Remarks on the land consolidation in the Czech Republic

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1 Introduction

The process of land consolidation is broadly effectuated in the Czech Republic. There is intensive demand for land consolidation as the means of readjusting the unfavorable land division and enhancing the appropriate use of the property without altering the status of ownership. It is also necessary to develop the infrastructure; enhance landscape and natural protection and decrease parcel fragmentation. Land consolidation is a strong instrument with multi-purpose objectives. Land ownership fragmentation is an important issue for farmers when non-contiguous plots of individual owners are scattered around the area of one or more cadastral units. After years of farming based on faulty land ownership, a significant number of plots are not accessible by field roads, and the plot shapes and sizes are not suitable because they reflect the conditions before World War II. These factors together with others like transfer of work force from agriculture to industry, the mismatch between small holding size and large agricultural machinery, problematic drainage and irrigation systems, the distinction between land ownership and land use. Thus, land consolidation not only deals with land redistribution, but also arranges optimal shapes and sizes in order to make the holdings viable.

The Czech Republic has been trying to put the relationships between owners and land into order since the political changes in 1989. The land consolidation projects are the basic form of this solution. In order to speed the process of land privatization up, the Czech law has two basic forms of land consolidation: simple land consolidation, dealing mostly with provisional land use, while comprehensive complex land consolidation that deals with changes in land ownership, land conservation, flooding control, land reclamation, field road systems, etc. Once the initial demands of the farmers are satisfied, complex land consolidation becomes increasingly important. Since 1999, about 100 LC projects per year have been completed, and the form of provisional land use has been discontinued. So far, complex land consolidation had been completed in 550 cadastral units (municipalities), and 250 other cadastral units are now in various stages of development.

The annual budget for land consolidation does not correspond with current demands, the land offices should prioritize funding according to the anticipated effects. Models based on the multidisciplinary ex ante evaluation approach are appropriate methods for selecting preferred areas (Thomas Rutherford 1999; A.K. Yaldir 2002), and the consolidation effect is a decisive factor in the decision processes in countries with highly fragmented land structure. At the same time, evaluation of land consolidation effects offers the rational schema for more effective approaches.

2. Goals and limits

The objectives of land consolidation have been changing during the past fifteen years, recently the complex solution of cadastral unit is being stressed. Chart 1 shows simple land consolidation (SLC, smaller area, limited goals) versus complex land consolidation (CLC) history. In Chart 2, there is a comparison of the investment in both types of land consolidation.

Chart 1. finished simple (SLC) and complex (CLC) land consolidation in the CR

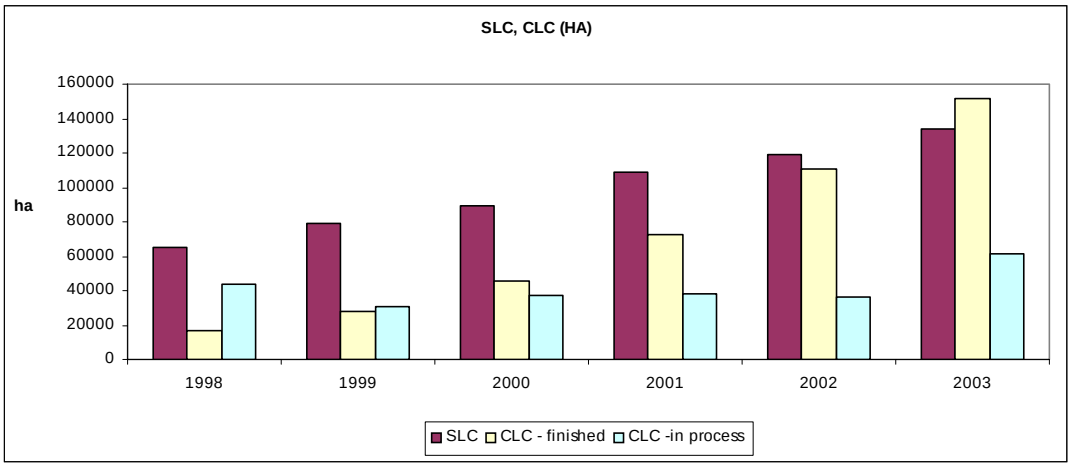
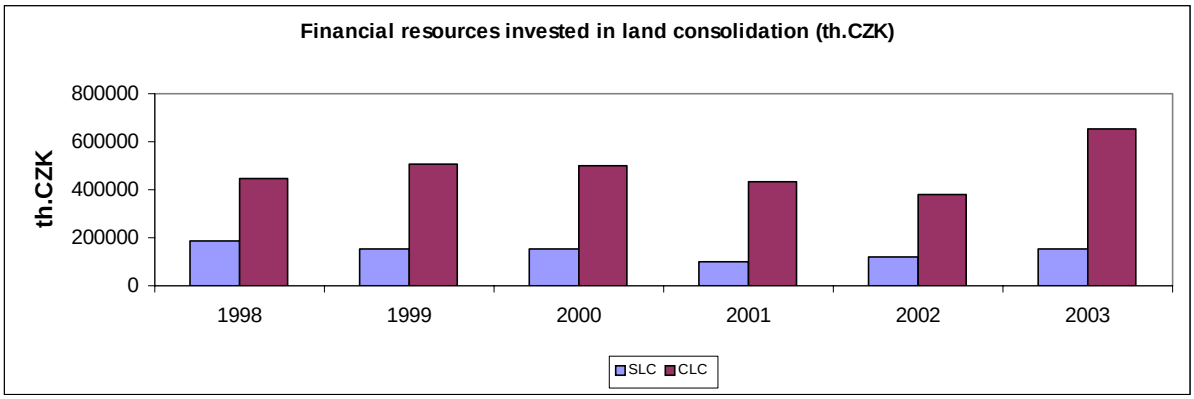


