leon in: (BABBIE, 2003).

Table 1: Indicator A of the income from agricultural activity (2005 = 100)

Name	2007	2009	2011
EU (27 countries)	115.8	101.3	128.4
Euro area (16 countries)	112.8	94.5	110.3
Belgium	132.5	99.3	104.9
Bulgaria	98.8	111.4	135.5
Czech Republic	109.4	105.9	167.3
Denmark	114.4	67.2	128
Germany	135.1	104.3	125.7
Estonia	140.1	94.2	192.3
Ireland	91.8	66	91.9
Greece	103.9	121.9	105.3
Spain	107.4	91.6	98
France	122.3	88	128.6
Italy	96.7	93.4	93.7

235

Cyprus	90.1	89.8	68
Latvia	135.6	101.8	136.3
Lithuania	133.2	105.9	154.5
Luxembourg	132.8	62.7	72.9
Hungary	115.8	103.7	181.2
Malta	95.7	99.6	82.2
Netherlands	121.7	84	99.8
Austria	127.8	95.2	127.4
Poland	137.8	133.9	182.9
Portugal	95.9	91.3	92.4
Romania	76.8	97.1	155.4
Slovenia	109.5	92.1	115.2
Slovakia	128.9	110.5	200
Finland	112.3	113	123.2
Sweden	135.7	92	125.4
United Kingdom	111.1	141.4	150.7
Iceland	-	-	-
Norway	105	120	123.1
Switzerland	102.5	104.4	104.1
Montenegro	-	-	-
Croatia	120.3	131.9	113.3
Former Yugoslav Republic of Macedonia	-	-	-

- = not available
Source: EUROSTAT, 2013

The trend researches aimed to the changes that occurred over time in a population. The cohort study is about special sub-populations (cohorts) and look at how they vary over time. The panel is similar to trend and cohort, just here we test the same sample. The advantage of this research is that, we obtain detailed information about the temporal process, but we have to face a specific problem, which is nothing more, than a drop, this is considered by Carol S. ANESHENSEL. The researchers faced this problem when they compared the sexual behavior at adolescent people. They had to take into account these problems, to reach the correct conclusions. (ANESHENSEL et al., 1989) This is an example, to realize, the correct and consistent information management is a hazard and it is a potential. too.

As a secondary research, we used the EUROSTAT databases. For reaching the informations about the information management. In our examples we used the Indicator A of the income from agricultural activity about different countries. (Table 1)

3. RESULTS

It is no longer a question of the deal, the company managed to the information in the production, interpretation, but is much more concerned with how to do this. The effectiveness of information management, just as in the case of other production factors can have a profound effect on the entire corporate management. The main feature of rural society in the relationship between the man and the artificial nature of the information and people to people. In the era of agriculture in the direction of the knowledge of the past was seen (cultivating their land on the basis of past generations of experience), industrial society, present-oriented (especially the most recent discoveries, knowledge results by recovered), the information society towards the future (you have to try the next evolution directions to estimate the identified trends to draw knowledge for the present). Due to this transformation in agriculture is increasingly striving for a future-oriented thinking, which now has become the cornerstone of profitable operation. This is an essential component of information management. Changing the entities dating back decades, stuffy way of thinking is not easy, but necessary and increasingly urgent. In this and similar articles designed to facilitate and accelerate the birth of this process. The information management in agriculture including appears in the context of precision agriculture, since it includes the place of production to adapt cultivation, including plate changing technology, integrated pest management, high technology, remote sensing, GIS, geostatistics, and changes in crop production mechanization and information technology with the integration of crops . During the operations in digital files are of considerable size are formed. They can be developed to analyse. In this respect, a major task is to select the relevant data. The on-board computers to engines equipped with data recording is configured by the manufacturer, the user cannot modify. The resulting data are typically technical - diagnostic purposes, but some of them are useful for economic analyzes input information (eg, the size of the area under cultivation, fertilizer and pesticides sprayed amount, etc). They are the company's internal data, which in any case gather and effectively use.

