COMPETITIVENESS AND ORGANIZATIONAL STRUCTURE: CLUSTER ANALYSIS OF RETAILERS IN THE CZECH REPUBLIC

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Abstract

This study is an attempt to prove the hypothesis that long-term development of organizations goes in accordance with the recurring alternation of serial (vertical) and parallel (horizontal) organizational structure. Alternation is due to the need to increase the efficiency and competitiveness of businesses. The proof is going on the example of retailers, since they have separate subdivisions and hence well-defined organizational structure. Ease of access to information determined the choice of the Czech Republic retailers, but at the same time it was limited the scope of the study. A two-step cluster analysis demonstrates that all retail enterprises of one country may be represented as groups of five clusters, each of which unifies together enterprises with the same structure and similar efficiency parameters. Independent variables used in the analysis are sales volume, number of employees, labor productivity, number of locations, the number of activities types. The competitiveness of each next cluster enterprises increases. Knowledge of development pattern allows each entrepreneur to clearly determine his cluster and to develop strategy to improve current business process or elaborate a strategy for jumping to the next level of development.

Key words: retail, organizational structure, serial, parallel, efficiency

JEL Code: L22, L81, C38

Introduction

The purpose of this article is to show that the development of commercial companies goes in accordance with objectively conditioned pattern of evolution. Its manifestation is in repeated alternation of serial (vertical) and parallel (horizontal) organizational structures.

Thompson (2003) notes that the organizational structure is determined by core technology and he identifies three types of structures. The first is "pooled interdependence" in which the elements of organization are minimally dependent and organizational elements are completely independent. O'Shaughnessy as an example of such an organization results

mentions "multiple retailers" (2013). Another type of structure is "sequential interdependence" (Thompson, 2003), in which the input of a single element is the output of the previous one. We can say that this structure, for example, may characterize any store in which employees sequentially perform activities to ensure sales. The third type of structure is "reciprocal interdependence" in which the outputs of each become inputs for others. This type is the most complex and for this reason it is difficult to provable by statistical methods. Thus, we will try to prove the existence of the first two basic types of structures.

In favor of proving the existence of two basic types of organizational structures can be noted that, systematizing a number of scientific schools, modern scholars often discuss only two variants of management structures – mechanistic and organic (Daft, 2013), which are based on the concepts of vertical and horizontal organizational structure. Also contemporary debates about the flat (horizontal) and tall (vertical) systems (Ghiselli & Siegel, 1972) have recently become the main focus of discussion on the advantages of flat organizations.

Furthermore, it is assumed that a company transforming an organizational structure, even without changes in technology, can enhance working efficiency, for example, with the vertical or horizontal integration (Pieri & Zaninotto, 2013; Belderbos, Gilsing & Lokshin, 2012; Álvarez-SanJaime, Cantos-Sánchez, Moner-Colonques & Sempere-Monerris, 2013).

Based on the above, we agree with Coleman (1990), that most types of social organizations can be represented as vertical or horizontal. Of course there are many other, more complex structures, but they often can be represented as a combination of these two ones.

In our study, we will try to prove the hypothesis of alternation of serial and parallel organizational structures. The very hypothesis has been put forward in the Russian scientific papers by the author and co-authors (Denisov, Kolokolov, & Yusim, 2010), but to date has not received a wide scientific recognition. In this article, we use new methods of evidence and data.

In order to verify the hypothesis of alternation, we have chosen the retail as a sector of a national economy, where organizational structures are formed by separated enterprises (shops) and in which the effect of competition and the laws of the market are most obvious, so that the organization structure can be formed in an objective manner. During the time that has elapsed since 1990, retailers have become the most dynamic sector in the Czech economy. Starting with small stores which were owned by state and by co-operatives, retail now is a highly competitive market (Simova, 2010), formed with the active participation of major

international network of companies and have the best practices of the optimal organizational structures.

For a confirmation of our hypothesis we will use the methods of cluster analysis according to the data of the Czech Republic retailers. Cluster analysis is widely used for the determination of relatively homogeneous groups, combining elements of samples with similar characteristics. This method is used also for defining retailing structure (Capece, Cricelli, Pillo & Levialdi, 2010; Adusei, & Awunyo-Vitor, 2014).

1   Materials and Methods

1.1   Theoretical framework

The retailer's activity generally may be seen as a process consisting of procurement, storage and sale (retail) for the purpose of gaining profit. In the extreme case, this process may be made by a single person and we can speak about the basic initial stage of a retail firm. The notion of a firm consisting of a single person somehow does not coincide with the mainstream theories but there are many individual entrepreneurs present in various economies, so such firms can be considered as the first level of development.