Chart 2.



The strict implementation of law makes possible only the solution outside a village, it means the residential area is excluded from the consideration. The complex land consolidation solution - the implementation of measures that improve the economical, agronomical parameters of farming, implementation of ecological remedy in the landscape, solution of problem of soil erosion, building of new road network and what is considered in the CR as very important - the design of new cadastral map in the limits of the cadastral unit in the process of the land consolidation. The process of land consolidation is supervised by the regional offices of the Ministry of Agriculture; land consolidation is considered finished when the results are accepted by the offices of cadastre.

After being approved by owners, the proposed new territorial and property structure is inscribed in the cadastral registers. In many cases it is the final point of the process, the finalization of proposed construction works (roads, ecological construction etc) could take a few more years.

The cadastre offices, as places of central ownership registration, see in complex land consolidation one of the main sources of actualization of their datasets. The process of land consolidation is carried out by private sector. As it follows from the basic statistics of the process, the land consolidation take place on the entire state territory, employing the

specialists in geodesy, agronomist, cad designers etc., in the non central regions the notion of land consolidation is becoming known to the population. The law defines the impetus of the land consolidation process, one of the main reason for land consolidation opening is the urge of the majority of land owners. This, however, in general is not the case. Usually the magistrates of related municipalities urge the owners and prepare demand for process opening in their names, because the clean up of the ownership structure is often precondition for many types of rural subsidies. That is also the weak point of land consolidation, for very often the only results of the process is creation of digital cadastral map with precise registration of ownership structure but there are no visible results in landscape; the lease structure stays untouched and the proposed implementation in the terrain is not done because of the lack of financial means. Even this is considered as important step, the digital cadastral map output and new design of the ownership structure could be important. Nevertheless, the complex land consolidation should have other aims. Another question is the partial character of the solution - the interior part of village remains unsolved. Often, the main demand is for defining the potential of the village for growth and to evaluate the capacities and social possibilities of the villages with the relation to the landscape and agriculture. The limitation of the process to the outside part of the village brings also technical disorder in the cadastral system, that is the cadastral system has difficulties to inscribe the “out of village” part of ownership into their database, namely there is the internal concatenation of the ownership in the frame of the cadastral unit.

3. Efficacy

How to evaluate the efficacy of the process of land consolidation on the present level with all of its limitation? The ten percent of the land consolidations are being done because of the needs coming from regional or state exigencies, as a base for important constructions of infrastructure (highways, anti-flood measures, soil of extreme erosion etc), this could be considered as enforced by national interests, the other opening should undergo the critical analysis. The traditional reason for land consolidation, the improvement of the productive aspects of the holding hasn’t been practically observed as a reason for land consolidation opening. There is still an unnatural gap between the ownership and tenant structure, tenant structure is optimal and it is important for productive agriculture, generally the complex land consolidation isn’t done in the leaseholders interests.

