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INTERRELATIONSHIPS OF MANAGEMENT AND WORK ORGANIZATION ON FARM BUSINESSES PRODUCING BEEF

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1. The Goals of the research

The Government Regulation issued in 1972 set two specific goals: on the one hand the development of milk production according to the demands of consumption and on the other hand the increase in beef cattle breeding. In Hungary there has been no beef cattle breeding consequently, a new branch had to be developed. It soon turned out that beef cattle breeding has to be performed according to different economical principles as dairy cattle breeding and can be successfully organized and efficiently operated using different foraging and breeding technologies as the ones used so far.

We have to make the best use of our ecological endowments. It is a tendency in the EU that the pasture land is increased with land taken away from arable land, which is favourable for beef cattle breeding. Our joining the EU is likely to improve our position in beef cattle breeding.

The Hungarian stock breeding farms are characterized by diverse states of development and even more diverse organizational structures. It is fundamental with beef cattle breeding that only the cheapest solutions are to be utilized.

Not only the equipment but also workforce has to be used economically. Meeting the requirements of new challenges induced by recent changes has brought forward the evaluation of production and management. A prerequisite for this are surveys, which are rarely conducted in spite of the demand proved by everyday life.

The aim of my work is to get acquainted with the present situation by examining the organizational factors that essentially influence the circumstances of decision-making and the efficiency of management. By means of this I would also like to provide assistance for the support of strategic organizational decisions necessary for progress.

In order to achieve this goal, I will focus on decision making, primarily examining the degree of procedural rationality, the factors affecting rationality, approaches to decision making, the personal factors of decision making such as skills and capabilities, the applied decision support and the role of the various decision types.

Since work organization is a very significant part of beef cattle breeding determining the efficiency of management to a great extent, a decision support that will enable judgement/decision on immeasurable factors will be necessary.

Therefore I set as a goal the creation of an expert system -model that will reveal the immeasurable relations from the expert's experience and will represent these relations for the decision maker.

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2. PRELIMINARIES AND APPLIED METHODS

The survey was carried out between 1994 and 2000. The sample includes public companies and cooperative societies. The survey extended to 49 cattle breeding farms in 34 towns and villages –out of these 23 being in Hajdú – Bihar County- in 6 counties.

The above-mentioned six counties are: Hajdú-Bihar, Jász-Nagykun-Szolnok, Szabolcs-Szatmár-Bereg, Bács-Kiskun, Békés and Borsod-Abaúj-Zemplén. My survey included not only beef cattle breeding and cattle fattening farms but also dairy farms. The following reasons account for the composition of the sample:

1. at present most of the beef produced in Hungary comes from the stock bred for dairies.
2. the ecological conditions present in Hajdú-Bihar and the neighbouring counties are favourable for the quality development of beef cattle breeding.
3. an efficient and competitive sector has to be established, the material and human resources of which can be easily set in motion and operated on big farms.
4. the relative urgency and demand for financial assistance, which arise from joining the EU and the characteristics of the sector, emphasize the importance of exploiting the available professional, intellectual and material resources for the achievement of quality development.
5. the quality development has professional requirements as well (knowledge about stock keeping, breeding, foraging, animal health and other issues) and the availability of this on cattle breeding farms is a potential advantage.
6. as far as the scale of the sector is concerned beef cattle breeding is flexible, but economy of scale is such a critical factor in the fattening phase that it requires big farming scales.
7. beef cattle breeding all over the world is characterized by being a supplementary activity and being dependent on other sectors, which highlights the advantages of versatile stock keeping and breeding.

Considering the number of the cattle heads, the sample used in the survey represents a 14.6% for the 6 counties. This means a representation of 23.45% for the North Hungarian region and a representation of 44.14% for Hajdú-Bihar County.

2.1. EXAMINATION OF MANAGEMENT RELATIONS

The method used for examining management relations and the terminology was developed by a research group on a basis of an international model in the course of a research program called "Competing with the World" examining the micro-economical factors of the international competitiveness of the Hungarian economy. The project of the aforementioned program was called "Management and Competitiveness" prepared by the University of Economics of

Budapest. By the consequent application of the said method and terminology I ensured the comparability of results. Data collection was realized through interviews, questionnaires and personal observations. The model for drawing up the questionnaire was provided by the questionnaire prepared with the guidance of Zoltayné Paprika Zita in subproject called "Decision Methodology" within the "Management and Competitiveness" project. I adapted the aforementioned questionnaire. I examined the relations from the decision making point of view, considering management as a decision making or problem solving process. The subjects of the survey were representatives of upper management in the positions of directors, managers, financial – accounts managers and department heads of large beef producing companies. I interviewed several upper managers from one company so the responses of 152 upper managers provide data for the survey. By the agricultural companies mentioned in tables and graphs I mean the beef producing agricultural companies involved in the present survey.

