STATISTICAL RESULTS OF ACTIVITIES CATEGORIZATION IN CZECH AGRICULTURAL COMPANIES*

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In today's competitive environment, to identify and correctly adjust the individual components of the business model is an important strategic device for every entrepreneur. This paper (preliminary study) deals with different types of business models applied to the sector of small and medium-size farms in the Czech Republic. The main objective was to identify and categorize activities undertaken by Czech farmers into homogeneous clusters and offer recommendations on possible business model modification. The research was based on data from the Farm Accountancy Data Network (hereafter FADN). The principal component analysis and cluster analysis were carried out as part of the assessment, under which farms are categorized into homogeneous groups. The results showed that the farms surveyed can be categorized according to similar economic characteristics, production plans, and implementation processes into three basic clusters. The first business model is elaborated for the classic field production and various kinds of vegetable or livestock production, the second model for the special crop and livestock production, and the third one for the animal production. The use of FADN data and the fact that most Czech agricultural companies are of small- and medium-size should be taken into account as limiting factors of the study.

business model, principal component analysis, cluster analysis, agribusiness, small and medium-size farms

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INTRODUCTION

The agricultural sector is a very important part of national economy, but it is also one of the most sensitive areas of economy, because it has its own specifics that must be respected. Its specificity is mainly due to the seasonality of production, high dependence on natural conditions, but also to its production structure. These specifics are reflected in the profit or loss of farms and they also have an impact on the setting of their capital structure (Hlavsa, Aulová, 2013). According to Vorley et al. (2009) a business model is associated with business strategy, which is the process of business model design and business operations (implementation of pany's business model into organizational structures and systems). George, Bock (2011) found that the basic dimensions of a business model are the structure of resources, transactive structure, and value structure and they discussed the nature and consequences of dominance of the three-dimensional measures and behaviour of the company. These results provide new directions for the development of theory and empirical studies in business by linking the business model, the co-creation of opportunities, and organizational outcomes. Sivertsson, Tell (2015) concluded that there are many barriers, when the farmers are thinking about upgrading using the business models. These barriers are due to the human factor, represented by the attitudes of individuals, history and tradition as well as those related to a particular

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Table 1. Farm size classes in the Czech Republic – full set

Economic size class	Total agricultural units		Physical persons		Corporate bodies	
	n	%	*n*	%	*n*	%
I	1 565	6.0	1 563	6.7	2	0.07
II	2 513	9.6	2 505	10.8	8	0.28
III	4 625	17.7	4 572	19.6	53	1.82
IV	4 521	17.3	4 442	19.1	79	2.72
V	3 013	11.5	2 917	12.5	95	3.29
Small (I–V)	**16 237**	**62.0**	**16 000**	**68.7**	**237**	**8.18**
VI	2 873	11.0	2 749	11.8	123	4.26
VII	2 426	9.3	2 246	9.6	180	6.21
VIII	1 987	7.6	1 582	6.8	405	13.98
IX	851	3.3	461	2.0	390	13.46
Medium (VI–IX)	**8 137**	**31.1**	**7 038**	**30.2**	**1 098**	**37.91**
X	411	1.6	138	0.6	273	9.42
XI	269	1.0	50	0.2	219	7.57
XII	367	1.4	38	0.2	329	11.35
XIII	459	1.8	18	0.1	441	15.22
XIV	302	1.2	2	0.0	300	10.35
Large (X–XIV)	**1 808**	**6.9**	**246**	**1.1**	**1 562**	**53.91**
Total	26 182	100.0	23 284	100.0	2 898	100.00

Source: Czech Statistical Office, data from 2015

setting of the enterprise itself. It can be said that as far as the farms are concerned, the most important area is the one of business strategy and processes, qualified employees, and last but not least elimination of risks. Other barriers specific to agriculture are, among others, government regulations, position of the value chain, and the weather. All these barriers deserve special attention when designing a new business model intended for farming.

According to Vorley et al. (2009) it can be said that a wide range of business models in agriculture is focused at improving integration, equality, sustainability and financial sustainability of trade relations between small farmers on the one hand and agriculture (processors, exporters, and retailers) on the other. The business model is the way how the farm creates and sizes value within the network of manufacturer, supplier, and consumer markets or otherwise – what the farm does and how it makes money. Hol et al. (2014) applied the business models in the analysis of small and medium-size farms in the suburban areas of Sydney, since Australia is struggling with the uncertainty of farmers in selling their products. Most of the farmers sell products through agents or on markets. In both the cases, farmers do not have a complete overview of demand and market prices. Results showed that through cooperation and networking, farmers can obtain such a comprehensive overview.

