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SN 116

Changes in Networks of Secondary Schools in Ukraine

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It is recognized that the network of secondary schools in Ukraine is highly inefficient, for example as measured by average class sizes or by the share of very small schools. This inefficiency contributes to high costs of providing obligatory education to all Ukrainian youth, especially through excessive employment of teachers. This is also a barrier to significant increases of teacher salaries, because financing higher salaries of too many teachers becomes an excessive burden on the national budget.

Ministry of Education and Sciences of Ukraine (MES) is not the founder of secondary schools, and therefore does not have direct managerial powers to optimize school network and improve system efficiency. This is the responsibility of local governments which are school founders, namely oblasts (regions), city of Kiev, cities of oblast significance (large cities with special status), rayons, and recently formed amalgamated territorial gromadas (OTG). Of course, closing schools is a difficult decision for founders of communal secondary schools, because it entails longer travel time to schools for students and loss of work for teachers.

Although MES is not a school founder, it can introduce instruments which will help local governments to optimize their local school networks. One such instrument is creation of hub schools (опорна школа), and changing the status of a nearby small secondary school to a satellite school (філія), which will typically cover only initial grades (between 1 and 4). Additionally, MES introduced specific grants exclusively addressed for hub schools, to further motivate local governments to create them. It is therefore of great importance to monitor the process of school closures and of introduction of hub schools across the country. Indeed, MES has introduced the school status into educational statistics (in the statistical form ZNZ-1), allowing to summarize the data in yearly Bulletin issued by MES[1]. The Ministry also conducts monitoring of creation of hub and satellite schools based on operational reports from oblast administrations. The data reported from these two sources are however quite divergent, only the first of these is considered official.

A new different source of information regarding secondary schools is state information education system DISO. Nearly complete data on secondary schools have been collected in DISO in September 2017, 2018, 2019 (prior data collection in September 2016 did not yield complete coverage). These data still have some gaps and errors, which require a careful review in order to correct missing or contradictory data, based on appropriate methodology. Such a review of DISO data has been performed (see Methodological Annex). For hub and satellite schools, data obtained from DISO (after necessary corrections) are quite divergent from official statistics and close to operational monitoring conducted by MES. We assume that these data are closest to reality. Based on the results of this review it is also possible to analyze the changes in the network of communal secondary schools in Ukraine, which were introduced by school founders in 2018 and 2019.

However, presently a review of all the changes in school networks is not possible, because of the continuing and somewhat chaotic process of decentralization. There is no registry of secondary schools, which would legally record transfer of school from one school founder to another. The transfer of schools is not limited to September 1, and may occur at any date between collection of statistical data on schools, conducted every year. There are no strict rule who should be the founder of a given secondary school, and local governments adopt different solutions depending on local conditions and on their willingness to compromise. In some cases this may lead to local conflicts. For

[1] The last one: Інформаційний бюлетень. Заклади загальної середньої освіти Міністерства освіти і науки України, інших міністерств і відомств та приватні заклади (2017/2018 та 2018/2019 н.р.).

example, secondary school in the village of Sholokhove changed its founder several times before the court finally decided that its founder is not rayon, but the urban OTG based on city of oblast significance Pokrov (Dnipropetrovska oblast). This example indicates that our analysis is only preliminary.

The present Short Note 116 is designed to present the results of this analysis. This will allow the Ministry to assess the effectiveness of current measures introduced to improve network efficiency. In the first section we report statistical data about secondary schools. This is standard type of data for Ukraine, although due to careful assessment of data from 3 consecutive school years the number of schools of different type (autonomous, hub and satellite) is probably more accurate than currently available statistics. The second section provide completely novel type of data for Ukrainian education, namely data on individual decisions of school founders regarding school closures, changing the status of autonomous school to hub or satellite school, and opening of schools. In the third section we provide network information on growing private sector. The conclusions and recommendations following from our analysis are presented in section 4. The Annex describes the methodology used to obtained information about changes in school networks.

The present SN is a continuation of technical cooperation of MES and the Swedish-Ukrainian project "Support to Decentralization in Ukraine" (SDU). Issues of efficiency of local school networks were the topic of joint MES-MF-SDU project in 2015 (analysis of school networks of 40 rayons), addressed in SN 14, 15, 17 (May 2015). Policy options for fragmented school networks were discussed in SN 24 (August 2015). Model of hub schools was discussed in SN 33 (November 2015). Moreover SDU project published several guidebooks for OTG regarding management of local school networks.

Executive summary

Based on detailed analysis of school-level data from three consecutive years 2017, 2018 and 2019 it was possible to identify changes to individual communal secondary schools across Ukraine (See Annex). Alongside opening and closing of schools, identified changes include turning an autonomous school to a hub school or a satellite school, and closure of satellite school. This identification allowed to conduct, besides simple statistical reporting of the number of schools of different types (section 1), also of changes to those schools by region and by type of school founder (section 2). A separate review of changes to private schools is also provided (section 3).

The following are main findings of the analysis (section 4):

1. OTG are more active school founders than rayons, the share of schools owned by OTG affected by changes is higher than that of rayon schools.
2. Different oblasts pursue different policies regarding network optimization, which means that despite the decentralization process oblast education departments still yield considerable managerial powers.
3. Double-step verification of education statistics is not effective and is not sufficient to ensure either completeness or correctness of statistical data.
4. Hub school model is not working correctly, there are many hub schools opened without a single subordinated satellite school.

5. Allocation of schools to specific school founders is often problematic, and complicates the allocation of education subvention.

The following are key recommendations based on those findings (section 4):

1. Redesign hub school model to ensure that all hub schools have satellite schools.
2. Introduce strict school registry, so that there is clarity about which schools must submit statistical reports.
3. Redesign allocation of education responsibilities to local governments, so that for each secondary school it is clear who is its school founder.
4. Share more network information with regions, to improve data verification and analysis.