2.2. EXAMINATION OF WORK ORGANIZATION

Assessment of the organizational level is one of the most important and most difficult part of company diagnostics. There is a close connection between the level of organization and the extent of achieving the organizational goals. In the domain of decision support in the 90's the development of knowledge-based systems (expert systems) was dominant, the basic principle of which I used for the examination of work organization. The two components of the expert system are the computer software (frame) and the knowledge base (the expert's and the decision maker's knowledge). The framework system is provided by the DOCTUS expert framework system (TÍMÁR, 1996). I built the knowledge base on the basis of the interviews conducted with the managers of beef cattle breeding farms, personal observations and information collected from relevant literature. For choosing the organizational factors I used the approach developed by SZENDRŐ and SZÍJJÁRTÓ (1979) for agriculture. For modelling the knowledge collected this way, I took the rule-based conclusion as a basis.

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3. THE MAIN STATEMENTS OF THE THESIS

3.1. MANAGEMENT AS DECISION MAKING

I examined the following points approaching management from decision-making point of view.

- Procedural rationality
- The factors affecting rationality in the course of decision making
- Skills and abilities among the personal factors of decision making
- Decision making approaches to be found and identified at companies
- Applied decision support and the success criteria of decisions
- The role of the various decision types

3.1.1. Procedural rationality

In the course of examining the procedural rationality of the decision (Dean and Sharfman, 1993) they examine how thorough and circumspect the decision makers are, how much effort is made in choosing the right alternative in the process of decision making. In this respect, I examined the decision making process of the cattle breeding farms on the basis of the participants' opinions.

For this is I used a complex index, which includes the thoroughness of information analysis, how large scale data collection is, the use of quantitative, numerical analysis, and whether the main role is played by detailed analysis or intuitive solutions (table 1).

Table 1.

The degree of procedural rationality

The factors affecting the degree	Agricultural companies	Non agricultural

of procedural rationality			companies *	
	Average	Coefficient of variation %	Average	Coefficient of variation %
The thoroughness of information analysis (1)	3,73	23	4,15	-
Large scale data collection (2)	3,71	21	4,15	-
Role of quantitative methods (3)	3,49	28	2,94	-
Detailed analysis or intuitive solutions (4)	3,28	31	2,69	-
Procedural rationality (1-4)	3,55	26	3,57	-

* *Source:* Zoltayné Paprika (1997), I transformed the results obtained on 5-degree scale to a 6-degree scale used by myself

I found that prior to decision making there is large-scale information gathering and the information is analysed in detail. In the course of decision making quantitative methods have a significant role. This is in accordance with the fact that decision preparation based on information analysis is generally preferred. Interpreting the complex index of the procedural rationality, it can be established that agricultural companies are very circumspect and cautious when making decisions affecting the existence of the company. In comparison with the figures yielded by a survey of non-agricultural companies, it can be seen that in that case the averages indicate a more thorough information analysis and larger scale data gathering. Intuition is attributed a more prominent role than in case of the managers of agricultural companies. This is also corroborated by the fact that detailed quantitative and numerical analysis is less significant with managers of non-agricultural companies.

3.1.2. Factors affecting decision making

3.1.2.1. The influence of external factors

The factors affecting decision making are scored according to the degree of their impact (table 2.). The external control is the role (Zoltayné Paprika, 1997) played by other institutions and people other than company management or staff in the decision making process.

Table 2.

The score of the factors affecting decision making

Factors affecting decision making	Agricultural companies		Non agricultural companies *	
	Average	Coefficient of variation %	Average	Coefficient of variation %
Share holders	4,05	315	5,2	-
Members	12,03	131	-	-
Board of directors	20,42	111	14,9	-
Management	24,38	113	54,5	-
Financial institutions	10,65	105	3,2	-
Authorities	4,49	182	-	-
State institutions	13,74	139	10,0	-
Mother company	0,39	774	7,1	-

Staff	3,10	194	-	-
Personal relations outside the company	6,30	141	-	-
Other	0,46	439	5,1	-
External control	72,53	-	45,5	-

*Source: Nagy, 1997

According to this the strategic decisions are largely influenced by external, outside institutions and persons. In other sectors the role of external agents was rated by 27% less by managers. Furthermore, it is conspicuous that the agricultural sector attributes a much greater role to state institutions and financial institutions.

3.1.2.2.Uncertainty as a factor affecting decision making

The uncertainty prevailing in the agricultural sector is characterized by the fact that in a changing agricultural environment, cattle breeding has been at great disadvantage, since cattle cannot bear the results of frequent, rash decisions, due to its characteristics of species. I assessed the uncertainty present at agricultural companies on the basis of the averages of the feedback I received to the following three characteristics:

1. the availability of the determinant information
2. the similarity of the procedures in problem solving
3. are the consequences of the alternatives predictable?

The uncertainty is represented by a complex index calculated from the averages of the values given to the three characteristics (table 3.). According to the responses determinant information is missing, since I would have had an average of approx. 5 if all the information were available. This also adds to the fact that the consequences cannot be properly predicted. In addition to this it uncertainty is only increased by the fact that different strategically problems require different procedures.

Table 3.