The organizational structure of the firm's first development level may be presented as serial (sequential) value chain comprising (Porter, 1985) the Primary Activities (in this case sale process) and Support Activities (divided in two components – input and output) (see Figure 1).

Fig. 1. The serial organizational structure of the firm's first development level consists of one employee (salesperson)

| Support Activities (input)	Primary Activities (Sales process)	Support Activities (output)
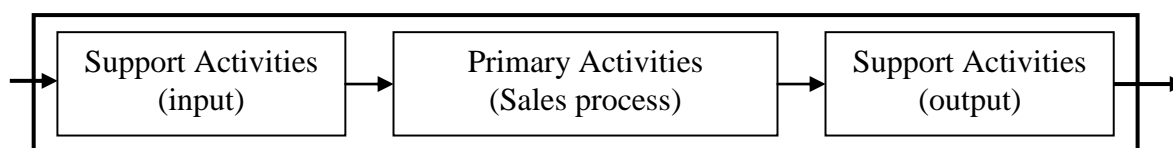
When creating structural pattern of firm's evolution, we will assume that the initial products may be bought in the required quantities at a market price. We will similarly suppose that there is a demand for all products of the firm and that all products are demanded by the market.

Upon reaching the limits of the current technological improvements, the owner of the first development level firm most likely has only one way to increase profit and to reduce costs. The entrepreneur will duplicate the primary activity (process of retail) and we can speak

of organizing the second development level. Its structure acquires the characteristics of a parallel structure (see Figure 2).

Fig. 2. The parallel organizational structure of the firm's second developmental level consists of up to 10 "identical" store salespersons
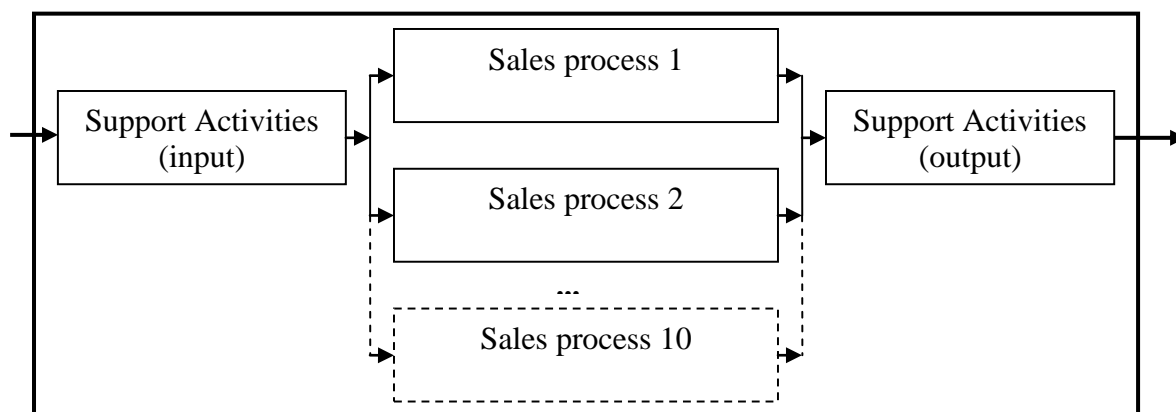
The capabilities of a firm consisting of at least two people has increased twofold because the examined pattern of production implies the duplication of the best of the achieved retail process. The efficiency of one employee, as a ratio of the volumes of sale goods to all the firm's expenses increases due to the fact that the expenses for purchasing and selling products increase to a lesser extent than the volume of the products increases. Moreover, the firm's owner obtains an opportunity to purchase a greater volume of initial products at a lower price and thus also decreases his costs. We can see known effect of economies of scale.

The boundary of the quantitative growth of number the production processes is mostly determined by the span of control. The modern researchers are close to the empirical estimate, in accordance with which the figure of about 10 employees may be considered the limit of the span of control under the conditions of the business environment (Mintzberg, 1979). Therefore, the maximum production volume of the second development level firm grows approximately tenfold compared to the first development level firm. And as a result, we have, for example, ten stalls (10 different workplaces).

The attempts to extend the boundaries of the second firm's development level via organizing a multi-level management system for performing the existing technological processes are possible especially in the retail (we know many examples when networks unified a lot stores of different sizes and formats), but they do not eliminate the general problem of improving technologies and the necessity to move to a higher level.

The emergence of the third development level means a qualitative change in retail technologies. The new firm uses the advantages of division of labor and specialization of workers which have already been described by Smith (1776). The organizational structure of

the firm becomes serial again (see Figure 1). In retail, this means the transition from a network of small stores (stalls) toward a supermarket. For example, for cutting and packaging are used machines that are located outside the sales area and the point of sale (POS) terminals are installed at the tills, which significantly increases productivity. The labor productivity in supermarkets is several times higher compared to the traditional retail methods.