1. Statistical data on schools

Since the introduction of hub schools in Ukraine in 2017, we can now distinguish three types of secondary schools:

1. Autonomous schools (самостіна школа) or stand-alone school, a secondary school which is neither a hub school nor a satellite school,
2. Hub school (опорна школа), a central schools with several subordinated satellite schools,
3. Satellite school (філія), a subordinated school unit without legal identity, usually enrolling students from initial grades only (1 to 4).

The primary source of information about the type of school comes from data collected in DISO. However, due to many errors and omissions, these data must be reinterpreted and assessed using information from more than one year. The methodological issues of identifying school type are discussed in the Annex.

The following Table 1 summarized the number of autonomous schools, hub schools and satellite schools by oblast in September 2017, 2018 and 2019. The table and the analysis further below exclude private and state-owned schools (except for the last section of the note).

Table 1. Numbers of secondary schools by region

	Autonomous schools			Hub schools			Satellites		
Region	2017	2018	2019	2017	2018	2019	2017	2018	2019
Вінницька	828	740	709	18	47	54	12	52	71
Волинська	615	597	580	24	30	31	59	66	67
Дніпропетровська	895	835	816	22	42	46	48	70	81
Донецька	537	507	498	5	9	12	10	16	18
Житомирська	647	603	562	34	56	68	41	42	51
Закарпатська	660	656	656	0	0	0	0	0	0
Запорізька	546	524	495	12	24	32	17	20	29
Івано-Франківська	701	688	665	7	10	15	23	29	44
Київська	669	648	616	24	34	50	30	35	51
Кіровоградська	298	264	243	52	67	76	155	167	171
Луганська	280	267	259	11	14	17	8	17	21

Львівська	1204	1130	1106	41	61	66	83	119	119
Миколаївська	512	477	457	5	17	22	19	36	43
Одеська	776	731	719	21	37	41	28	35	37
Полтавська	608	564	533	25	46	59	27	39	48
Рівненська	608	575	553	20	30	35	46	61	76
Сумська	445	394	367	20	43	51	35	50	54
Тернопільська	738	702	665	20	27	33	52	67	70
Харківська	714	678	658	26	44	52	35	50	58
Херсонська	423	406	390	14	21	25	18	25	35
Хмельницька	716	653	616	13	21	27	9	8	6
Черкаська	594	557	530	5	16	20	10	32	39
Чернівецька	404	389	384	10	13	15	10	19	22
Чернігівська	511	472	446	16	35	40	11	18	21
Місто Київ	425	427	426	0	0	0	0	0	0
Total	15 354	14 484	13 949	445	744	887	786	1 073	1 232

We note that in 2 years number of autonomous schools decreased by 10%, number of hub schools almost doubled, and number of satellites grew by 50%.

Some regions require more detailed review. Of course, we do not expect hub schools or satellite schools in Kiev metropolis. However, it is remarkable that Zakarpatska oblast does not have a single hub or satellite school. This shows both that the education policy in the region is not aligned with the national education policy, but also that the regional authorities have sufficient power to block creation of hub schools in nominally independent rayons and OTG. Note also that this is a region with very few OTG formed.

In contrast, in Vinnitska oblast the number of hub schools tripled in 2 years, while the number of satellites increased more than fivefold.

Another interesting region is Khmelnitska. The optimization of local school networks in this oblast is conducted through quite radical school closures (see also next section), but the number of hub schools remains small, and the number of satellites actually decreases (this may also be data issue, see Annex).

Only autonomous schools and hub schools are legal entities, but all three types have their own school facilities. This is reflected in Table 18 below.

Table 2. Numbers of legal entities and school facilities by region

	Legal entities			**School facilities**		
Region	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Вінницька	846	787	763	859	839	834
Волинська	639	627	611	699	693	678
Дніпропетровська	917	877	862	965	947	943
Донецька	542	516	510	552	532	528
Житомирська	681	659	630	722	701	681
Закарпатська	660	656	656	660	656	656

Запорізька	558	548	527	575	568	556
Івано-Франківська	708	698	680	731	727	724
Київська	693	682	666	723	717	717
Кіровоградська	350	331	319	505	498	490
Луганська	291	281	276	299	298	297
Львівська	1 245	1 191	1 172	1 328	1 310	1 291
Миколаївська	517	494	479	536	530	522
Одеська	797	768	760	825	803	797
Полтавська	633	610	592	660	649	640
Рівненська	628	605	588	674	666	664
Сумська	465	437	418	500	487	472
Тернопільська	758	729	698	810	796	768
Харківська	740	722	710	775	772	768
Херсонська	437	427	415	455	452	450
Хмельницька	729	674	643	738	682	649
Черкаська	599	573	550	609	605	589
Чернівецька	414	402	399	424	421	421
Чернігівська	527	507	486	538	525	507
Місто Київ	425	427	426	426	427	426
Total	15 799	15 228	14 836	16 588	16 301	16 068

In two years, the number of legal entities decreased by almost 6%, while the decrease of the number of facilities was only 3.5%. The changes in school network evident in Table 1 are therefore mostly changes in school status. We discuss these changes in the following section.

Finally, we discuss two indicators which show how the model of hub schools was introduced in practice. This is the percentage of hub schools among all legal entities, and the average number of satellite schools per one hub school, presented in the following Table 3. For obvious reasons, Zakarpatska oblast and city of Kiev have been removed from this table.