Strategic decisions and uncertainty

Characteristics affecting uncertainty	Agricultural companies		Non agricultural companies*	
	Average	Coefficient of variation %	Average	Coefficient of variation %
Availability of determinant information (1)	3,21	29	3,27	-
Similarity of procedures used for strategic problems (2)	2,88	39	4,35	-
Are the consequences of the alternatives predictable (3)	2,72	43	2,92	-
Uncertainty (1-3)	2,94	37	3,63	-

**Source*: Nagy (1997), I transformed the indices, however the scale was used with opposite extreme values, so then an average of approx. 5 means great uncertainty.

On the basis of the values given for the three characteristics, decisions are made under circumstances freight with uncertainty both in the agricultural and other sectors. On the basis of the number of responses concerning the lack of determinant information, uncertainty has a decisive role, since besides urgency unavailable information was indicated as the most frequent reason.

3.1.2.3. Conflicts between the participants of decision making

I asked the subjects about the conflicts, different objectives arising in the course of decision making, and their impact on decision making.

Table 4.

The complex index of the diversity of objectives

	Agricultural companies		Non agricultural companies *	
	Average	Coefficient of variation %	Average	Coefficient of variation %
Decisions create a much more favourable situation for some participants. (1)	2,64	57	2,88	-
Does it cause conflicts between the participants of the decision making? (2)	2,09	72	1,76	-
Diversity of objectives (1-2)	2,37	52	2,09	-

**Source:* Nagy (1997), I transformed the indexes published

According to the complex index of the diversity of objectives (table 4.) the implementation of strategic decisions creates more favourable conditions for some of the participants. This however does not cause significant conflicts between the participants in the course of decision-making.

3.1.2.4. The impact of different factors in choosing between the alternatives

Here the impact of lack of time, the complexity of the problem, conflicts between decision makers the external factors and the uncertainty on choosing the right alternative was assessed. In the agricultural sector the role of these factors was rated higher than by the managers of other companies (table 5).

The averages with no significant difference were categorized into one group. I found that it is mainly uncertainty that is considered to hinder the selection of the most appropriate action plan.

Table 5.

Evaluation of the factors influencing the selection of the appropriate action plan

Factors influencing the selection of the most appropriate action plan	Agricultural companies	Non agricultural companies *	Group
	Average	Average	
Uncertainty	**3.61**	3,06	I.
Complexity of the problem	3,33	**3,32**	II.
Lack of time	3,12	2,80	II.
Influence of external factors	2,94	2,43	II.

Conflicts between participants	2,16	1,74	III.
Other	1,20	-	IV.

Note: the groups apply only for the results of agricultural companies

* *Source:* Zoltayné Paprika (1997), I transformed the indexes published

Comparing to the latter, the lack of time, the complexity of the problem and the influence of external factors have less impact. What matters least in decision-making is the conflict between participants. In addition, each of the above examined factor is in connection, to a certain extent, with the procedural rationality, however in a negative way. Therefore, with a view to this I consider them hindering factors. Uncertainty is what affects most procedural rationality. The more uncertain the circumstances of management are deemed, the less consequently will the steps of decision making process be followed.

3.1.2.5. The relations between the characteristics of strategic decision making

This time I examined the characteristics and the relationship between them one by one without using complex indices. From the correlation matrix of the characteristics I particularly emphasized the characteristics whose absolute value of correlation is 0.25 or over this value (table 6). Managers claim that they strive to be very thorough in obtaining and analysing the information as thoroughly as possible, which means very detailed analysis. The more minutely they want to analyse the information cautiously obtained, the bigger role quantitative and analytical methods will play. However, lack of time results in lack of information, so the consequences of the various alternatives cannot be properly predicted.

Table 6.

The relationship between the characteristics of decision-making

Characteristics		Correlation
How exhaustive information gathering is	- the exhaustiveness of information analysis	0,70
How exhaustive information gathering is	-the role of detailed analysis	0,53
How exhaustive information gathering is	-role of quantitative analytical methods	0,52
How detailed information analysis is	- role of quantitative analytical methods	0,50
How detailed information analysis is	- role of detailed analysis	0,46
Lack of information in decision making	- predictability of consequences	0,30
The role of detailed analysis	-role of quantitative analytical methods	0,62
Predictability of consequences	- lack of time - urgency	-0,26
The complexity of the problem	- lack of time – urgency	0,29
The complexity of the problem	- role of external factors	0,31
Lack of time – urgency	- role of external factors	0,27

The more complex a problem is deemed, the less time is considered to be available for its solution and the more they expect assistance from external factors. The management sensitivity of the sector is also expressed by the fact that participants wish to tackle lack of time with external guidance.

3.1.3. Managerial capabilities

3.1.3.1. Capabilities and skills in decision making

With the help of a prepared list the respondents rated the characteristics usually expected from a Hungarian manager in order to make the right decisions. On the basis of the averages I set up an order, which, according to the respondents, represents a priority list of skills and capabilities that play a role in decision making, (table 7.).

Table 7.