Upon reaching the minimum costs and maximum labor productivity with using of the existing third-level technologies, the firm shifts to the reproduction of the production processes once more. But in this case it will not be just an ordinary hiring of additional personnel, but total multiplication of the firm's establishments. As a result, there emerges a firm of the fourth development level comprising several supermarkets. (see Figure 2).

This way of increasing the capacity with use of the existing technologies can be continued until it reaches a limit. Such development is also limited due to the growth of general entropy in the system and the gradual lessening of the effect from increases in production volumes by means of adding new establishments, in comparison with the growth of expenses for the operation of the whole system. When getting a certain value, the increase caused by adding one more retail process becomes equal to the increased costs for the support activities. The economic sense of future growth in this direction will be lost.

The developmental logic (which is given in the article) suggests a transition from the firm of fourth parallel development level toward the firm of fifth serial development level. It is possible to form companies of two serial types. The first one is a "continuation" of a firm of the fourth level by a chain of added value towards resources (for example, wholesale trade) or to the consumer. For example, it can be a firm comprising technological chain and can be built as a network of supermarkets, producers for them and a transportation subdivision (logistics). In such case, we may speak about vertical integrated holding company. The second variant of firm's fifth development level is a formation of a rather large enterprise, for example, it can be a single shopping mall or a shopping center (like MAKRO Cash & Carry ČR).

The transition to a firm of the sixth level suggests the formation of a parallel structure comprising several homogeneous regional divisions, each one being a firm of the fifth level. According to the logic of this research, it will be an expansion of a corporation within the trade and process of horizontal integration.

Besides, it can be supposed that the formation of firms of the sixth development level will take place based on mergers and it could be similar but not identical companies.

1.2   Material

We used the initial data from the database Albertina Gold Edition of Bisnode Česká republika, a.s. For the study was selected enterprise category of Retail (CZ-NACE: Retail) with a positive (more than one) number of employees and a turnover for 2013 or 2014. All interval variables were recalculated into the arithmetic ones. The total number of entries are 5 660 retailers and by type of primary activity (CZ-NACE predominant) the retail organizations cover all types of retail.

1.3   Method

Two-step cluster analysis was conducted to prove our hypothesis. Continuous variables: Number or workplaces; Turnover; Number of employees; Categorical variables: Number of Employees (interval). The calculation was made by using IBM SPSS Statistics. We hypothesize that organizations in which one workplace and less than 5 employees should be included in the first cluster. Unfortunately, the available data do not allow to make more detailed analysis and to prove that the actual sequential structure of the first level of development forms one person. The second cluster is evaluated, as a group firms with a large number workplace (approximately up to 10) with the same activity (and so probably with parallel structure) and the characteristics of such organizations are a number of employees more than 5 and increased the number of jobs. The third cluster is formed mainly from organizations with a consistent structure and with an even greater number of workers. In the fourth cluster we include classical retail networks which have a parallel structure, because they include several stores. The fifth cluster consists of representatives of the major networks, which include wholesale and retail trade.

2   Results

As a result of the two-step cluster analysis we were able to produce the decomposition of the data set into groups (or clusters). In the Table 1 and the Table 2 we can see that organizations with number of employees fewer than 5 peoples expected form the basis of one of the clusters (column №4). The second and third cluster is formed as expected by the following size (number of employees and turnovers) organizations (columns №5 and №3). The fourth cluster (№2) has included as expected the retail networks. The fifth cluster has the biggest retailers and also the "emissions" of previous levels (column №1).