Considering the foregoing, the main aim of the paper is to find activities undertaken by Czech farmers and categorize them into homogeneous clusters and to offer recommendations concerning the modification of the business model. Considering the fact that in the Czech Republic the largest number of farmers is in the category of small and medium-sized (FADN CZ, 2015a), the paper analyzes farms of these sizes. The first part of the paper brings a comparison of the authors' opinions on the topic and it presents the results of international researches. The next part describes the methods and techniques used in the analysis of secondary data sources. The results and discussion chapters present data assessed on the area of agro-enterprises, and contain recommendations as concerns the business model.

Theoretical background

Czech agriculture has a centuries-proven tradition that covered not only guaranteeing the nation's self-sufficiency in staple foodstuffs, but even made this Central European corner world famous abroad. According to FADN database (FADN CZ, 2015b), main commodities supplied in the long-term look by the agricultural exports are milk, live animals, cereals, sugar, and malt. Agricultural enterprises, regardless of their size, have in the relation with the rest of the economy a specific position. The primary sector

(which includes agriculture, forestry, and fisheries) in the Czech Republic occupying a total of 3.6% by statistics of national accounts (Kučera, 2014), has been and will be a distinctive area of the national economy. Despite the not-so-favourable conditions of agriculture (adverse weather conditions, low average wages etc.) there is still a large number of people, who do business in agriculture and it is necessary that appropriate devices, such as the business model, create the conditions for business to help them achieve the competitive advantage and succeed in the competitive struggle. The largest group of farms in the Czech Republic are small businesses (see Table 1).

Considering the above statistics it can be said that small and medium-size farms make up the largest economic class in agriculture, which must be dealt with properly during business processes.

A key factor of the economic backwardness of the Czech Republic remains the low productivity (Tomšík, 2010), which is mainly caused by the increasing demands of economic activities for high quality inputs and by the problem of ensuring sufficient competent staff and managers in the farm management. Similar problems are faced by farmers abroad, too (Davis et al., 2013). In the context with this task, it is necessary to ensure key resources and intensity of individual processes, being the primary parts of a correctly adjusted business model (Hol et al., 2014). Combination of the innovative performance and quality of human resources is the basic condition for the progress of all enterprises (Michaels, Gow, 2015) including farms. Regarding what is given above it can be concluded that the business model is a relatively modern concept describing the dynamic business structure and it includes all important objects of business reality and their interactions, i.e., including also the view on strategy and performance, processes, rules, organizational structure, knowledge, risk, and IT services, as evidenced by the research of Tyrychtr et al. (2015). Considering that as the most important parts of a correct business model adjustment within agricultural enterprises, the commercial strategy area, the processes adjustment (production, processing etc.), the qualified staff, and last but not least the risk elimination (weather) can be assumed, it seems necessary to pay a great attention to these areas. Another strategy can then be the differentiation of enterprises, however this be carried out within a different portfolio structure. According to Špička (2006) this is suitable for risk management of family farms, employing for instance family members, diversification of production structure and business activities. On the other hand, for large farms he proposes specialization in the product portfolio as a more appropriate strategy, which will contribute to quality improvement, cost reduction, and an overall stabilization of the company. The results of Špička (2010) also showed that OECD countries apply a price stabilization system in the area of agriculture. Although the proportion of subsidy extended to market prices within the estimated production support is decreasing, it still remains an important risk management device in best part of the world. According to Schnitkey et al. (2004 – unpublished data) it can be said that one of the key characteristics of agriculture is the high level of production risks, market risks, financial risks faced by producers, and human resource issues. It can be said, that in less than 20 years the number of employees in agriculture decreased by more than three quarters and the structure of work force was changed. Urbancová, Čermáková (2015) state that the agricultural sector in the Czech Republic has been struggling for a long time with problems in the workforce, which can be considered crucial. According to the 2015 National Accounts of the Czech Statistical Office (http://apl.czso.cz/pll/rocenka/rocenkavyber.makroek_pracov.), the total number of employees were 4 326.06 thousand persons out of which only 119.47 thousand were employed in agriculture, forestry and fishing sector in 2014. Comparing years 1994 and 2004: the number of employees were 4 530.87 thousand persons in 1994 and 4 052.88 thousand persons in 2004. In the agriculture, forestry and fishing sector, 247.11 thousand persons were employed in 1994 and 151.06 thousand persons in 2004. Spěšná (2009) adds that in 2008 the occupational structure of agriculture (including hunting and forestry) was as follows: 38.0% qualified workers, 17.1% service of machinery and equipment, 15.0% technicians and related fields, 10.3% assistants and unqualified workers, 7.9% artisans and repairmen, 4.3% senior officials and managers, 3.5% professionals and scientists, 2.6% lower office workers, and 1.3% service and commerce workers. Three quarters of the farmer numbers work at the workman level, out of which roughly one seventh doing unqualified and auxilliary jobs. All in all, it can be said that based on the Czech Statistical Office (hereafter CZSO) and the Ministry of Agriculture results, Czech agriculture has always been struggling with the lack of workforce and with disinterest of young people to work in the agricultural sector. This is one of the risk areas (loss of labour capital) which needs to be dealt with in agriculture. The combination of innovative performance and quality human resources in every agriculture enterprise (Gellynck et al. 2014) is an essential condition for the development of knowledge-based competitiveness. Human resource issues are key for current enterprises and they can use business models for their business. The business models, the enterprise plans and strategies are based on, can be applied to correctly adjusted enterprise processes. It can be summarized that a correctly adjusted business model and the business plans derived from it (individual steps in particular business model areas) help raise farms competitiveness. This is in line with the research findings by Ball et al. (2013) or Tsikata, Yaro (2013).