Priority list of managerial skills and capabilities

Capabilities- skills	Average	Order	Group
Vast professional knowledge	4,64	1	I.
Problem solving skills	4,61	2	I.
Flair for business	4,59	3	I.
Organizational skills	4,41	4	II.
Knowledge of management	4,24	5	III.
Proficient communication skills	4,23	6	III.
Practice orientation	4,15	7	III.
Willingness to take risks	3,97	8	IV.
Capability to stand up for ideas	3,95	9	IV.
Analytical skills	3,91	10	IV.
Computer literacy	3,15	11	V.

I made a comparison of the averages and categorized the capabilities and skills into 5 groups. Vast professional knowledge, problem solving skills and flair for business were placed into the first group. Rated slightly less was the organizational skills, which forms a one-member group. Knowledge of management, proficient communication skills and practice orientation form the third group. All of the characteristics of the first three groups have an average of over four, which stresses the importance attributed to them. They also precede the fourth group, the willingness to take risks, ability to represent ideas and analytical skills. According to the responses, computer literacy is needed the least. Managers working in the agricultural sector regard professional knowledge as the most important characteristic whereas with the managers in other domains this was ranked only as the seventh characteristic. However, the willingness to take risks was ranked eighth by managers in the agricultural sector whereas it was in the second place in case of managers of other sectors. This is in conformity with the view that decisions should only be made with precaution taking the minimum of risks, as there is no time to eliminate the consequences of a bad decision on account of the relatively long reproduction periods.

3.1.3.2. Company management and self assessment

I asked the managers to assess the management of their companies and their own capabilities and skills from this point of view. Examining the company management, the managers of different sectors rated professional knowledge as high and considered the management to be practice oriented as well (table 8).

Table 8.

The order of the skills and capabilities of company management in case of agricultural and non-agricultural companies.

Order	Agricultural companies	Non agricultural companies *
1	Vast professional knowledge	Practice orientation

2	Practice orientation	Vast professional knowledge
3	Knowledge of management	Problem solving skills
4	Problem solving skills	Flair for business
5	Organizational skills	Analytical skills
6	Ability to stand up for ideas	Proficient communication skills
7	Flair for business	Organizational skills
8	Analytical skills	Knowledge of management
9	Proficient communication skills	Willingness to take risks
10	Willingness to take risks	Ability to stand up for ideas
11	Computer literacy	Computer literacy

**Source*: Zoltayné Paprika, 1997

The problem solving skill had a prominent place too. Organizational skills and knowledge are in an average place however, there are deficiencies as regards willingness to take risks and computer literacy.

Assessing their own skills and capabilities, the respondents claimed that good problem solving skills, practice orientation and organizational skill are accompanied by vast professional knowledge (table 9).

Table 9.

The order list of the respondents' own skills and capabilities in case of agricultural and non agricultural companies

Order	Agricultural companies	Non agricultural companies *
1	Problem solving skills	Organizational skills
2	Practice orientation	Problem solving ability
3	Organizational skills	Willingness to take risks
4	Vast professional knowledge	Analytical skills
5	Knowledge of management	Practice orientation
6	Proficient communication skills	Flair for Business
7	Analytical skills	Proficient communication skills
8	Ability to stand up for ideas	Vast professional knowledge
9	Flair for business	Ability to stand up for ideas
10	Willingness to take risks	Knowledge of management
11	Computer literacy	Computer literacy

**Source:* Zoltayné Paprika, 1997

Managers admit significant deficiencies in flair for business, willingness to take risks and computer literacy. The representatives of other sectors rate problem solving skills and organizational skills as prominent skills, whereas professional knowledge is rated lower. However, they consider themselves more willing to take risks than the managers of the agricultural sector.

3.1.4. Decision making approaches identified in companies

I used different theory models representing four different approaches to decision making. These have been called the optimalising, restrictedly rational, political and the intuitive. The respondents received the short characteristics of the four basic types of strategic decisions. Then they assessed the degree to which these models are typical for the decision-making mechanism of their company. The optimalising model depicts the best way decision making in companies; however, the intuitive and the political approaches also have a significant role (table 10). The least typical is the restrictedly rational approach. This result coincides with the result obtained in the survey conducted at non agricultural companies (Nagy, 1997).

According to the upper management, the intuitive solutions are attributed even a slightly bigger role than the optimalising ones. In this case the political and restrictedly rational (satisfactory) approaches are considered marginal. According to the production managers, the political model slightly prevails over the optimalising model. It is not negligible for them how the different departments can represent their interest in the course of decision-making.

Table 10.

Decision making approaches in companies broken down to the position of the respondents

Model	*Upper manager (49)*	*Production manager (69)*	*Financial manager (34)*	*Whole sample (152)*
	Average	Average	Average	Average
Optimalising	3,04	3,26	3,18	3,17
Political	2,73	3,29	2,85	3,01
Restrictedly rational	2,73	2,52	2,76	2,64
Intuitive	3,10	2,81	2,97	2,94

The political model is characterized by the fact that the managers of the main units seek to improve the position of the department under their control with their managerial respect and they usually strive to assert this approach. Less emphasis is given to the intuitive and much less to the satisfactory solutions.

