Management of agricultural production in the conditions of information society

Riadenie poľnohospodárskej výroby v podmienkach informačnej spoločnosti

A. Látečková, M. Kučera

Slovak University of Agriculture, Nitra, Slovak Republic

Abstract: Nowadays the development of information systems and technologies secures an effective solution of the production process. The implementation of a qualitative software solution is a competitive advantage for agricultural companies as well. In this article, we pay our attention to problematic fields which need to be respected in the process of automated management of agricultural production. We consider as the most important part the creation of adequate information infrastructure which respects the company organization structure and manager's requirements for information accessibility; data monitoring in terms of environmental economy (nitrate directive) and we suggest selected aspects for automated company information system.

Key words: agricultural production, management, software, information systems

Abstrakt: Rozvoj informačných systémov a technológií umožňuje v dnešnej dobe veľmi efektívne riešiť výrobný proces. Aj pre poľnohospodárske podniky je konkurenčnou výhodou implementácia kvalitného softvérového riešenia. V predkladanom článku sme sa zamerali na problémové oblasti, ktoré je potrebné rešpektovať pri automatizovanom riadení poľnohospodárskej výroby. Za dôležité považujeme vytvorenie zodpovedajúcej informačnej infraštruktúry zohľadňujúcej organizačnú štruktúru podniku a požiadavky manažérov na dostupnosť informácií, sledovanie údajov z hľadiska enviromentálneho hospodárenia (nitrátová smernica) a navrhujeme vybrané aspekty pre automatizovaný podnikový informačný systém.

Kľúčové slová: poľnohospodárska výroba, riadenie, manažment, softvér, informačné systémy

The strategy of the European Union accepted in March 2000 in Lisabone is based on the unique statement according to which the future of Europe consists of successful entrepreneurs, mainly the small and medium companies, and also how they use information and communication technologies (ICT).

All countries of the EU try to use ICT meaningfully in order to quicken the development of their companies and business. They directly tie up with the "Framework program for competitive ability and innovation (for years 2007–2013)" made by the European commission in April 2005. The program supports the activity for development of the unified European information space and reinforces the domestic market for information products and services. Its aim is to encourage the innovation by the means of extended implementation and investment to ICT in order to develop the accessible information society. The effort of society is to enable mainly the development of mutual access and coordinated activities, the change of good procedures and implementation of interoperate solutions in the whole Union (2005).

The government of the Slovak Republic as the governments of other countries of the EU equally realizes the need of formulating its own policy for the development of the information society in SR. One of the main priorities is to create the company climate and the incentives for company investments and the development of information-communication and knowledge-based industry in the SR mainly in the field of small and medium businesses and also the spreading of its results to all spheres of the national economy and the life of society. Information development of the Slovak society is pushed to real

life by the particular departments. Information development program of the agricultural department is focused on the building of information system as a system interconnected to IS, which will be able to provide the information and necessary services to satisfy the requirements of department management, and also cooperation with other departments as well as with the public.

According to Bielik (2004), Kučera et al. (2005) and Michaláková (2007), the building of information system has an important meaning on the level of agricultural companies in order to increase the quality of management and decision making where it is necessary to respect the specific features of agricultural production.

Main problems of internal management information security are concerned in this article. The aim is to:

1. Present the results of our research in the fields of management information security in agricultural companies,
2. Point out the meaning of qualitative information base's creation in companies – in the concrete we directed to:
   (a) information infrastructure in relationship to data processing,
   (b) monitoring of trading income,
   (c) environmental economy – nitrate directive.

MATERIALS AND METHODS

Realisation of the set aim required the analysis of the current status information system at our market, but also the current status in the chosen agricultural subjects.

We applied the methods of observation, analysis, synthesis, directed discussion with software company developers, and also with operators of information systems in business subjects in the research of the mentioned topic. We specialized in the monitoring of the conception system, its components, integrity and functional characteristics, quality and possibility of additional development and the attention was also directed to the system reliability, stability in regard to company management.

For the solution of this topic, we utilize the information sources of available domestic and foreign literature including the actual internet domestic and foreign sources.

In this article, some data and partial results are used from the research task E-XI realised in the department of information systems: Transformation of company information systems in the agro-resort in connection with the entry to the EU.

RESULTS

Production management is a very complicated process. Nowadays it is impossible to manage the whole process without computer processing. Agricultural production management has its own specific features given by the character of this production, which increase the intensity for information security.