The process of land consolidation in the entire state employs 1200 land officers in 75 regional land offices and consumes enough money. On the state level, the alternative options of running the process are being discussed, the role of the land officers and private sector, how to compare the efficacy of the single land offices etc. The regional differences have implication on the duration of the process; the costs are regionally conditioned as well the level of fragmentation etc. The investigations of this character are effectuated at the present time. The position of land officers is also regionally conditioned. Their control attitudes during the land consolidation process often depend on their technical skill, on the capacities of the private sector in the region, on the interpretation of law by cadastral offices etc. Another very delicate question is the size of regional offices and their subdued area. In seventy-five regional offices in average, 16 employees are working. The concentration of offices in central cities would permit to employ other specialists, deeper specialization etc.; on the other side, the land office would lose the direct touch with the region and the strong acquaintance with the landscape would disappear.

4. Land Consolidation Cost and performance Categories

Table 1 shows the frequency of numbers of offices in each financial and performance category – implementation costs are deducted from total costs (tertile 1 – the first third – includes the offices with the lowest levels of financing and performance). There is an interdependence between the performance category and the financial cost category, in this table we get an extremely strong group dependency (χ^2 = 37.05, p=0.001). This means that we can refer to the overall cluster homogeneity of performance and land consolidation cost. Of course, the question may be raised why two offices from the lowest cost category also belong into the highest performance category.

Table 1. frequency table of performance categories

			hectares category (completed, in-progress)			
	tertile		**1**	**2**	**3**	
	1	Number	19	4	2	**25**
Land consolidation cost		*%*	*76*	*16*	*8*	***100***
category	**2**	Number	6	12	8	**26**
without implementation projects		*%*	*23.1*	*46.2*	*30.8*	***100***
	3	Number		10	15	**25**
		%		40	60	**100**
Total		**Number**	***25***	***26***	***25***	***76***
		%	***32.9***	***34.2***	***32.9***	***100***

The cost and performance analysis makes it possible to predict expectations concerning the area of completed land consolidation projects with respect to regional differences and to determine certain performance “norms” for the land offices. A certain structural inertia in the relations of the cost and performance categories becomes explicit. The length of the time series does not allow a more robust time series apparatus to be deployed, but the nature of the dependencies makes it possible to partly disclose the structure and power of the influences affecting the land consolidation processes in the country. The land consolidation process is a financially demanding process, the possibilities of budgeting are limited, the rational planning and evaluation of use of resources could enhance the overall productivity.

5. Basic statistics and influences

The resources inserted in the execution of land consolidation are immense, approximately CZK 1 billion per year was put in the process, never less there was the financial gap in the last year when the state decreased the budgeting radically causing a certain crisis in the process, hopefully it was an exception. The scope of land consolidation projects that have been completed and/or are in progress is also extremely large. In terms of the extent of the completed land consolidation projects, the Czech Republic has shown dramatically different results from those of its Eastern European neighbors. The detailed data from the past decade make possible to conduct a more in-depth analysis of the factors affecting the completion rate, and also the mutual conditionality of some parameters becomes apparent. The dependencies

are more or less of a categorical nature. It becomes clear, however, that it is possible to predict the effects of the alternative financial policies of the center.

As follows enclosed tables (2,3,4,5) the land consolidation in the last years was done on 5.5% of the total agricultural area, almost 86000 owners were involved in the process. Substantial decrease of fragmentation was achieved, the number of parcels was halved etc. The tests proved significant shift almost in all parameters in consideration.

In the Czech Republic there are 14 administrative provinces that often follow the limits of the ancient historical divisions (Bohemia, Moravia, German area). An important influence of the administrative regions on output parameters and very strong homogeneity of those parameters on level of provinces was observed (defragmentation index as function of pre-process parameters). Fragmentation indexes, price per hectare differs significantly among provinces. The highest consolidation effect was observed in the South Bohemia province (ID = 1.7, IC = 61.0). Traditionally different farm sizes in provinces, the different type of inheritance principles and of other relevant historical events are very important influences on the variation of the original fragmentation. Different type of inheritance principles and traditions are the key factors of fragmentation.

Before land consolidation, the holding of one owner had been divided into 6.4 plots with average plot size 0.41 ha, land consolidation modified these parameters to 3.2 plots and 0.86 ha. The consolidation potential can be expressed as one plot with size 2.68 ha per owner. LC also significantly reduced the density of plot boundaries to 59% of the original value. The average plot shape given by the area-to-perimeter ratio was also positively changed from a value of 18.5 to 32.0. Average total LC costs were calculated to the extent of 17 thousand CZK per hectare. The so-called projecting stage of land consolidation, which includes projecting, survey and investigation works, accounted for 40 percent, while the implementation of the proposed measures accounted for about 45 percent of the total land consolidation costs.