Table 3. Share of hub schools and number of satellites per hub school by region

	Share of hubs among legal entities			**Number of satellites per hub school**		
Region	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Вінницька	2,1%	6,0%	7,1%	0,67	1,11	1,31
Волинська	3,8%	4,8%	5,1%	2,46	2,20	2,16
Дніпропетровська	2,4%	4,8%	5,3%	2,18	1,67	1,76
Донецька	0,9%	1,7%	2,4%	2,00	1,78	1,50
Житомирська	5,0%	8,5%	10,8%	1,21	0,75	0,75
Запорізька	2,2%	4,4%	6,1%	1,42	0,83	0,91
Івано-Франківська	1,0%	1,4%	2,2%	3,29	2,90	2,93
Київська	3,5%	5,0%	7,5%	1,25	1,03	1,02
Кіровоградська	14,9%	20,2%	23,8%	2,98	2,49	2,25
Луганська	3,8%	5,0%	6,2%	0,73	1,21	1,24
Львівська	3,3%	5,1%	5,6%	2,02	1,95	1,80

Миколаївська	1,0%	3,4%	4,6%	3,80	2,12	1,95
Одеська	2,6%	4,8%	5,4%	1,33	0,95	0,90
Полтавська	3,9%	7,5%	10,0%	1,08	0,85	0,81
Рівненська	3,2%	5,0%	6,0%	2,30	2,03	2,17
Сумська	4,3%	9,8%	12,2%	1,75	1,16	1,06
Тернопільська	2,6%	3,7%	4,7%	2,60	2,48	2,12
Харківська	3,5%	6,1%	7,3%	1,35	1,14	1,12
Херсонська	3,2%	4,9%	6,0%	1,29	1,19	1,40
Хмельницька	1,8%	3,1%	4,2%	0,69	0,38	0,22
Черкаська	0,8%	2,8%	3,6%	2,00	2,00	1,95
Чернівецька	2,4%	3,2%	3,8%	1,00	1,46	1,47
Чернігівська	3,0%	6,9%	8,2%	0,69	0,51	0,53
Total	2,8%	4,9%	6,0%	1,77	1,44	1,39

On average, hub schools form a share of 6% of all legal entities; this share was increasing rapidly in the last two years. However, the differences between regions are very large. The share is highest in Kirovogradska (25%), Sumska (12%), Zhitomirska (11%) and Poltavska (10%); apart from Zakarpatska (with no hub schools at all) and Donecka (with a difficult situation due to the war) it is lowest in Ivano-Frankivska at about one third of the national average (2,2%).

Across the country, average hub school has less than 2 satellite schools, and this indicator is decreasing from year to year. This is the reflection of the fact that more hub schools are created than satellites. Again, this indicator is quite differentiated. It is highest in Ivanofrankivska, with almost 3 satellites per hub, and in Kirovogradska (2,25). The indicator is very low in Chernigivska, with twice as many hub schools as satellite schools. Again, we note that indicators for Khmelnitska region may be due to data errors.

Kirovogradska oblast is exceptional in that it not only has a very large number of hub schools, but it also ensures that each of them has a number of satellites.

Finally, in Table 4 below we report the number of schools with different status by the type of school founder. We separate the City of Kiev as a city with special status. For reasons explained in Methodological Annex we cannot report the number of schools by type of school founder for 2017 (as done for oblasts in Table 1).

Table 4. Numbers of secondary schools by type of school founder

	Autonomous schools		**Hub schools**		**Satellite schools**	
School founder	**2018**	**2019**	**2018**	**2019**	**2018**	**2019**
Київ	427	426	0	0	0	0
Область	451	447	1	2	0	0
Місто	2 925	2 941	8	11	12	13
Район	7 324	6 767	384	442	588	633
ОТГ	3 357	3 368	351	432	473	586
Total	14 484	13 949	744	887	1 073	1 232

It is interesting to note that the number of schools in rayons decreases from 2018 to 2019, as the decentralization process continues and new OTG appear and take over secondary schools from rayons. At the same time, the number of autonomous schools in OTG in 2018 and 2019 remains stable, while number of hub and satellite schools is increasing. However, these data must be treated with caution. Some OTG schools are returned to rayons for different reasons, which complicates the picture. Further, some cities have amalgamated with nearby gromadas and have taken over their schools, which means that a formerly rayon school is now a city school[2].

The share of hub schools among legal entities and the number of satellite schools per hub school is presented in the following Table 5. We provide data only for rayons and OTG.

Table 5. Share of hub schools and number of satellites per hub school by school founder

	Share of hub schools among legal entities		Number of satellite schools per hub school	
	2018	2019	2018	2019
Rayon	5,0%	6,1%	1,53	1,43
OTG	9,5%	11,4%	1,35	1,36

We note that OTG have much higher share of hub schools than rayons. However, the data in Table 5 have to be interpreted with caution, as discussed above.

2. Changes in the network of secondary schools

Availability of data for 3 consecutive years allows us to assess changes of school networks introduced during 2 years, namely during 2018 and 2019. Indeed, data from September 2017 provide the state of the system at the end of calendar year 2017 and hence at the start of the year 2018. Data from September 2018 provide the state of the system at the end of 2018, and comparing with previous data we can assess changes made during that calendar year. The same argument applies to changes introduced during the calendar year 2019.

We consider the following changes in local networks of secondary schools:

- Closure of school, either of autonomous school, of hub school or of satellite school.
- Change of status of autonomous school to a hub school or to a satellite school.
- Opening of a new school, of an autonomous school or of a hub school.

One could expect that some satellite schools may change their status back to an autonomous school, for example if it was created by the rayon, and if it and the corresponding hub school have found themselves in different OTG. Our analysis identified a few potential such cases, but they require further analysis and are not discussed below. Analogously, theoretically a rayon or an OTG may open a new small rural school and give it the status of a satellite of a nearby hub school. Our analysis did not find such a case.

Indeed, the typical challenge facing school founders is the need to close small rural schools, not to open them.

[2] Amalgamated gromadas based on a city of oblast significance are treated as cities in the present report.

In subsection 2.1 we provide an overview of changes in schools at the national level. Subsection 2.2 reviews the changes by regions, and subsection 2.3 – by the type of school founder.

2.1. Summary of changes to schools

The following Table 6 present the summary of all changes to the school network listed above, introduced during the years 2018 and 2019.