Information structure is very important for a company, because it secures:

1. input data for management and decision. Two alternatives of data acquisition can be identified in agricultural companies:
   (a) decentralized – it means the data are processed by computer just in the place of their origination in individual operations,
   (b) centralized – data are processed by a computer on a company level. The disadvantage of such a process is that the data from the base evidence (original/primary documents) are rewritten, which causes the decrease of actuality (usually processing is made for a particular time interval) and the increase of the processing error rate. Results of research done in the chosen set of agricultural companies are displayed in Figure 1.

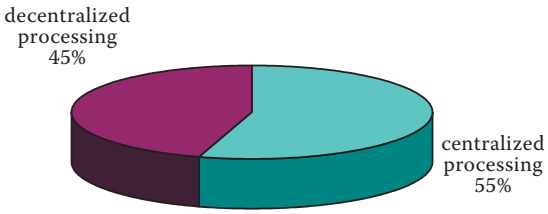

Figure 1. Company data processing

2. Processing of registered data – the quality of processing increases the declared ability of data and the quality of information support for managers. Users are fully responsible for input data and the form of data processing is influenced by the quality of software solution.
   The evaluation of referred results processed by management is presented in Figure 2, from the point of the provided information.

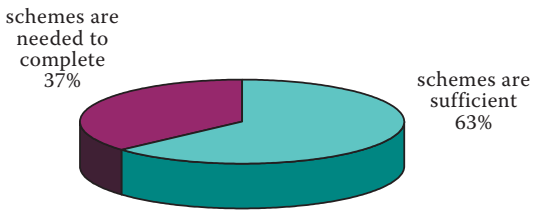

Figure 2. Evaluation of data processing by the company management

3. distribution of the processed results to managers on individual levels of organization structure – presentation of the processed results depends on the quality of software and also the abilities of users to create the required reports, in fact the majority of current programs disposes with wide possibilities for the creation of own reports.

We analyzed the periodicity of information utilization in the chosen set of companies. This periodicity provides software processing according to time: daily, weekly or monthly, displayed in Figure 3.

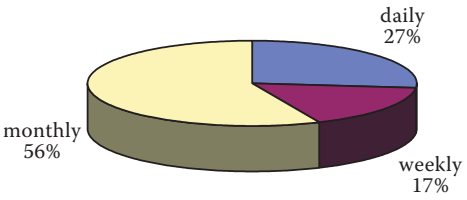

Figure 3. Time utilization of economic schemes by the company management

The basic element of qualitative software security is the presentation of the company organization structure. It is not sufficient, when software secures a record and consequently keeps an evidence only for particular departments. The organization structure should be adjusted so that it would be possible to:

(a) divide departments in plant production into production blocks for the better control of crop procedure, consumption of fertilizers and sprays, documents for subsidies, etc., the evidence of area in ha, status of land and its analysis are required as well,

(b) monitor the individual stables and categories of animals in animal production, the detailed evidence of animals is usually solved in a special program part: Animal store, which solves increases, decreases and transfers of animals in separated cards,

(c) solve the mechanization evidence into particular garages, machines, technologies and maintenance (workshop).

The detailed organization structure is also important for requirements of managers in order to structure trading income. Monitoring of trading income by the means of total annual revenues and costs, it means utilization of the classic model used in accountancy, is not sufficient for the current management of agricultural production. The requirement of managers is focused on the possibility to make an analysis of the individual trading income items for an arbitrary time period. We regard as the most advantageous system the one which enables to choose the required group of costs and the system will be able to present them according to several dimensions, e. g.:

– according to the place of cost origination,
– according to the time of cost origination,
– according to the internal departments,
– according to the aim of the costs use,
– in the animal production according to the individual categories of animals,
– in the plant production according to the individual crops,
– in mechanization according to the individual machines and the orders for machine works, the profitableness of vehicles and so on.

The value of the mentioned analysis is increased with the possibility of showing the reference values, i.e. with the possibility of comparison with:

– previous periods,
– before set values.

Nowadays the conditions are stricter for the agricultural production with the connection of the environment protection. One of the relevant requirements is following of the Directive of Board No. 91/676/EC about the protection of water resources against the contamination by nitrates from agriculture. It is known as the "Nitrate Directive" in practice. Unambiguously it is an advantage for farmers if their information systems enable following of obligations resulted from this directive. The software solution should secure:

– the evidence of fertilization with regard to the valid announcement (it means fulfil the cards of fertilizers with data separated into industrial and own fertilizers and the evidence of nutrient substitution),
– the balance of nutrient according to the particular plots,
– the evidence of crop procedure.