Table 2. Descriptive statistics

	Mean	Median	Min	Max	SD	Skewness	Kurtosis
Revenues from crop production (CZK)	411 688.08	237 052.03	22 530.00	962 143.53	386 316.56	0.489	–1.716
Revenues from livestock production (CZK)	352 737.88	345 970.25	0.00	1 144 667.86	331 859.14	1.071	1.237
Revenues from own products and services (CZK)	819 409.42	853 093.22	473 794.14	1 257 057.14	247 870.28	0.027	–1.202
Profit/loss of current accounting period (CZK)	–605.75	0.00	–14 000.00	5 647.06	5 399.12	–1.634	2.6805
Equity (CZK)	32 873.22	0.0000	–2 636.36	352 391.30	93 369.18	3.558	12.961
Foreign capital (CZK)	215 635.51	211 603.27	29 022.00	519 953.70	144 816.95	0.846	0.353
Labour input – total number of hours (h)	3 552.39	3 423.72	2 708.33	4 641.12	549.96	0.508	–0.265
Utilized agricultural area (ha)	30.22	25.66	1.56	69.74	22.30	0.552	–0.638
Number of livestock units	15.59	18.88	0.00	32.83	11.91	–0.240	–1.538
Average capital (CZK)	2 634 115.85	2 500 914.32	1 511 827.78	4 614 588.29	905 305.77	0.878	0.207
Labour costs (CZK)	25 454.82	16 601.43	0.00	104 461.30	28 819.06	1.646	3.456
Total production (CZK)	916 150.57	1 007 873.22	568 815.00	1 103 848.67	177 117.62	–0.686	–1.002
Arable land (ha)	11.27	6.6600	0.25	41.32	12.04223	1.473	1.648

Source: own compilation based on data from the Farm Accountancy Data Network

MATERIAL AND METHODS

During the preparation of the article, the logical methods of analysis, synthesis, deduction, and induction were used. The input matrix mentioned in the article has been compiled from the data received from the FADN database, representing 552 very small, small, and medium-size (below the midpoint) farmers who were selected on the basis of their economic size. According to the FADN CZ (2015a), the economic size of an enterprise is given by the annual production (calendar or accounting year). Data in the FADN CZ database are arranged according to economic size and very small, small, below the midpoint, above the midpoint, large, and very large enterprises are distinguished. Therefore very small family farms are included in the study, too. There should be mentioned that in the Czech Republic even very small family farms and their owners – every owner of a goat, sheep or a horse – must be registered as a micro farm. Such farmers do not have profits and basically do not care about risk management. The results of this study have these limitations. This group of farmers has been divided according to their second level type of farming. The focus of the production is given by a percentage prevalence of a certain type of production and represents more detailed breakdown at the second level. The classification scheme allows to itemize and describe the types of farming at three distinctive levels (the general type, the main type, and the special type of production focus). The most important and the most frequently used are the first two distinctive levels of this typology (FADN CZ, 2015a).

The default matrix formed from these data has been statistically adjusted. IBM SPSS Statistics Version 22 software has been used for the calculation. The exploratory data analysis has been conducted and within this analysis, normality of distribution, characteristics of position, variability, skewness, and kurtosis have been investigated (Table 2).

Remote and extreme values have been identified. Furthermore, the principal component analysis (PCA), which is useful for other statistical methods, has been carried out. Instead of original variables it uses their linear combinations, so called components, which are usually significantly fewer (Hebák et al., 2013). Based on the PCA, the components constituting the input variables for the cluster analysis were determined.