Table 6. Summary of changes to schools in 2018 and 2019

Changes	Number of changes			Share of schools affected	
	2018	2018	Together	2018	2019
Schools closed	274	197	471	1,8%	1,4%
Schools turned to hubs	299	142	441	1,9%	1,0%
Schools turned to satellites	305	208	513	2,0%	1,4%
Satellites closed	18	49	67	2,3%	4,6%
Hubs openned	0	1	1		
Schools openend	5	12	17		
All changes	901	609	1 510		

Overall, one and a half thousand changes were made in 2018 and 2019, but the number of changes in 2019 was only two thirds of the previous year. In 2018, 5,7% of all autonomous schools were affected by the changes; this share fell to 3,8% in 2019. At the same time, the rate of closures of satellite schools doubled. Of course, 2 consecutive years of observations are not enough to determine long term trends. Nevertheless, it is an important policy issue why school founders made there were fewer decisions to optimize school networks in 2019 compared to 2018. International experience suggests that lower intensity of school closures is associated with local elections[3].

The following table presents the balance of changes which were made to autonomous schools.

Table 7. Balance of changes to autonomous schools in 2018 and 2019

	2018	2019
Schools at the start	15 354	14 484
Schools closed	-274	-197
Schools turned to hubs	-299	-142
Schools turned to satellites	-305	-208
Schools openend	8	12
Schools at the end	14 484	13 949

We note in Table 7 that of nearly 9 hundred changes of autonomous schools in 2018, about one third were school closures, about one third change into a hub school and about one third change into a satellite. Thus, newly created hub schools had on average about one satellite. Only 5 new

[3] See for example Herczyński, J., Sobotka, A. "Diagnoza zmian w sieci szkół podstawowych i gimnazjów w Polsce 2007-2012", IBE 2014.

autonomous schools were created, mostly in large cities (2 of them in Kiev). In 2019, more autonomous schools were turned into satellites than into hub schools.

The balance of changes to hub schools is illustrated in the following Table 8.

Table 8. Balance of changes to hub schools in 2018 and 2019

	2018	2019
Hub schools at the start	445	744
Hubs created out of schools	299	142
Hubs opened	0	1
Hubs at the end	744	887

No hub school was closed, and one new school was opened as a hub school (unless this is a data error). During the two years under consideration, almost 340 hub schools were created out of existing autonomous schools. We conclude with the balance of changes to satellite schools, presented in Table 9.

Table 9. Balance of changes to satellite schools in 2018 and 2019

	2018	2019
Satelites at the start	786	1 073
Satellites closed	-18	-49
Satellites created out of schools	305	208
Satellites at the end	1 073	1 232

We can see from Table 9 that a trend is appearing, under which a small rural school is first turned into a satellite, and a few years later is closed.

Note that first and last rows of Table 7, Table 8 and Table 9 correspond to the last row of Table 1.

2.2. Changes to schools by region

Our first Table 10 presents the changes to school networks by oblast (it present the same data as the first column in Table 6, but disaggregated by region).

Table 10. Changes to schools in 2018 by region

	Changes to autonomous schools					
Region	Schools closed	Turned to hub	Turned to satellite	Satellites closed	Schools opened	All changes
Вінницька	21	29	40		1	91
Волинська	5	6	8	1		20
Дніпропетровська	18	20	22			60
Донецька	20	4	6			30
Житомирська	15	22	7	6		50
Закарпатська	4					4
Запорізька	7	12	3			22
Івано-Франківська	4	3	6			13
Київська	6	10	5			21

Кіровоградська	7	15	12			34
Луганська	1	3	9			13
Львівська	18	20	36			74
Миколаївська	6	12	17			35
Одеська	14	16	16	9	1	56
Полтавська	11	21	12			44
Рівненська	8	10	15			33
Сумська	14	23	15		1	53
Тернопільська	13	7	16	1		37
Харківська	3	18	15			36
Херсонська	3	7	7			17
Хмельницька	55	8		1		64
Черкаська	4	11	22			37
Чернівецька	3	3	9			15
Чернігівська	13	19	7			39
Місто Київ	1				2	3
Total	274	299	305	18	5	901

Overall, out of 9 hundred changes to secondary schools introduced in 2018, the largest number was introduced in Vinnistka (10,1% of all changes), Lvivska (8,2%), Khmelnitska (7,1%), Dnipropetrovska (6,7%) and Odeska (6,2%). However, the types of dominant changes are quite different in different regions. We have already seen in Table 1 that there are no hub schools in Zakarpatska region. Apart from this exceptional case, we note that on Khmelnitska school closures accounted for 86% of all changes, while in Kharkivska only for 8% (we put aside the case of Luganska, due to the war in the East). Thus some regions pursued network optimization mainly through school closures, while others were turing autonomous secondary schools into hubs and satellites.

To review these processes more closely, similarly to rightmost columns of Table 6, we present in the following Table 11 intensity of changes to schools, that is the share of all autonomous schools which were closed, turned to hub or to satellite in 2018. We also present the share of satellite schools which were closed.

Table 11. Share of autonomous and satellite schools affected by changes in 2018

Region	Share of autonomous schools which were			Share of satellites closed
	Closed	Turned to hub	Turned to satellite	
Вінницька область	2,5%	3,5%	4,8%	
Волинська область	0,8%	1,0%	1,3%	1,7%
Дніпропетровська область	2,0%	2,2%	2,5%	
Донецька область	3,7%	0,7%	1,1%	
Житомирська область	2,3%	3,4%	1,1%	14,6%
Закарпатська область	0,6%			
Запорізька область	1,3%	2,2%	0,5%	
Івано-Франківська Область	0,6%	0,4%	0,9%	
Київська область	0,9%	1,5%	0,7%	
Кіровоградська область	2,3%	5,0%	4,0%	