The activity of financial managers is characterized by figures, accurate calculations, reports and deadlines. Their area of activity is very much bound by laws and regulations and other constraints and restrictions. People working in this domain prefer all the information to be available or obtainable. The consequences should be predictable with reasonable accuracy and measured /verifiable with figures. According to them the optimalising model best represents the decision-making mechanism. In their view, the least acceptable are the intuitive, the political and particularly the satisfactory solutions, but, since they take part in decision making together with other managers, they perceive the role of the afore-mentioned approaches too.

On the basis of the responses given it can be established that the role of different approaches very much depends on the position of the respondent. Decision-making may require different approaches in different spheres or domains.

I also examined the different approaches from the point of view of their interrelationship in their role in decision-making. In companies where the optimalising approach is marginal, the restrictedly rational and particularly the intuitive approaches gain ground.

The optimalising approach is often entwined with politics in some companies. This result also corresponds to the results of the survey conducted at non agricultural companies (Nagy, 1997). The survey conducted at agricultural companies also corroborates the following: the uncertainty caused by internal organizational factors or by the rapidly changing environment, the different objectives of the participants in the decision making and their manifestation does not favour the adoption of the optimalising approach. In such an environment companies prefer the intuitive approach to the optimalising one because of the complexity of the problems.

3.1.5. The applied decision support and the success criteria of the decision

Information has become indispensable and with the rapid spread of information science new possibilities have emerged. However, this has not completely eradicated personal information gathering. It has also revolutionized the internal information flow in companies. The most important source of information is considered to be the orders\regulations (table 11). This stresses the continuous dependence, the seek for external assistance and the previously mentioned strong external control. The company information system and the personal relations outside the company, which proves the assertion of the managerial roles, follow this. There is no significant difference between the averages of the two former sources and that of the journals and past experience, consequently, I considered these four as having similar roles. Then follow information provided by the staff, conferences and seminars. The participants of the decision making use the media least as a source of information. Information technology can assist decision making in several ways.

Table 11.

The evaluation of the information sources

Information sources	Minimum	Maximum	Average	Coefficient of variation %
Orders /regulations	2	5	4,39	17
Company information system	0	5	3,68	29
Personal relations outside the company	0	5	3,68	24
Journals	1	5	3,56	25
Past experience	1	5	3,56	26
Staff	1	5	3,37	29
Conferences	0	5	3,11	31
Media	0	5	2,61	45

Mainly data processing programs are used (41%). These are followed by management information systems (31%). None of the decision support systems indicated on the list were recognized.

Thorough preparation and professional experience affect the success of the decision in 21 and 21 % respectively. (Graph 1.) It is also necessary to be well informed - (15%), to have experience in management (15%) and to follow up on implementation (15%). There is no need for too many action plan alternatives and the success of the decision depends on professional instinct the least.

Graph 1

3.1.6. The role of different decision types

In the past decade there have been a number of significant changes that affected almost each and every aspect of management (table 12.).

Table 12.

The significance of different types of decisions in the past ten years broken down to the respondent's position.

Type of decision	*Upper manager 49)*	*Production manager (69)*	*Financial manager (34)*	*Whole of the sample (152)*
	Average	Average	Average	Average
Investment	**4,10**	**3,88**	3,79	**3,93**
Reorganization	3,29	3,36	3,03	3,26
Privatisation	2,98	3,25	2,88	3,08
Acquisition of sources	3,49	3,59	**3,94**	3,64
Marketing	3,06	2,96	2,68	2,93
Production development	3,35	3,32	3,29	3,32
Human resource	3,51	3,35	3,24	3,38

For the whole of the sample it can be established that investment decisions are considered to be the most important. This is understandable if one knows the outdated facilities and equipment available in the agricultural sector. Unfortunately, in the past decade they have had to face continuous lack of resources. Cost reduction and the elimination of losses could be realized only by eradicating subsectors or by cuts in manpower. Production was carried

out with much fewer professionals and fewer staff than previously. This required considerable shake ups in organization. The least impact on the company operations had privatisation and decisions regarding sales.

Top managers consider investment decisions as being the most decisive decisions. According to them marketing decisions and privatisation play the least important roles. Production managers also ranked investment decisions as the most important decisions. The least significance was attributed to marketing decisions too. Financial managers unanimously consider source acquisition as the most significant decision type in the past ten years. This is followed by investment decisions. They attribute less importance to reorganizations and even much less importance to the effects of privatisation and decisions on marketing.

Top managers and production managers alike assign great importance to the organizational decisions of the past years. When evaluating the importance of skills and capabilities organizational skills were ranked second right after professional knowledge. This emphasizes the importance the professionals working in agriculture attribute to production planning that rests on sound professional knowledge. There is an increasing need for such knowledge and skills, especially in a domain of activity that cannot allow high production costs. Beef production is one these activities.