Tab. 1: Five clusters of Czech Republic retailers. Frequencies

Number of employees		Cluster				
		1	2	3	4	5
1 – 5	Frequency	1	0	0	3 275	0
	Percent	0,0%	0,0%	0,0%	100,0%	0,0%
6 – 9	Frequency	0	0	0	0	879
	Percent	0,0%	0,0%	0,0%	0,0%	100,0%
10 – 19	Frequency	1	0	764	0	0
	Percent	0,1%	0,0%	99,9%	0,0%	0,0%
20 – 24	Frequency	0	153	0	0	0
	Percent	0,0%	100,0%	0,0%	0,0%	0,0%
25 – 49	Frequency	0	240	0	0	0
	Percent	0,0%	100,0%	0,0%	0,0%	0,0%
50 – 99	Frequency	1	94	0	0	0
	Percent	1,1%	98,9%	0,0%	0,0%	0,0%
100 – 199	Frequency	0	69	0	0	0
	Percent	0,0%	100,0%	0,0%	0,0%	0,0%
200 – 249	Frequency	19	0	0	0	0
	Percent	100,0%	0,0%	0,0%	0,0%	0,0%
250 – 499	Frequency	52	0	0	0	0
	Percent	100,0%	0,0%	0,0%	0,0%	0,0%
500 – 999	Frequency	29	0	0	0	0
	Percent	100,0%	0,0%	0,0%	0,0%	0,0%
1000 – 1499	Frequency	9	0	0	0	0
	Percent	100,0%	0,0%	0,0%	0,0%	0,0%
1500 – 1999	Frequency	3	0	0	0	0
	Percent	100,0%	0,0%	0,0%	0,0%	0,0%
2000 – 2499	Frequency	3	0	0	0	0
	Percent	100,0%	0,0%	0,0%	0,0%	0,0%
3000 – 3999	Frequency	1	0	0	0	0
	Percent	100,0%	0,0%	0,0%	0,0%	0,0%
4000 – 4999	Frequency	1	0	0	0	0
	Percent	100,0%	0,0%	0,0%	0,0%	0,0%
5000 – 9999	Frequency	4	0	0	0	0
	Percent	100,0%	0,0%	0,0%	0,0%	0,0%
10 000 – and more	Frequency	3	0	0	0	0
	Percent	100,0%	0,0%	0,0%	0,0%	0,0%

Source: own calculations

Tab. 2: Five clusters of Czech Republic retailers. Cluster Profiles

		Number or workplaces		Turnover		Number of employees	
		Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Cluster	1	77,21	82,076	3 450,88	8 242,600	1 077,22	1 937,625
	2	7,55	8,557	146,22	245,919	53,17	40,145
	3	2,52	1,761	38,28	36,638	14,50	0,000
	4	1,35	1,022	6,43	8,031	3,00	0,000
	5	1,67	1,026	19,15	18,258	7,50	0,000

Source: own calculations

3   Discussion

the existence of a specific organizational structure by statistical methods is quite complicated to prove conclusively. In our case, we have got the almost expected results because the clusters have together united precisely those companies which we expected. At the same time, we cannot assert the uniqueness of received result. Only the logic of development allows us to suggest that cluster analysis confirmed the alternation of serial and parallel systems.

In the case of retailers, we can agree with the existence of the pattern of alternation of serial and parallel structures. In addition, we can also talk about the existence of the development levels of the organization one of the characteristics of which is the organizational structure, which changes as the organization grows.

The alternation of serial and parallel structures in the course of the growth of a firm's development was shown in a conventional pattern (see Table 3) and illustrated by the results of cluster analysis.

Tab. 3: Levels of retailer development

Level of development	Trade	Organizational structure
1	Retailer (stall)	serial
2	Network of stalls	parallel
3	Supermarket	serial
4	Network of supermarket	parallel
5	Wholesale + Retail	serial

Source: own calculations

The best way to increase efficiency of fourth development level firm is an extension of the process chain due to the inclusion of the previous or subsequent redistribution. But for retailers it is a wholesale trade. That is why the retailers of the fifth level of development of its production units are made up of blocks of wholesale and retail, and together form a coherent system. The level of wholesale and retail means that after a significant increase in output within the parallel structure again there is a transition to a consistent system. And it caused due to, as always, the requirement to increase the efficiency of the company.

The structure of national trade system is shown in table 3 (which, is a bit simplistic, but, in fact, quite informative).

Conclusion

The current development level of the trade organization describes the static state. Dynamical evolution represents a shift from the level achieved toward a higher one and the structures change from serial to parallel (and vice versa). We can argue that there is a pattern

(may be even law) of permanent alteration serial and parallel organizational structures in long-term corporate evolution.

Unfortunately, in the modern statistics or corporate data there is not any information about the structure and we had to use indirect signs. We interpreted the organization of the first level of development as consisting of one person. Such organizations by definition, can only be serial. The second level of development – are organizations with a common activity, but having several workplaces. Obviously, they should characterize the parallel structure. The third level is in many respects was obtained based on the analysis of activities that can be seen as consistent organization. The forth organizational level is a classic retail networks with supermarkets, and therefore parallel. The largest organization is national representative of international retail networks.

Certainly our article can only be seen as a first step and thorough proof requires larger studies, involving analysis of the structure of specific organizations.

The next step in the study which can confirm our hypothesis should be offered field study of several organizations of each level of development. It would be desirable to produce a representative sample of the trade of the Czech Republic and a comprehensive analysis of their organizational structure.

It can be assumed that the general pattern of the organization's evolution presented in the article is universal, because the approaches underlying it can use it with certain clarifications to trade organizations from any country with a market economy for the purpose of an objective determination of current situation, assess the prospects and development of methods and strategies for accelerated development both individual trade organization and the national trade system as a whole.

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