Cluster analysis is used to classify units characterized by multidimensional vectors into one of the unknown number of predefined mutually exclusive groups known as clusters (Hebák et al., 2013). Ward's method has been used for the cluster analysis. Ward's method constitutes a series of steps of clustering that begins with the t number of clusters, each of which contains one object, and ends with one cluster which includes all objects. At each step it makes connection of two clusters, resulting in the smallest increase in

the value of the sum of squares or variance index (E index) (R o m e s b u r g , 2004).

RESULTS

The following section presents the results of the analysis of data on Czech farmers. The input data matrix comprises of data of very small, small, and medium-size (below the midpoint) farms, according to CZSO broken down by the main activity as follows:

Grain, oilseeds and protein crops; General field production; Horticulture; Viticulture; Fruit-growing; Growing of perennial crops; Milk production; Rearing and fattening of cattle; Combined breeding of cattle; Sheep, goats and other species of grazing livestock; Breeding pigs and poultry; Mixed vegetable production; Mixed farming – mostly cattle breeding; Mixed livestock, mostly pigs and poultry; Field crops and raising cattle; Various kinds of crop and animal production.

The following key indicators were monitored with the farmers categorized in line with the above. Also the international comparisons are carried out in line with the above categories. The indicators in question are: *Revenues from crop production; Revenues from livestock production; Revenues from sales of own products and services; Profit and loss statement in the accounting period; Equity capital; Foreign funds; Labour input – total number of hours; Farm land; Number of livestock units; Average capital; Labour costs; Total production; Arable land.*

The group of very small, small, and medium-size farmers (below the midpoint) has the average revenue from crop production amounting 411 688 CZK. Average revenues from the livestock production amount 352 738 CZK. Average revenues from the sales of own products and services amount 819 409 CZK. Net profits of this group of farmers are negative on average. The equity capital amounts 32 873 CZK and foreign funds 215 636 CZK. The average capital amounts 2 634 116 CZK. Examined farmers have 30.22 ha of agricultural land and 11.27 ha of arable land on average. Furthermore, they keep 16 livestock units on average. The total production amounts 916 150 CZK on average. The average labour costs are 24 455 CZK and the average workforce input is 3 552 h in total. *Growing of various perennial crops* and *Mixed vegetable production* categories were excluded from the input matrix due to unsufficient number of respondents and missing data. Remote and extreme values have been detected. Extreme values were found for the main activities entitled *Rearing and fattening of cattle* and *Grain, oilseeds and protein crops*. In order to maintain the complete information, these values will be kept for further examination. For testing of the data normality, the Kolmogorov-Smirnov test has been chosen. It has been found that the data do not come from normal distribution. The only variables arising from normal distribution are: *Revenues from livestock production; Revenues from sales of own products and services; Foreign funds; Workforce input; Farmland; Number of livestock units;* and *Average capital*.

The data was subject to the correlation analysis. Due to the abnormal content in the file, the Pearson's correlation coefficient was used. Furthermore, the PCA was carried out on the basis of the correlation matrix, using – after exclusion of the above mentioned indicators – the following indicators: *Revenues from livestock production*; *Revenues from sales of own products and services; Profit/loss of current accounting period; Labour input – total number of hours; Farmland, Number of livestock units; Average*

Table 3. Kaiser-Meyer-Olkin (KMO) and Bartlett's test

KMO measure of sampling adequacy		0.675
Bartlett's test of sphericity	approx. Chi-square	24.180
	df	21
	p-value	0.000

Source: own compilation

Table 4. Total variance explained

Component	Initial eigenvalues			Extraction sums of squared loadings[1]		
	total	% of variance	cumulative %	total	% of variance	cumulative %
1	2.896	41.374	41.374	2.896	41.374	41.374
2	1.510	21.566	62.940	1.510	21.566	62.940
3	0.971	13.870	76.810	0.971	13.870	76.810
4	0.658	9.406	86.216			
5	0.408	5.833	92.049			
6	0.328	4.691	96.740			
7	0.228	3.260	100.000			

Source: own compilation

[1]extraction method: Principal Component Analysis)

Table 5. Component matrix

	Component		
	Workforce and profit	*Livestock units and financial indicators*	*Arable land*
Wages paid	0.889		
Profit/loss of current accounting period	–0.884		
Labour input – total number of hours	0.583		–0.538
Number of livestock units		0.852	
Revenues from own products and services		–0.730	
Average capital	0.449	0.713	0.372
Arable land			0.868

Source: own compilation based on data from the Farm Accountancy Data Network

capital; Labour costs; Arable land; Foreign funds; and *Revenues from crop production*.