3.2. EXAMINATION OF WORK ORGANIZATION

3.2.1. The application of the expert system in beef cattle breeding

In Hungary beef cattle breeding based on pasture grazing is the future for the development of quality beef production. This sector however is very cost sensitive. Therefore, decision support based on professional experience and vast knowledge is indispensable for making the right decisions. Work organization is a very significant part of beef cattle breeding, which affects the efficiency of management to a great extent. SZENDRŐ and SZIJJÁRTÓ (1979) call the attention to the fact that the professionals in charge of organization have to establish the organizational factors for the given area of activity according to the various demands.

I regard this as an expert activity. There are factors among the organizational factors that are hardly measurable numerically. Therefore, a decision support, which enables evaluation of the factors that cannot be numerically measured, is necessary. The expert system gives assistance in this issue.

3.2.2. The structure of the expert system

This system is a special knowledge based system, which, on the basis of the expert's experience following the train of thought described by the rule "if...then", supports decision making. Prior to this however, the knowledge available has to be organized. For this a knowledge organizer is needed and also a professional –expert- with adequate experience in the given field. I was the knowledge organizer. I regarded as experts those respondents who had an experience of at least 5-10 years in the field of beef cattle breeding so, they were sure to have had several thousand cognitive schemas on this topic. In addition a framework system is necessary as well, and the knowledge base has to be created. As a framework system I used the DOCTUS expert framework system, which is available for purchase. In order to create the knowledge base a data collection and its organization is needed. I did the data collection through interviews with professionals, personal observations and using relevant literature. Then data organization followed, but actually the two activities were entwined during data collection. The collected knowledge was then organized into the applied framework system. For entry I followed the scheme of the system structure. So, the knowledge base was created through data/knowledge collection and organization.

The knowledge base has four components:

1. aspects (characteristics, requirements) and their degrees – features
2. the hierarchy of the aspects – decision tree
3. the rules of " if... then" between the degrees of the aspects
4. knowledge (facts) on the theme to be examined

When establishing the aspects (characteristics) and their degrees I used the organizational factor system published by SZENDRŐ and SZIJJÁRTÓ (1979) and adapted to the beef cattle breeding field on the basis of experts' opinion and data from relevant literature.

There are five factors that affect work organization:

1. the location of the work place, its set-up
2. manpower
3. organization of work procedures
4. motivation
5. work atmosphere

The aspects –characteristics - affecting work organization can be categorized into three groups according to the dependence relationship between them. The first group is that of the final conclusion or output characteristic. This is a characteristic that is dependent on the rest of the characteristics but none of these characteristics are dependent on it. In our case this is the work organization.

The other group is the dependent aspects (dependent characteristics) or intermediate characteristics. These depend on some other aspects and also other aspects depend on them. Considering work organization as a final conclusion such a dependent aspect is any of the organizational factors such as manpower. The third group is the independent aspects –characteristics- or input characteristics. These do not depend on any other characteristics. Such are the aspects that directly or indirectly, through one or several aspects influence for example the manpower, which is also a dependent factor here.

Using the collected data, I determined the aspects necessary for assessing the work organization of beef cattle breeding and also the degrees the said aspects can take. I described the relations between them by the "if...then" rules. This is called rule provision or rule entry. The framework system enables the hierarchization of the aspects, so I set up a decision tree illustrating the relations between the aspects. A rule system belongs to each connection point of the tree (but not compulsory). The aspect being at the connection point is the output characteristic of the rule system, and the aspects connecting to this are the input characteristics. I applied the rule based conclusion for the model set up in this manner. In the course of conclusion I activated the rules established. Given the input characteristics describing specific cases and their degrees, the framework system concludes the output characteristic (the final conclusion) from the given rules through the dependent aspects. This way specific cases can be interpreted.

3.2.2.1. Assessment of work organization

The organization of a pivot organizational unit is influenced by several factors. Professionals assess the role of these factors in different ways. But the degree of organization is also difficult to accurately tell since there is no unambiguous and uniform scale or unit of measurement. For an easier interpretation of the work organization I established the degrees of organization on the basis of the five factors affecting work organization and also with a view to the characteristics of the expert system.

These degrees are as follows:

- ***Disorganized:*** Not adapting to the local conditions, and most of the organizational factors – at least 3- deviate without reason from the expected factors and require radical reorganization.
- ***To be reorganized*** There is at least 1 but at most 2 significant deficiencies that require radical reorganization.
- ***Acceptable*** None of the factors hinder operations considerably, but improvement of most of the factors- of at least 3- would result in significant improvements in efficiency.
- ***Organized*** Adapting to the local conditions, generally operating without difficulty, however the improvement of 1 or two factors is justified, which does not involve radical reorganization.
- ***Well organized:*** An efficiently operating unit that takes into account the local conditions. In this case the improvement of the factors is no longer in focus, the task being exploitation and making the

best use of resources.