We consider as the most appropriate way the creation of a separated subsystem which will be connected with other parts of the company system and namely with the organisation structure, stocks, animal store and with the plant production. Simultaneously the subsystem should contain the pre-defined files – the form, which would consist of nutrient utilization (main and supplementary goods), the form for the definition of other moves for identification of required documents according to which it will be possible to count nitrate directive, then the file with the actualised nitrate directive. It is also necessary to create relationships between the output and the

organization structure. The requested results of subsystem work are:
– fertilization reports,
– possibility of corrections, it means corrections of fertilization and utilized nutrients,
– closing of the chosen period after the agreement of nutrient status according to moves and corrections,
– modelling of the requested status, it means the possibility of nutrient status calculation for the required period.

DISCUSSION

The company information infrastructure and its software security should be created in such a way that they would keep the specific features of agricultural production and mainly:
– monitoring of a farming year. The agricultural production is different in many ways from the calendar year and the evaluation should accord to this fact,
– calculation of the main and supplementary goods. Main goods create the majority of products in agricultural company (milk, meat, calves…), but the calculation of additional indicators (e.g. costs and profit per ha) is important as well,
– internal transfers of costs (tractor work, combine harvester, and other machines),
– unfinished production.

We consider as one of the most important things the solution of information infrastructure so that it would secure in the process of data acquisition:
1. data report in the real time – decentralized acquisition secured by the company intranet is the best solution for the security of data acquisition . It is financially more pretentious solution for agricultural companies but only this way can indeed secure operative management,
2. security of the correct input data – it means to avoid mistakes in the process of input to computer processing. The responsible person for correct data is that one which inputs them to the computer and the protection of correct inputs should be solved in software – it means the qualitative solved form, which do not secure incorrect input data (e. g. predefinition of activities for the individual departments will be secured by the relevance of production evidence for the department).

The software which disposes with the possibility of signal statement is a contribution for operative management and data evidence is solved in the real time. The manager is able to find out and solve the deviations of the originated costs, so other losses or ineffective uses of costs are avoided. Instead of the common way, in which e.g. all costs in the plant production are recorded continuously, but they are evaluated after the data acquisition, the above mentioned way has indisputable advantages. It is almost the same in the animal production, where the detailed evidence of used costs is missing – only some of the programmes dispose with the possibility of cost evaluation for the individual turns of animals.

After the realised analysis, we recommend to secure agricultural companies by the information system in which it will be possible to:
– present a detailed organization structure of a company,
– record costs and incomes for the individual elements of the organization structure, eventually for employees,
– record costs and incomes for the individual outputs,
– solve planned calculations,
– set limits for the individual costs,
– monitor signal statements about the amount of costs,
– create alternatives in the case of deviation formation from the settled limits,
– relate cost and value system of the company, secure a relation between costs and revenues for employee rewards,
– solve agricultural reporting,
– monitor for the need of the nitrate directive,
– secure a relation with external programmes (export of data to MS Office, MS Excel and so on),
– solve internet trading and electronic communication with suppliers and consumers,
– solve manager evaluation including a financial analysis.

Nowadays, it is inevitable to apply the effective system of management information security in agricultural production. The company information infrastructure should be built in accordance with the needs of a company and it should contain actual trends of information system and technologies development. Only the manager is considered to be the most substantial element in the whole system and also his abilities to use the information for solution of the agricultural production process.

REFERENCES

Bielik P. (2004): Konkurencieschopnosť slovenských producentov (Competitive ability of Slovak produ-

cers). Acta oeconomica et informatica, 2: 32–35; ISSN 1335-2571.

Kučera M., Látečková A. (2006): Informačné systémy v podnikovej praxi (Information systems in business practice). SPU, Nitra; ISBN 80-8069-735-3.

Kučera M., Škorecová E., Látečková A. (2005): Nákladový systém ako súčasť manažérskeho informačného systému podniku (Expense system as a part of company's management information system). Agricultural Economics – Czech, *51* (8): 342–347.

Michaláková J. (2007): Informačné systémy v podnikovom riadení (Information systems in company management). Sborník mezinárodní Baťovy doktorandské conference. UTB, Zlín; ISBN 978-80-7318-529-9.

Rámcový program pre konkurencieschopnosť a inováciu pre roky 2007–2013 predložený Komisiou Európskych spoločenstiev (Frame programme for competitiveness and innovation from 2007 until 2013 presented by the commission of European community) (2005). KOM, Brusel

Arrived on 6th June 2007

Contact address:

Anna Látečková, Milan Kučera, Slovak University of Agriculture in Nitra, Trieda A. Hlinku 2, 949 76 Nitra, Slovak Republic
tel.: +421 376 414 149, e-mail: anna.lateckova@uniag.sk, milan.kucera@fem.uniag.sk