According to the anti-image matrix the following indicators were excluded: *Revenues from livestock production* and *Total production*, showing the lowest Kaiser Meyer Olkin value (KMO) on the matrix diagonal. According to the PCA and values on the inverse matrix diagonal, so called Variance inflation factor values (hereafter VIF), the *Farm land* variable was excluded from further examination, since the VIF value exceeded 10. Also the *Equity capital* variable, having the lowest value of KMO on the anti-image matrix diagonal, was excluded.

The KMO test result was 0.675, i.e. the model was moderately suitable for running the PCA (Table 3). The rate of transferability of the original variables to components thus represented 67.5% (Table 4). The PCA proved that the model can be explained using two or three components. The Scree Plot recommends usage of three components (Fig. 1). Using the above selected variables in the PCA, the three of the newly formed components explain 76.81% of the variability of the original variables. The three newly formed components (Table 5) can be interpreted according to component matrix as follows:

The first main component explains 41.37% of the variability of the original variables. The indicators concerning workforce and labour costs are the most positively correlated with the first component. On the other hand, profit/loss correlates with this component negatively. Between this newly formed variable and the *Labour input* there is a moderate dependence (r = 0.583). The correlation coefficient between this newly formed variable and the *Labour costs* is 0.889. This means that there is a very strong dependence between them. The strong indirect dependence (r = –0.884) occurs between the new variable and the *Profit/loss* variable. This component is consisting of

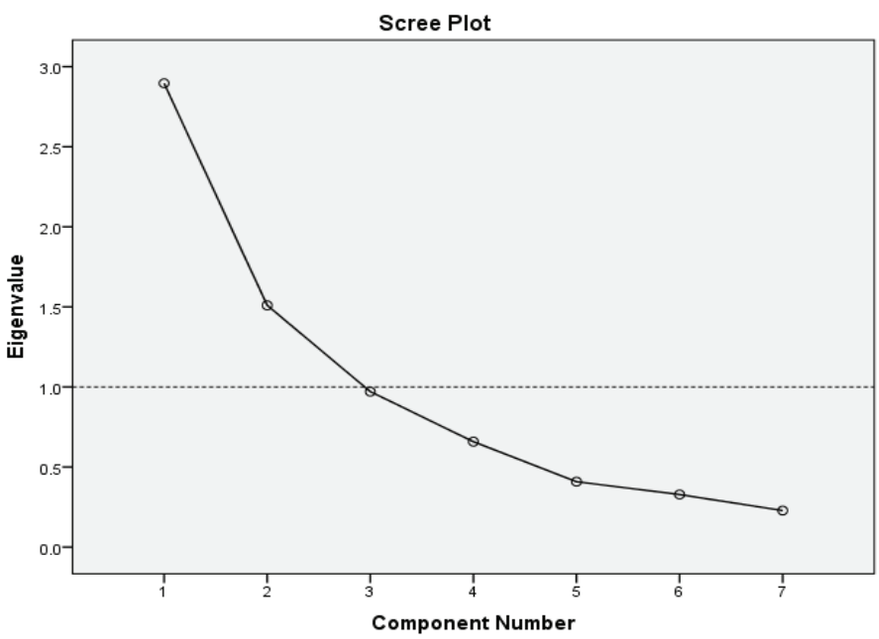

Fig. 1. Scree plot - principal component analysis
Source: own compilation based on the data from FADN

the items concerning the workforce and profit/loss, therefore it might be generally called *Workforce and Profit*.

The second newly formed component explains 21.57% of the variability of the original variables. This component correlates positively with the *Number of livestock units* and *Average capital* variable. Direct medium dependence occurs between this second newly formed variable and the *Number of livestock units* variable (r = 0.852). There is a strong dependence (r = 0.713) between the second component and *Average capital* variable. Furthermore, dependence equalling –0.730 occurs between the new variable and the *Revenues from own products and services* variable. Due to this relation, the second component might be called *Livestock units and financial indicators*.

The third newly formed component explains 13.87% of the variability of the original variables. This component correlates positively with the *Arable land* variable. A very strong dependence (r = 0.868) occurs between this third newly formed variable and the variable entitled *Arable land*. Due to these results, this last component might be generally called *Arable land*.

On the basis of these three newly-formed components (*Workforce and Profit, Livestock units and financial indicators*, *Arable land*) the cluster analysis was launched in order to create homogeneous groups and determine the type of business model. Ward's method was used for the cluster analysis, which yielded three relatively homogeneous clusters (Fig. 2) similar in their properties (or characteristics).

The first cluster is consisting of the farmers with main activity focused on: *Grain, oilseeds and protein crops; General field production; Field crops and raising cattle; Various kinds of crop and animal production.* In this group, the *Revenues from the sales of own products and services* are rather above the average. *Profit/loss of the current accounting period* is equal to zero or positive (profit). *Labour input – total number of hours* and *Labour costs* are rather below-average. The *Average capital* is average if compared with values of the other groups. The ownership of the *Arable land* is high above the average in this cluster. This fact is quite logic due to the main activities in this cluster. The farmers can be recommended to increase cooperation at the local and regional level, since they have sufficient sources available. In the area of human resources they should get focused on human resource branding (attracting new employees and maintaining the existing ones).