Луганська область	0,4%	1,1%	3,2%	
Львівська область	1,5%	1,7%	3,0%	
Миколаївська область	1,2%	2,3%	3,3%	
Одеська область	1,8%	2,1%	2,1%	32,1%
Полтавська область	1,8%	3,5%	2,0%	
Рівненська область	1,3%	1,6%	2,5%	
Сумська область	3,1%	5,2%	3,4%	
Тернопільська область	1,8%	0,9%	2,2%	1,9%
Харківська область	0,4%	2,5%	2,1%	
Херсонська область	0,7%	1,7%	1,7%	
Хмельницька область	7,7%	1,1%	0,0%	11,1%
Черкаська область	0,7%	1,9%	3,7%	
Чернівецька область	0,7%	0,7%	2,2%	
Чернігівська область	2,5%	3,7%	1,4%	
Місто Київ	0,2%			
Total	1,8%	1,9%	2,0%	2,3%

The last row of Table 11 corresponds to the penultimate column of Table 6. The differences between the strategies of different regions, already noticed in Table 10, are now much more apparent. While 7,7% of autonomous schools in Khmelnitska were closed, in Kirovogradska 9% were turned into hub or satellite schools, and over 8% in Vinnitska and Sumska. While nationally about 5,7% of autonomous schools underwent some form of transition, in regions this indicator ranges fro 0,2% in Zakarpatska to over 11% in Kirovogradska and Sumska.

The situation regarding closures of satellite schools is different. Satellites were closed in only 5 regions, but in three cases the intensity of closures is remarkable, with nearly a third of all satellites in Odeska closed. This very high value of the indicator may be due to data errors.

The following Table 12 provides information about changes to schools introduced in 2019. The creation of hub school is omitted (according to data, one hub school was created in Kyivska region).

Table 12. Changes to schools in 2019 by region

	Changes to autonomous schools					
Region	**Schools closed**	**Turned to hub**	**Turned to satellite**	**Satellites closed**	**Schools opened**	**All changes**
Вінницька	6	7	19		1	33
Волинська	11	1	6	5	1	24
Дніпропетровська	6	4	12	1	3	26
Донецька	5	3	2		1	11
Житомирська	18	12	11	2		43
Закарпатська	1				1	2
Запорізька	11	8	10	1		30
Івано-Франківська	6	5	15		3	29
Київська	2	15	16		1	34
Кіровоградська	2	9	10	6		27
Луганська	1	3	4			8

Львівська	11	5	8	8		32
Миколаївська	7	5	8	1		21
Одеська	4	4	4	2		14
Полтавська	9	13	9			31
Рівненська	2	5	15			22
Сумська	6	8	13	9		36
Тернопільська	19	6	12	9		46
Харківська	4	8	8			20
Херсонська	1	4	11	1		17
Хмельницька	31	6		2		39
Черкаська	16	4	7			27
Чернівецька		2	3			5
Чернігівська	16	5	5	2		28
Місто Київ	2				1	3
Total	197	142	208	49	12	608

Again, analogously to Table 10, the last row correspond to the last column in Table 6. Similarly to what happened in 2018, we can notice significant differences between regions. About 80% of all changes to schools in Khmelnitska were school closures, while in Kyivska it was only 6%. Intensity of changes decreased in comparison with 2018 (we do not provide a table analogous to Table 11). In Khmelnitska, 4,7% of autonomous schools were closed, continuing the trend of 2018, while in Zakarpatska only 0,2%. The largest shares of autonomous schools affected by changes were in Kirovogradska (8% of all autonomous schools), Sumska (6,9%) and Zhitomirska (6,8%).

Regarding closures of satellite schools, we note once again extraordinary variation of intensities between regions. Setting aside Khmelnitska, were 2 out of 8 satellites were closed, we note that in Sumska region 18% of satellites were closed, while in Ternopilska over 13%. If these high values are not due to data errors, we can conclude that in some regions of Ukraine changing the status of school to a satellite is the first step to its closure. Of course, at the same time this lowers the ratio of satellite to hub schools, and may leave some hub schools without satellites.

2.3. Changes to schools by type of school founder

In the previous subsection we reviewed the changes to secondary schools by Ukrainian regions. Such a review is interesting in that it indicates significant regional differentiation of local education policies pursued by local governments. In the present subsection we turn to the type of founder. We distinguish 5 types of school founders: the capital Kiev, regions, cities of oblast significance (including those cities which joined neighboring gromadas and became amalgamated gromadas without losing the status of cities of oblast significance), rayons, and OTG.

The following Table 13 presents the changes to school networks introduced in 2018 by the type of school founder.

Table 13. Changes to schools in 2018 by type of school founder

	Kiev	**City**	**Region**	**Rayon**	**OTG**
School closed	1	33	9	127	104

School turned to hub		1		153	145
School turned to satellite				172	133
Satellite closed				7	11
School opened	2	1	2		
All changes	3	35	11	459	393

We note that over 94% of all changes were made by rayons and OTG. This is of course natural, because they experience most strongly the demographic pressures on school networks. Only cities and regions opened schools. Rayons and OTG did not open new schools. Only in Kiev the number of opened schools is greater than the number of closed ones. However, rayons introduced more changes to school networks than OTG, except for closures of satellite schools. This is in part due to much larger number of secondary schools founded by rayons.

Newly created hub schools have very few satellites. Indeed, we note that many hub schools created in 2018 by OTG did not have a single satellite school!

A similar picture emerges for changes to schools in 2019, presented in Table 14.

Table 14. Changes to schools in 2019 by type of school founder

	Kiev	**City**	**Region**	**Rayon**	**OTG**
Schools closed	2	15	7	100	73
Schools turned to hub		3	1	71	67
Schools turned to satellite		3		90	115
Satellites closed		1		19	29
Schools opened	1	2	4	4	1
Hubs opened				1	
All changes	3	24	12	285	285

In 2019, the number of changes introduced is smaller, and the rayons and OTG introduced the same number of changes. However, rayons closed more schools than OTG, and turned fewer of them into satellite schools. Still, at the beginning of 2019 (in September 2018) there were more schools founded by rayons than by OTG.