Table 2. investment in land consolidation process per regional office

Th. CZK, total 1998-03							
	N	Minimum	Maximum	**Total**	**Mean per office**	Deviation	**i.e. %**
Preparatory works	76	0	42,824	389,051	5,119	6,503	**10.3**
Surveying	76	0	53,740	793,234	10,437	8,631	**21.0**
Designing	76	0	57,364	811,681	10,680	10,985	**21.5**
Setting-out	76	34	80,266	560,431	7,374	9,887	**14.8**
Roads	76	0	48,597	974,642	12,824	10,411	**25.8**
Environment	76	0	16,543	101,032	1,329	2,748	**2.7**
Water	76	0	13,376	87,705	1,154	2,317	**2.3**
Erosion	76	0	6,357	32,159	423	1,168	**0.9**
Others	76	0	3,253	29,046	382	680	**0.8**
Land consolidation total	76	166	199,550	3,778,109	49,712	34,044	**100.0**

Table 3. basic statistics of compex land consolidation process

perimeter territory	***area total***	***number of parcels***	***number of parcels***	***number of owners***	***number of owners***	***perimeter of parcels***
m	*ha*	*before process*	*after process*	*before process*	*after process*	*before process*
9107739	233009	551942	266135	85951	82357	118484972
perimeter of parcels	***price total***	***price design***	***price alignement***	***price digital maps***	***price construct.***	***price erosion***
after process	*th.KC*	*th.KC*	*th.KC*	*th.KC*	*th.KC*	*th.KC*
70106522	3986196	1575100	306831	670021	2017685	63070
area erosion	***price ecology***	***area ecology***	***price water***	***area water***	***price roads***	***length roads***
ha	*th.KC*	*ha*	*th.KC*	*ha*	*th.KC*	*m*
875	220128	1857	107292	1085	1846847	705192

Table 4. land consolidation indicators

average parcel (ha)	***average parcel (ha)***	***average owner (ha)***	***average owner (ha)***
before	*after*	*before*	*after*
0.41	0.86	2.68	2.78
total price	***design price***	***dig.map price***	
ha (th.KC)	*ha (th.KC)*	*ha (th.KC)*	
18.04	7.14	3.24	

Table 5. average cadastral unit

		N	***Mean***	***std***
total area	ha	585	394.3	258.1
parcels	before	577	956.6	891.5
parcels	after	575	462.8	435.6
owners	before	580	148.2	168.5
owners	after	577	142.7	166.7
total perimetr	m	542	218607.0	216600.4
total perimetr	m	552	127004.6	114249.3
owners over 10ha	ha	539	213.6	189.5
total price	th. KC	573	6949.0	6410.7
design proce	th. KC	508	604.0	643.8
digital map price	th. KC	519	1291.0	18281.8
erosion measures price	th. KC	550	114.7	524.0
area of erosion measures	ha	532	1.6	5.4
ecological measures price	th. KC	525	419.3	2123.2
area of ecological measures	ha	537	3.5	10.1
water measures price	th. KC	543	197.6	830.8
area of water measures	ha	530	2.0	33.3
roads price	th. KC	552	3345.7	5697.5
roads length	m	553	1275.2	2116.0

6. Conclusion

At present the intensity of the land consolidation does not have a comparable pendant in Europe. It is in the first place because of demands of cadastre (instauration of ownership, cadastral maps), building structures in the landscape, construction of basic infrastructure (highways, roads) and probably what is most important factor - the good established structure of land offices that are obligatory involved in the process; in short, an office is given.

The outputs of land consolidation projects between 1989 and 2005 have demonstrated the great contribution of land consolidation to reducing land ownership fragmentation and also to improving the production parameters of the land pattern. The average plot size has been doubled and the plot shape has also achieved an evidently positive change. Both key parcel attributes were changed to create higher efficiency of the farming operations for which the agricultural plot is used. The economic effect due to reduced tillage time per hectare could be quantified. Land consolidation has contributed to defragmentation, its potential is not been fully exploited. For viable agriculture is necessary to accelerate the process of land consolidation and put money in it in effective way. There is potential of acceleration in linkage of land consolidation with urban development in the countryside, it is necessary to stress the implementation of building structures in the landscape, and to include in the area of one solution more cadastral units and to solve in one project a larger territory with its all developing aspects.