The second cluster is consisting of very small, small, and medium-size farmers with main activity

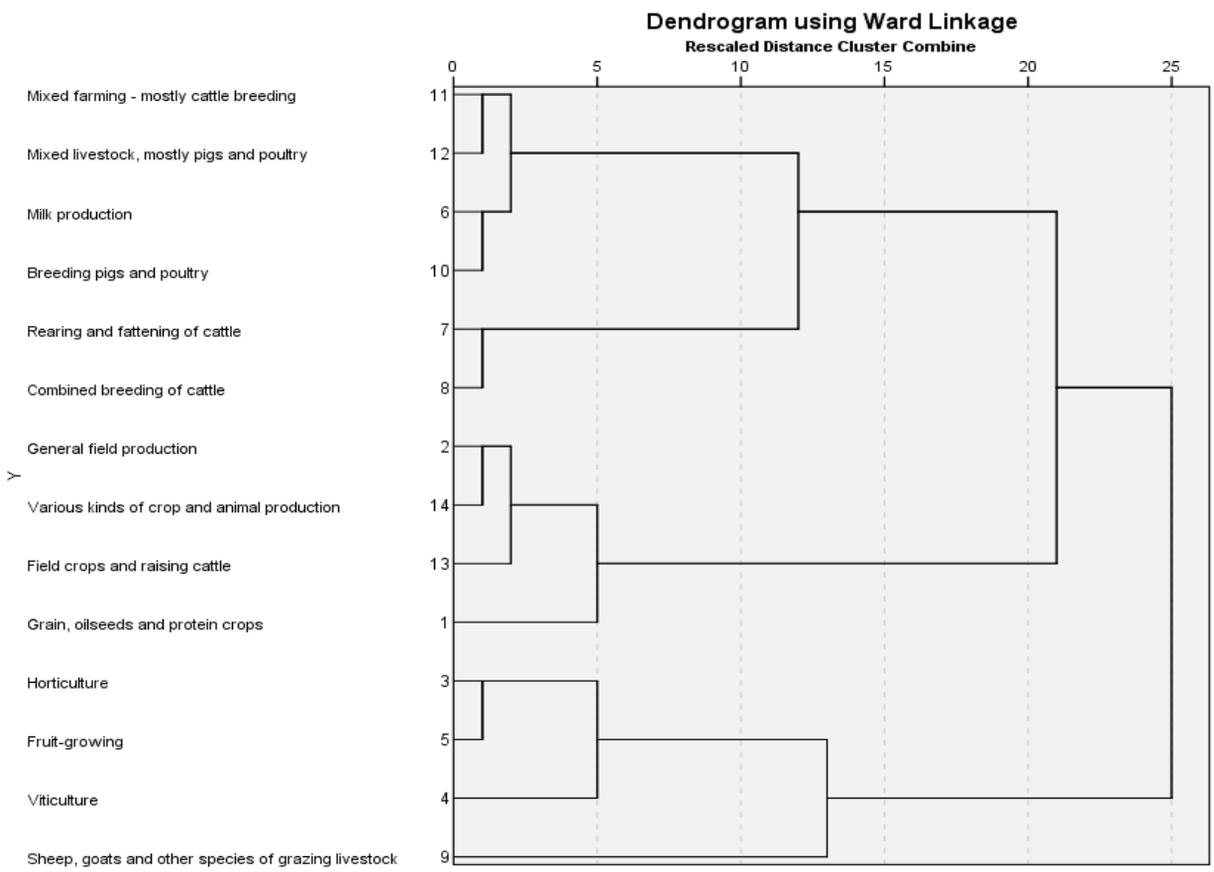

Fig. 2. Dendrogram - cluster analysis
Source: own compilation based on the data from FADN

focused on: *Horticulture;Viticulture; Fruit-growing; Sheep, goats and other species of grazing livestock. Profit/loss of the current accounting period* is equal to zero or negative (loss). *Labour input* is rather above the average. *Labour costs* are rather below-average and the ownership of *Arable land* is significantly below-average.

The results suggest that this is concerning primarily seasonal production with high staff turnover and the strategy of the enterprise is significantly influenced by natural risks (weather) that cannot be avoided in most cases. It is appropriate to focus primarily on the cost structure and risk management areas.