We must not forget however outside the enterprise information does not. Very useful info "sent to you" but external companies, consultants taxes or the weather forecasters prognosis well. However, it forgettable to the future not the past linear

extension, ie the historical data can not make a clear decision about the future, because the world, the conditions, the weather and other factors change so incredibly quickly that this was simply not sufficient. It is this evidence analysis in our research.
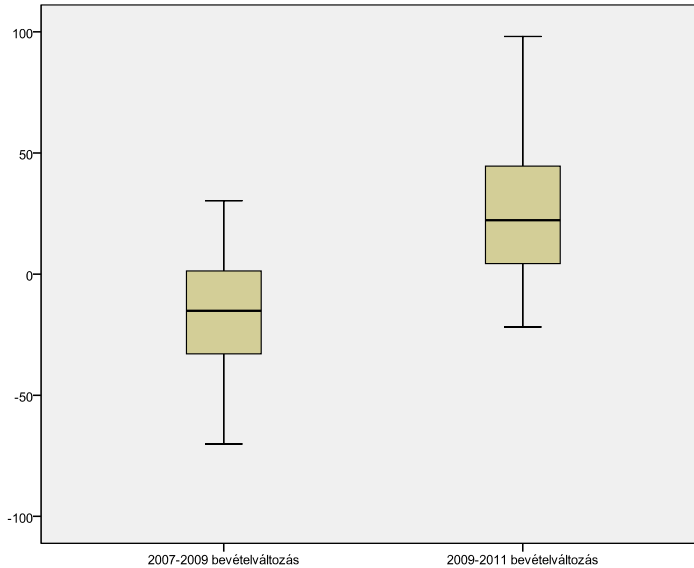

Figure2: *Boxplot of the changing income of the agricultural enterprises in 2007-2009 and in 2009-2010*
Source: private editing

Short Description about the indicator: Indicator A Corresponds to the deflated (real) net value added at factor cost of agriculture, per total annual work unit. The implicit price index of GDP is used as deflator. Using the standardized data in some countries already seen changes in the year 2007-2009's and the changes in rates from year 2009-2011 and data from individual countries visualized using a Boxplot. Percentage changes in value of the converted. (Figure 2) in the case of boxplot the box Digard in area in the country, while, on the lines above and below contain a quarter to one-fourth of the sample. It is evident that the revenues of the enterprises in the agricultural year 2007-09 have increased in the years 2009-10.

The changes can be seen in the depiction of the boxplot, so with the help of the longitudinal examination we can exactly establish that the incomes of the agricultural activeness were decreased or increased in the individual countries during these periods.

We can see on the Figure3 that in the 66,67% of the examined countries this indicator increased during these time-periods. It means that instead of the effect of the economic crisis the countries could increase their income from the agricultural activeness. We could experience decreasing only in the 12,12% of the examined countries.
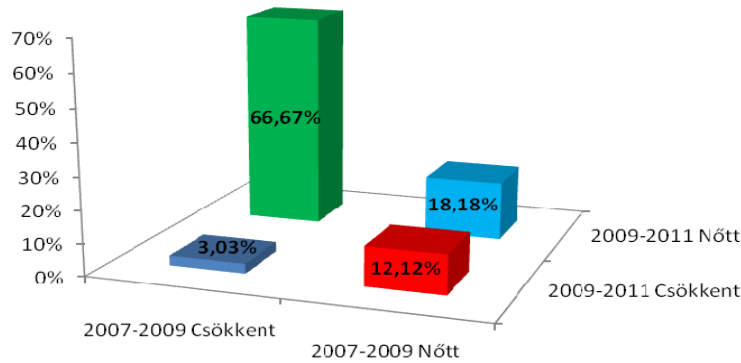

Figure3: *this **diagram** shows the results of the **longitudinal examination***
Source: private editing

During the longitudinal panelexamination we took a PearsonChi-Square Test on a crosstable and we experienced as a result that between the changes of the datas in the individual periods there was a stylistics connetcion. For the examination of the connection's strength we used the Phi assocional coefficient, because the resultmatrix was 2x2.

The Phi indicator is between -1 and +1, its sign shows the course of the connection, too.
The significant level of the Chi-Square Test which was taken on the crosstable of the longitudinal examination was 0,5%.There is a significant connection between the datas of the individual years, because the value was under 5% which is accepted in the social science. The value of the Phi coefficient was -0,497 which showed a middle-strength, reversed coursed connection between the datas of the individual countries.

4. CONCLUSION
There is an accelerated shift of needs for companies to gian the most valuable data from their available large databases which are often referred in the professional language as Big Data. The new developments moved away from the slower hard drives and accelerate the processing of data utilizing multicore processors and

RAM. Executives receive the requried data in seconds, which previously took several hours. This also means that the long term planning may be shifted towards the ablity of continuous intervention, which is extreamly important. Due to the increased uncertainties of the operating environment those will gain advantage who is able to revise their plans fast. It is even more relevant in the agricultural activities, where the climate change due to global warming results more and more often crops producers face extreme weather conditions, and it is important that they can make quick decisions in line with that, and in the knowledge of as much information as possible.

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