New hub schools created in 2019 by rayons and OTG had more satellites than hub schools created in 2018, but still there were on average fewer than 2 satellites per hub schools created by OTG, and fewer than 1,3 satelites per hub schools created by rayons.

It is therefore interesting to review the intensity of changes to school networks introduced by different school founders, similarly to Table 11 above with intensity reviewed by regions. Unfortunately, this cannot be done for 2018, because as discussed in the Annex, assignment of schools to individual school owners in September 2017 is difficult. The following Table 15 provides these data for rayons and OTG (as is clear from Table 14, relevant intensities for other school founders are negligible).

Table 15. Share of schools affected by changes in 2019 by type of school founder

	Rayon	**OTG**

School closed	1,4%	2,0%
School turned to hub	1,0%	1,8%
School turned to satellite	1,3%	3,2%
Satellite closed	3,4%	5,8%

We note in Table 15 that OTG were much more active school owners than rayons. OTG have closed or change status of 7,0% of all their autonomous secondary schools, compared to just 3,7% of schools affected by decisions of rayons. Also, OTG were more actively closing satellite schools. We can conclude that the decentralization process in Ukraine is creating more responsible and active school owners.

3. Network of private schools

Private schools constitute a very small segment of secondary education in Ukraine, and are mostly concentrated in large cities, especially in Kiev. The following Table 16 provides statistics on the number of private schools in September 2017, September 2018 and September 2019.

Table 16. Numbers of private secondary schools

	2017	2018	2019
Autonomous schools	188	220	275
Hub schools	7	8	0
Total	195	228	275

There are no reported private satellite schools, which indicates that appearance of hub schools is a data error; we assume further that all private schools are autonomous schools. This means that the only changes in the network of private schools we can identify are opening and closing of autonomous schools. The following Table 17 displays the balance of the number of private schools in 2018 and in 2018, similar to Table 7, Table 8, and Table 9 above.

Table 17. Balance of changes to private schools in 2018 and 2019

	2018	**2019**
Schools at the beginning of the year	195	228
Schools closed	-2	-7
Schools opened	35	54
Schools at the end of the year	228	275

Fiscal year 2019 was the first year during which private schools receive education subvention. This is a financial support to private secondary schools, which may lead to lowering of prices and hence to the expansion of private sector in secondary education. However, Table 17 indicates that such an expansion has not yet started in 2019. Although the number of schools opened has increased in 2019, so did the number of schools closed. In fact, 3,1% of all private schools operating at the beginning of 2019 were closed, an intensity much higher than for schools managed by rayons or OTG, see Table 15. This indicates a high level of instability in the private sector.

Interestingly, among the private secondary schools closed in 2019 there is one which had opened in 2018 and closed a year later.

4. Conclusions and recommendations

Sections 2 and 3 report new type of data regarding networks of secondary schools in Ukraine, respectively communal schools and private schools. Using detailed analysis of data on individual schools, collected in September of 2017, 2018 and 2019 in education management and information system DISO, we are able to present not only the statistical data about the numbers of schools of different type and location, as is historically done in Ukraine (and as is reported in section 1 as well), but also to present data on changes of schools, such as opening and closure of school, and change of an autonomous secondary school into a hub school or a satellite schools.

The following are the main findings of presented review:

1. OTG are more active school founders than rayons.

   As shown in Table 15, OTG closed or turned to hub or satellite school relatively more autonomous schools than rayons did. This indicates that as school owners, OTG take a more strategic position and are willing to adopt more difficult decisions than rayons, who know that rather soon they may be eliminated from the sector. This also give grounds for expecting that after the process of gromada amalgamation is completed, new school owners will more radically optimize local school networks.

2. Different oblasts pursue different policies regarding network optimization.

   There are significant differences between oblasts in their approach to optimization of schools networks, as seen in Table 3, Table 10, and Table 12. Kirovogradska has the highest share of hub schools among the legal entities, and has the highest number of satellites per hub school. On the other hand, Khmelnitska has few hub schools, but has the highest share of closed schools. These two regions have very opposite strategies to optimize school networks. Zakarpatska is a special case, as it has zero hub schools and almost no school closures. This finding indicates that despite decentralization process, oblast education departments still yield considerable managerial power over rayons and OTG on their territory.

3. Double-step verification of education statistics is not effective.

   Today, education statistical forms ZNZ-1 and ZNZ-2 are verified in a two-step procedure: after data is submitted by the school, it is verified and approved by the school founder (rayon, OTG, city) and then once again by oblast administration. As seen in Table 18, in consecutive years many schools submitted inconsistent information. Further, Table 19 shows in how many cases a reassignment of school status was necessary. We have to conclude that current form of data verification is not sufficient.

4. Hub school model is not working correctly.

The model of hub school was introduced to allow better use of education and human resources. By allowing continuation of initial education in small satellite schools, and by transferring students of basic and upper secondary school to the central (hub) school, it is possible to provide education close to the family home for young students, and to optimize network of classes for older students. However, as Table 3 shows, the number of satellite schools per one hub school is very low and it decreases from year to year. In 2018, OTG created many hub schools without a single satellite school, contrary to the very concept of hub schools, see Table 13. In 2019 situation somewhat improved (see Table 14), but still not sufficiently. This means that the current model of hub schools is not an effective instrument to optimize delivery of education in rural areas.

5. Allocation of schools to specific school founders is often problematic.

   As discussed in section 1, determination of the type of school owner for individual schools is a complicated issue. The main problem is whether the school located on the territory of a given OTG is assigned to the OTG or to the rayon. There are no clear rules and local governments take different decisions, based on local conditions and also on their ability to agree. In some cases this may lead to local conflicts. Thus there are many changes of school founder from year to year which are difficult to understand without detailed knowledge of the local situation. This lack of clear rules makes it also more difficult to allocate education subvention.