The third cluster is consisting of farmers with main activity focused on: *Milk production; Combined breeding of cattle; Breeding pigs and poultry; Mixed farming, mostly cattle breeding; Mixed livestock, mostly pigs and poultry.* The number of the *Livestock units* is above the average within this group of farmers. *Profit/loss of the current accounting period* is equal to zero or positive, but only slightly above-average. *Arable land* ownership is slightly below-average. With respect to these results it is important to ensure qualified staff, support further development of technological production, and make internal processes more effective (implement the value chain analysis). This will help prepare a suitable business model.

It can be summarized that in the case of work placement in the field of plant production, this would entail costs connected with training workers in relation to work activities with agricultural machinery. Workers would have to be trained in the area of work safety and driving authorization. The above-mentioned training has to be arranged periodically by the agricultural business. It is probable that workers in plant production also have to complete training in connection with protection of the environment, given that chemical agents for fertilization and protection of agricultural crops or propellant material could damage the health of people and burden the environment if used improperly.

Employees working in animal production have to be trained in the area of work safety with farm animals. Other activities of employees in animal production have to be substantiated by completion of training which concerns prevention of transmission, suppression, and eradication of infection of farm animals and zoons in the scope of the agricultural business as well as their transfer to other locations.

Taking into account the results of the PCA and the cluster analysis, it can be summarized that the first group of farmers (first cluster) is an enterprise with the business model elaborated primarily for the classic field production and the production of various kinds of crops and livestock production (emphasis given to the key activities and key resources parts of the business model), the second one for the special crop production and livestock production with focus on animals grazing bulky fodder (emphasis given to the cost structure and risk management), and third one for the animal production (emphasis given to the customer segments and revenue streams).

DISCUSSION

Sivertsson, Tell (2015) state, that through the business model innovation, farms can increase their competitive advantage in the agricultural industry. According to Rask (2014), the innovation through the business model presents creation or re-invention of the enterprise. He introduced four international types of the business model with allocation of resources throughout geographical regions. Bocken et al.

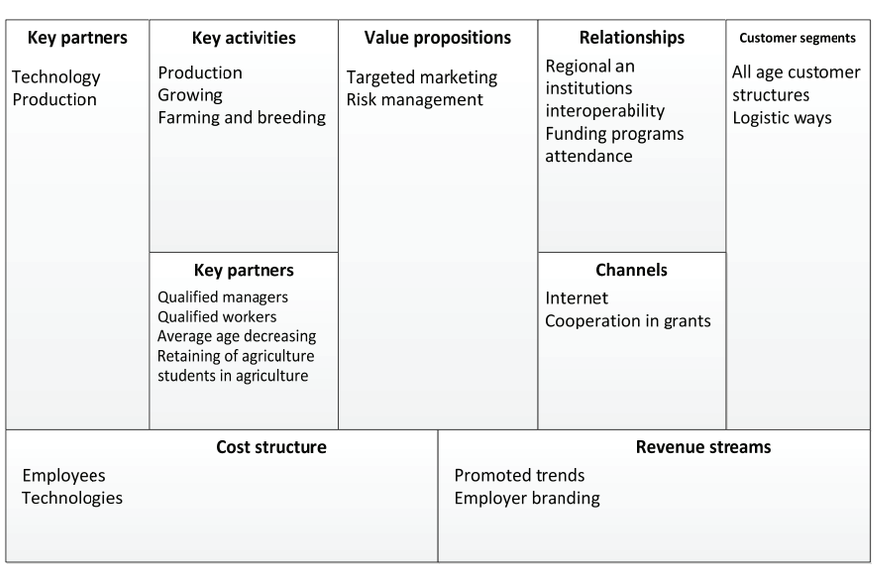

Fig. 3. Business model in agriculture
Source: own elaboration

(2014) described the archetypes of sustainable business models and introduced solutions that might contribute to sustainability by means of business models. These archetypes are: *Maximize material and energy efficiency; Create value from 'waste'; Substitute with renewables and natural processes; Deliver functionality rather than ownership; Adopt a stewardship role; Encourage sufficiency; Re-purpose the business for society/environment;* and *Develop scale-up solutions*. Kindström, Kowalkowski (2014) state in their studies that business models might be used as the tools for visualization of changes that would increase transparency, understanding, and awareness of possibilities of services and necessary changes. According to Page (2012), the advantage is that if the facts are simplified, the real situations can be comprehensively analyzed in full. However, if the enterprise is focused on important decisive variables (particular categories of the business model), cheaper and more reliable decisions can be taken. Based on theoretical assumptions, analysis of the results and their evaluation, summarized general structure of the business model, can be proposed. The model will respect obtained results and can be used in the specific agricultural sector (Fig. 3). According to the PCA, three main components were found to create the business models explaining 76.81% of the variability of the original variables. The most important one is Workforce and profit, which explains 41.37% of the variability of the original variables; it is a base of success in any kind of business and agriculture without an exception. Bahta, Malope (2014) found determinants of profit efficiency in agribusiness as follows: education, distance to the market, herd size, and access to income from crop production. However, the second component Livestock units and financial indicators explains 21.57% of variability; it is a specific factor for agricultural business the same as the third component Arable land, which explains 13.87% of variability. Hall et al. (2013) recommends the following financial indicators for the analysis of agribusiness: indebtedness, liquidity, aktivity, and profitability. Arora et al. (2015) examined the effect of land ownership on decision goals and found these 5 common factors: long-term objectives, short-term economic objectives, growth objectives, short-term social objectives, and personal objectives. Agricultural companies have to take in consideration the economic consequences of their changing goals. Manjunatha et al. (2013) state that land ownership is positively associated with profit efficiency.