The organizational factors are influenced by the practices inherent at the given company as well as the operational conditions. For the assessment of these factors, referred to hereafter as the decision aspects regarding organization, I used different degrees according to the basic principle of the expert system. According to the interdependence relationship between the aspects, the final conclusion is the function of each of the aspects. In our case the final conclusion is the assessment of work organization.

Dependent aspects are dependent on other aspects but also other aspects depend on these dependent aspects. Such are the organizational factors (aspects), which depend on further factors. Graph number 2 illustrates the hierarchical organization:

The conclusion graph of the aspects affecting work organization and their degrees

Graph 2

We have to clarify the relationship between the notions used for defining the degrees of organization and the degrees of the factors.

Not adapting to local conditions:

I consider work place set –up such a fundamental element in beef cattle breeding that if this receives the lowest degree, I consider work organization as not adapting to the local conditions.

What requires radical reorganization:

The organizational factor which receives the worst, the lowest degree describing it needs radical reorganization. Since work place set-up has such a fundamental role, I consider the "to be reorganized" degree as a degree at which the said factor needs reorganization.

Improvement (reorganization):

The organizational factor which received any of the describing degrees between the worst (the lowest) and the best (the highest) requires improvement (reorganization).

Exploitation of (making best use of) resources:

Each of the organizational factors received the best (the highest) degree. The different interdependence relationships between aspects are described by providing rules. Because of the number of the aspects and their degrees we have to deal with hundreds of combinations, out of which I highlight a few (table 13):

Table 13.

The relationship between the aspects affecting work organization and the degrees described with the help of "if ...then" decision rule (detail)

If … **Work place set-up**	**and If ...** **Manpower**	**and If…** **Work procedures**	**and if ...** **Motivation**	**and if…** **Atmosphere**	**then** **The organization**
Badly set-up	*	*	*	*	Disorganized
To be reorganized	Critical	*	Hindering	*	Disorganized
To be reorganized	Critical	Badly organized	*	*	Disorganized

To be reorganized	Critical	*	*	Bad	Disorganized
To be reorganized	*	Badly organized	Hindering	*	Disorganized
To be reorganized	unfavourable	Badly organized	Motivating	*	To be reorganized
To be reorganized	To be improved	Badly organized	Not motivating	Unfavourable	To be reorganized
Acceptable	Unfavourable	To be reorganized	Motivating	Excellent	Acceptable
Excellent	Favourable	Well organized	Not motivating	Excellent	Organized
Excellent	Favourable	Well organized	Motivating	Excellent	Well organized

Note: * = in case of any degree of the aspect

According to the "if ..then" rules the relation between the aspects and the degrees are to be interpreted in the following way. If the workplace is badly set up then in case of any degree of the other aspects I consider the work place as disorganized. If the work place is to be reorganized and if manpower is critical and the work procedures are badly organized, then at whatever degree of motivation or atmosphere the organization will be

deemed as disorganized. This is in accordance with the definition of the disorganized degree since most of the organizational factors (3 out of 5), the set up of work place, manpower and work procedures receive degrees that show that these factors deviate from the expected level without reason. Because of this deviation these factors need radical reorganization.

The various combinations of the degrees indicated in graph NR 2 will determine the degree of work organization. Action plan alternatives can be then assigned to the degrees describing the organization. By these action plans a desirable organization level can be approached.

In the present thesis, the aspects and their degrees should be regarded as suggestions, because their weight and role can be assessed in a different manner with several years of professional experience behind one's back.

3.2.3. The examination of work organization through the application of the expert system model

I examined the organization of 7 beef cattle breeding companies with the help of the expert-system model supporting the examination of work organization. The facilities of the examined companies were marked with T1- T7.

In table nr 14. I summarized the results of the examinations of the factors broken down to companies. From these results I concluded the work organization on the basis of the organizational degrees suggested for the model.

Table 14.

The results of the examinations of the factors affecting work organization broken down to companies and direct cost figures

Aspects and costs	T1	T2	T3	T4	T5	T6	T7
Work place set-up	To be reorganized	Acceptable	Acceptable	Excellent	Acceptable	Excellent	Acceptable
Atmosphere	Bad	Unfavourable	Unfavourable	Unfavourable	Bad	Bad	Unfavourable
Organization of work	Badly organized	To be reorganized	To be reorganized	To be reorganized	To be reorganized	To be reorganized	To be reorganized

procedures							
Manpower	Unfavourable	To be improved	Unfavourable	Unfavourable	To be improved	Unfavourable	Unfavourable
Motivation	Motivating	Motivating	Motivating	Motivating	Motivating	Motivating	Motivating
Work organization	Disorganized	Acceptable	Acceptable	Acceptable	To be reorganized	To be reorganized	Acceptable
Direct costs	272 Ft/kg	245 Ft/kg	255 Ft/kg	251 Ft/kg	266 Ft/kg	262 Ft/kg	259 Ft/kg

Note: direct cost includes material costs of material, wages and their rates and taxes, depreciation, maintenance, servicing and other costs of the year 2000.

The company operating the T1 facility received the disorganized degree. This corresponds to the definition of this notion since work place set up has received the to be reorganized degree and the atmosphere and the organization of work procedures received the worst (the lowest) degree.