On the basis of these conclusions, we can formulate the following recommendation for the Ukrainian Ministry of Education and Sciences:

1. Redesign hub school model.

   Today, the status of a school is determined by the school founder through an administrative decision. Thus a school may be designated a hub school even if it has no satellites. The model should be redesigned so that this becomes not an administrative decision, but a functional categorization. For example, if it is decided that a school is a hub school when it has at least 200 students (not counting the satellites) and has at least 3 satellite school, then a school will be categorized as a hub school based on actual data, not based on its legal documents like school statutes. However, change of status of an autonomous school into a satellite school and its subordination to another school must remain the decision of the school founder, because the school will lose its legal status.

2. Introduce strict school registry.

   In order to ensure that all necessary education statistical data are collected correctly, the present two-step verification should be replaced by better monitoring instruments. One of such instruments may be a stable school registry, acting as a backbone of the system of secondary schools. Issues related to school registry were discussed in several Short Notes submitted by SDU project to MES[4]. Another necessary instrument of data verification should

[4] SN 32 of November 2015, SN 36 of January 2016, SN 106 of November 2018, Sn 108 of December 2018.

be comparison of data for individual schools with their data submitted a year earlier. This will require using DISO or another such system in a more active way, not simply for entry and storage of data.

3. Redesign allocation of education responsibilities to local governments.

   The expected conclusion of the amalgamation process of gromadas and proposed new institutional roles of oblast and rayon administrations present a good opportunity to review and adjust the allocation of education responsibilities to different tiers of local administrations across the system. The new allocation should be consistent with education reform and with new regulation of upper secondary schools, of evening schools and of schools with dormitories. The law should clearly state that all initial and basic schools located on the territory of OTG are founded by the OTG. The law should also clarify which types of schools should be founded by regions. Finally, it is important to regulate under what conditions and through which procedures there may be deviations from the prescribed allocation of responsibilities.

4. Share more network information with regions.

   Currently, the verification of statistical data is conducted bottom-up, with schools submitting the data, and with school founders and regional education departments verifying these data and submitting upwards aggregated statistical reports. What is missing is a regular process of sharing by MES of nationally collected data with oblasts[5]. For example, information provided in the present report may be very useful to regional education departments to understand their situation among other regions, and to identify possible errors and omissions.

Methodological Annex

The source of data used in the present report is DISO. Three almost complete collection of statistical data on schools were completed in September 2017, September 2018, and in September 2019. This provides for assessment of the situation at the end of 2017, 2018, and 2019, as well as analysis of changes in school networks conducted in 2018 (changes between September 2017 and September 2018) and in 2019 (changes between September 2018 and September 2019).

Each secondary school is assigned a unique school identifier, the same for consecutive school years. A record in DISO database for a given school is maintained even if the school is permanently or temporarily not functioning. We use the data submitted in ZNZ-1 statistical form (for day secondary schools) and ZNZ-2 form (for evening schools). We consider that a record (school identifier)

[5] Informally, such a process of sharing of data reviewed by the Ministry with oblasts with the aim of improving data quality has already been initiated in relation to data used for allocation of education subvention.

corresponds to a functioning school in the given school year (as of September), if the following conditions are met, as defined in data items for the record:

- The number of students is positive (as the number of students, we consider the sum of students enrolled in day and evening school, in ZNZ-1 form and ZNZ-2 form);
- The school either submits ZNZ-1 form and the ZNZ-1 form exists (for day schools), or the school submits ZNZ-2 form (for evening schools);
- The school is active and its activity is not stopped;
- The school is not reported as not working for other reasons or under overhaul (renovation).

These conditions mean that if, for a given school year, either the school reports zero number of students, or indicates in some manner that it is not working, we do not consider it to be functioning (even if this is due to simple error of data entry). However, as we discuss below, to correct for such possible data errors, we analyze data submitted for the school in 3 consecutive years (in some cases in 4 consecutive years) and correct missing or wrong data. As Table 19 below shows, we had to correct considerable number of data items.

For each school and each year, DISO also provides school status. There are three values of that status: an autonomous secondary school (школа), a hub school (опорна), or a satellite school (філія). If the school did not function at all (in particular, if it submitted ZNZ-1 form with zero students), we assume that this status is empty. If for three years school status is equal to school, we assume that this is a school with unchanged status (13 963 cases in DISO database). The same is assumed if for three years the status is a hub school (419 cases) or a satellite (91 cases). If status is empty for three consecutive years, the school is excluded from the analysis. In remaining cases status in different years is different, and this requires interpretation.

Some combinations of status do not present interpretation problems. For example, is the consecutive values of status are school-school-empty, we assume that this school was closed in 2019 (200 cases). Nevertheless, there are multiple cases that require analysis. Below we discuss the most important of these.

- If the school status is the same in 2017 and 2019, but is missing in 2018, we assume that in 2018 the school simply did not submit its ZNZ-1 form, but that the status remained unchanged.
- If the school status in 2017 and 2019 is the same, but is different in 2018, then we assume that value of 2018 is mistaken and should be corrected.
- If the school status is missing in 2017, but appears in 2018 or 2018, we assume that it is unreported in 2017 and for 2017 assign it the same status as it reported in 2018. However, this is controlled with (incomplete) data collected in DISO in 2016. If the school did not exist in 2016, than we assume it also did not exist in 2017, and was opened in 2018 or 2019, depending on its status in 2018.
- If the status in 2019 is missing, we assume that the school was closed in 2019. If the status in both 2018 and 2019 is missing, we assume that the school was closed in 2018.

Several other combinations of status were reviewed in more detail, to assess how they should be interpreted (usually on the basis of additional information available on websites of schools or of school foundres).

Based on these discussions, a uniform interpretation was assumed for all cases appearing in DISO, and is presented in the following Table 18. For every appearing combination of values of school status in consecutive years, the table shows how it is interpreted and in how many cases it appears.