The enterprises following the first cluster are farmers with main activity focused on: *Grain, oilseeds and protein crops; General field production; Field crops and raising cattle; Various kinds of crop and animal production.* Bandevica (2011) recommends for crop cultivation farms and farms of mixed specialization assuming constant volume of production to retain the current structure of production factors. The farmers of the second cluster have the main activity focused on: *Horticulture; Viticulture; Fruit-growing; Sheep, goats and other species of grazing livestock.* By Aggelopoulos et al. (2014) sheep and goat farming is very important because a large number of dairy and meat products have high nutritive value, and represent a substantial income to the farmers, creating added value by processing and marketing of sheep and goat meat and milk. The third cluster presents farmers involved in: *Milk production; Combined breeding of cattle; Breeding pigs and poultry; Mixed farming, mostly cattle breeding; Mixed livestock, mostly pigs and poultry.* Bandevica (2011) recommends in economic downturn, a replacement of labour with capital in pig and poultry as well as in dairy farming. According to Bahta, Malope (2014) the profit of smallholder beef producers can be increased through increasing cropland area and reducing input prices. This could be an improvement for farm profits, which could be directed at reduction of input prices and encouraging beef farmers to engage in crop farming, in particular employing for production of fodder. By Huda (1996) it is very important to develop strategic plans for the products imperative considering production cost, pricing, and profit. The marketing in this specific sector of agriculture is mostly B2B. This marketing communication should be carefully targeted, initially on a narrow target group which is interested in this product, or on individuals (it is part of customer segment). Ulvenblad et al. (2014) state that the increasing number of investigations (survey in organizations, modifications of the business model) confirms that business models are considered to be the key to competitiveness, revitalization, and growth of the enterprise. They also suggest that the future research might be also focused on the implementation of the process of lean innovation in the agricultural sector and on how such implementation should facilitate and create business model innovations. Further future research in the given area should be focused that way.

CONCLUSION

The results confirmed that Czech farmers can be categorized into three clusters according to particular parts of the business model they use. These three clusters (*Workforce and Profit, Livestock units and financial indicators*, *Arable land*) resulted on the basis of three components created by means of the PCA. The first cluster includes enterprises with classic field production and various kinds of vegetable or livestock production, while the vegetable production is the key one. This group of farmers has above-average arable land area, above-average revenues, and most of them show positive or zero profit-and-loss statement. The second cluster enrolls enterprises engaged in the special crop production and livestock production with

focus on animals grazing bulky fodder. These farmers' arable land area is below-average, workforce input and thus labour costs above-average. On the average, this group achieves zero or negative profit-and-loss statement. The third cluster is represented by the farmers involved in *Milk production; Rearing and fattening of cattle; Combined breeding of cattle; Breeding pigs and poultry; Mixed farming, mostly cattle breeding; Mixed livestock, mostly pigs and poultry*. Therefore they have above-average livestock units and positive or zero profit-and-loss statement. Labour costs and arable land ownership are slightly below-average. Altogether the Revenues from crop production are higher on average than Revenues from livestock production. On the basis of the results obtained, these three identified groups of Czech farmers are recommended to focus on the following parts of the business model: key activities and key resources (the first cluster), cost structure and risk management (the second cluster), and customer segments and revenue streams (the third cluster). It is recommended to modify the presented business model in line with the existing situation of an enterprise and its position in the market place. At the same time, limitations of small-size farmers should be taken into account.

The theoretical contribution of the article consists in the summarization of the theoretical assumptions and identification of important areas of the business models in particular agricultural enterprises in the Czech Republic. The practical contribution of the article is the assessment of the existing situation and suggestion of the general business model in agriculture, that might be modified according to the requirements and current situation of a given agricultural enterprise.

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