In case of the company operating T2 work organization is acceptable. Most of the factors received some of the lowest and highest degrees.

Similarly, work organization is acceptable in the companies operating T3, T4 and T7 facilities. Most of the factors need improvement but this is expected to bring about improvement in efficiency.

In companies operating T5 and T6 work organization received the degree of "to be reorganized". This also corresponds to the definition of the notion in question since at least 1 but at most 2 of the factors need radical reorganization, as they received the worst (lowest) degree.

The direct cost figures also corroborate the above-mentioned statements. Each of the companies operating at 260 Ft/kg or smaller cost received the degree of acceptable work organization. Companies operating with costs between 261- 270 Ft/kg received the degree of to be reorganized whereas the only company operating with a cost higher than 271 ft/kg received the degree of disorganized.

I found that work organization could be measured with the help of expert system model. On the strength of this, work organization in the beef cattle breeding facilities examined needs improvement. This result emerged setting off from the conditions required for the production of quality beef.

Consequently, out of the 7 companies examined work organization is disorganized in 1 case, it is to be reorganized in 2 cases whereas in 4 of the cases it is acceptable. I suggest that in case of each company they should evaluate and address the factors that yielded such results. A few action plans should also be worked out for the improvement and reorganization of the said factors. After choosing the satisfactory alternative, in the course of which, according to my studies, intuition plays a significant role, managers should continuously monitor implementation of the alternative selected by making the best use of their managerial skills and capabilities. This way they can make decisions that contribute to the improvement of organization. By means of this, a desirable work organization level can be approached.

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4. THE NEW OR NOVEL RESULTS OF THE THESIS

1. Using as the basis the responses of managers of beef producing companies of 6 counties, I examined the conditions of strategic decision-making and the relations between the factors affecting decision-making. Examining the rationality of the decision by using a complex index, I found that these companies operate with large-scale information collection and detailed analysis, in which quantitative methods play a significant role.

2. By the consequent application of the examination methods I created the adequate conditions and compared my results to the results of similar surveys conducted at non agricultural companies. I found that beef producing companies are very cautious and circumspect when making decisions affecting the life of the company.

   Examining the external factors, I found that professionals in the agricultural sector attribute a much greater importance to state institutions and financial institutions. Managers working in the agricultural sector regard professional knowledge as the most important factor whereas the willingness to take risks was ranked last. The reason for this is that, because of the long reproduction period –which is present in cattle breeding too-there is insufficient time for the elimination of the consequences of a bad decision.

3. Applying the basic principle of the expert system, I dealt with the factors affecting work organization from a different approach and represented the relations between these factors adapting them to beef cattle breeding based on pasturing. I set up rules for the aspects expressing the factors forming the system for all their combinations.

4. Work organization is the factor that significantly influences the result of management. Since this is not a parametrical factor, using the basic principle of the expert system, I established degrees of work organization in order to assess work organization. These are the following: disorganized, to be reorganized, acceptable, organized and well organized.

5. Based on the opinion of beef cattle breeding professionals (experts), theoreticians, and relevant literature, I established an expert system model for the examination of work organization of pasturing based beef cattle breeding.

   I tested the model for assessing the work organization of some beef cattle breeding facilities. On the basis of the results of the survey I found that the model can be adequately applied in case of such surveys, and moreover it can be recommended for the examination of work organization of other animal breeding facilities.

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5. THE PRACTICAL USE OF THE RESULTS

Regarding the management relations:

- The results call one's attention to the management sensitivity of the sector, which is manifested in the impact of external factors, the demand for external assistance and the risk-avoiding behaviour. At company level a more risk taking attitude has to be adopted and a strategy for decreasing the dependence on outside factors also has to be worked out. In order to achieve this, it is indispensable that a strategy and necessary conditions should be established and implemented at sector level.

- I introduce a decision support system through applying it to the agricultural sector. By this I would like the professionals in agriculture to acquaint themselves and familiarize with such systems.

- The results of the practical application of the theory can be used in education, for the justification of the presence and role of the various decision-making theories. The training of agricultural professionals has to put emphasis on professional knowledge in the future too. Information technology has an increasingly significant role in the decision making process. Bigger emphasis has to be placed on the acquisition of computer knowledge ands skills. In addition, organization knowledge has to be given a prominent role, since organizational activities and the related skills are regarded very important by professionals.

Regarding the examination of work organization:

- On the basis of the results I recommend the expert system for the surveys necessary for improvement in work organization and also for structuring information.

- In the said expert system-model I worked out degrees that enabled the representation of the results of work organization examination. With the help of these degrees work organization can be measured and interpreted. This allows for the comparability of different states in space and time and also the identification of the effects of a change.

- The model established this way is suitable for the examination of work organization of the pasturing based beef cattle breeding. The model can be further developed on the basis of practical knowledge, but it can also be used in the staff training in the given company or in higher education.

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6. PUBLICATIONS RELATED TO THE THESIS

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