Table 18. School statuses in DISO in 2017, 2018, 2019 and their interpretation

2017	2018	2019	Meaning	Number
школа	школа	школа	School with unchanged status	13963
філія	філія	філія	Satellite with unchanged status	91
опорна	опорна	опорна	Hub with unchanged status	419
школа		школа	School with unchanged status	7
філія		філія	Satellite with unchanged status	2
опорна		опорна	Hub with unchanged status	0
	філія	філія	Satellite unreported in 2017	567
		філія	Satellite unreported in 2017, 2018	33
школа	філія	філія	School turned to satellite in 2018	278
школа	школа	філія	School turned to satellite in 2019	188
школа	філія		School turned to satellite in 2018, closed in 2019	24
школа	школа		School closed in 2019	200
школа			School closed in 2018	274
школа	опорна	опорна	School turned to hub in 2018	299
школа	школа	опорна	School turned to hub in 2019	142
школа	філія		School turned to satellite in 2018, closed in 2019	24
філія			Satellite closed in 2018	18
філія	філія		Satellite closed in 2019	14
	філія		Satellite unreported in 2017, closed in 2019	54
школа		філія	School turned to satellite in 2018	2
школа	опорна	школа	School with unchanged status	32
опорна	школа	школа	School with unchanged status	77
опорна	опорна	школа	Hub with unchanged status	19
філія	школа	школа	School with unchanged status	18
школа	філія	школа	School with unchanged status	5
	школа	школа	School with unchanged status	76
	школа	філія	School turned to satellite in 2019	20
	школа		School closed in 2019	5
філія	школа	філія	Satellite with unchanged status	5
опорна	школа	опорна	Hub with unchanged status	8
філія	школа		Satellite closed in 2019	3
філія	опорна	школа	School with unchanged status	1
		школа	School opened in 2019	70
		опорна	Hub opened in 2019	2
опорна			School closed in 2018	2
	філія	школа	School unreported in 2017	2
	опорна	філія	School turned to satellite in 2018	1

As indicated in Table 18, the re-interpretation of changes in school status means that for a number of schools their statuses must be amended. The following Table 19 shows the scale of this reassignment in the three years covered by the review.

Table 19. Reassignment of school status

Type of reassignment	2017	2018	2019
Missing data filled in	726	349	0
Data changed to satellite	0	9	0
Data changed to school	92	34	0
Data changed to hub	0	8	18
All reassignsments	818	400	18

As mentioned above, these reassignments of school status in DISO were based on comparative review of DISO data from three consecutive years. Two further corrections of status in DISO were performed, using additional data.

In general, a school missing in 2017 but existing in later DISO data was considered simply unreported but existing in 2017, see Table 18. Thus, based on Table 18 no school was declared opened in 2018. This is of course unrealistic, some schools were in fact opened in 2018, especially private ones. In order to estimate the number of schools opened in 2018, the data were compared with (incomplete) DISO database for 2016. If a school existed in 2016, but was not reported in 2017, it was treated as missing data in 2017 and filled in. However, if it did not exist, or existed but reported zero students in 2016, and was again missing in 2017 and active in 2018, it was treated as opened in 2018. Overall this gave an estimate of 43 schools opened in 2018, of which 8 communal (see Table 7) and 35 private (see Table 17).

In general, a satellite school existing in 2018 and missing in 2019 is considered closed in 2019, see Table 18. This may overestimate the number of satellites closed in 2019 due to simple lack of reporting (especially for satellites opened in 2018). In order to reduce overestimate of satellite schools closed in 2019, data were compared with an inventory of hub and satellite schools maintained by MES separately from DISO. If a satellite school was listed as functioning in November 2019 in that registry, it was no longer considered closed in 2019. This correction reduced the number of satellites closed in 2019 by 46.

These corrections show that the small number of reassignments introduced for data collected in September 2019, as seen in Table 19 (which of course does not include data filled in for 46 satellites discussed above), may be in part due to the fact that the main reason for questioning the status of a school in DISO is comparing it to the status the next year. In particular, we do not know whether missing data in 2019 indicates real school closure or unreported school. We were able to correct this for satellites, but not for all schools, because MES does not maintain an independent of DISO inventory of all secondary schools.

Nevertheless, we can see in Table 19 that the number of corrections to the data collected in 2018 is much smaller than for data collected in 2017. This indicates that from year to year the quality of DISO data is improving.

A different data problem confronts the school founder, to whom the school belonged in different years. That information is contained in DISO in the budget code of the school founder. The third digit of the budget code defines the type of the school founder[6]. However, there is only one list of schools in DISO, updated every year. If the school owner is changed, the new budget code is overwritten over the old one. Thus any changes of the school owner introduced in DISO in 2018 or 2019 make it impossible to assess school owner in prior years (this difficulty is partially overcome by repeated use of data exported from the system prior to changes, but that approach creates its own problems as well).

For data of September 2016, when the system was used in an experimental mode, it is not possible to assign school records in DISO with budget codes of school founders, because this data was not collected in DISO.

For DISO data of September 2017, the budget codes of school owners were entered into DISO database for the first time. They were incomplete and were corrected in dialogue with oblast education departments. However, available budget codes were valid as of end of December 2018, for use in allocation of education subvention for 2019. The budget codes as of September 2017 are not available.

For DISO data of September 2018, the budget codes are available as of end of 2019, as used for allocation of education subvention for 2020. Therefore available budget codes in DISO data of September 2017 were used (valid as of end of December 2018), based on unique school identifiers in DISO. For new schools which appears in 2018 and were not reported in 2017, the budget codes of DISO data from September 2019 were used (these were mostly private schools).

For DISO data of September 2019, we have complete assignment of schools to school owners, obtained through multiple exchanges of data and information between MES are oblast education departments.

Kiev, January 19, 2020

[6] If the third digit is 1, the founder is the oblast; if it is 2, the city of oblast significance; if 3, rayon; if 5, OTG. For cities of oblast significance which were legally changed into OTG in 2019 and had their budget code changed accordingly, we still assume the old type of school founder.