

“Northern outpost: Chernihiv Polytechnic National University in the conditions of the russia-Ukrainian war”

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SPECIAL ISSUE: ACADEMIC MANAGEMENT IN THE CONDITIONS OF WAR

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NORTHERN OUTPOST: CHERNIHIV POLYTECHNIC NATIONAL UNIVERSITY IN THE CONDITIONS OF THE RUSSIA-UKRAINIAN WAR

Abstract

During the full-scale war, educational institutions of Ukraine were at the epicenter of hostilities and suffered from attacks and bombing by the Russian army: many schools, colleges, and universities were destroyed or damaged, and tens of thousands of students and teachers became refugees or forced displaced persons, lost their property and housing. Chernihiv Polytechnic National University (CPNU), located in the northern border region of Ukraine, was also significantly affected.

This study aims to systematize the features of the functioning of CPNU under siege, bombing, and shelling. An analytical method was used to assess statistical reports available in open access on the official websites of CPNU and the Ministry of Education and Science of Ukraine. The paper identified that during active hostilities, 25% of the university's infrastructure was destroyed by shelling and bombing; 37 teachers and researchers emigrated; about 4% of students stopped their studies. Currently, CPNU suffers from loss of human capital, physical destruction of educational and research infrastructures, lack of R&D financing, increased cyber security threats, and violation of the educational process. In response to military challenges, the university management rethinks and forms a new vision for further development based on sustainability principles to recover educational and research infrastructures, promote human capital development, and modernize the learning environment. The new vision of CPNU integrates "7R" principle – seven key pillars covering different directions of its operation (teaching, research, innovation, international activity, etc.).

Keywords

border university, war, teachers, students, educational and research infrastructures

JEL Classification

I21, I23, H56

INTRODUCTION

The full-scale war of Russia against Ukraine was a shocking challenge for Ukrainian higher education institutions, which were unprepared for such a sudden turn of events. Still, they adapted quickly to new working conditions. Nevertheless, Ukrainian universities encounter physical destruction, damage to campus buildings, theft of computers, office and specialized equipment from laboratories by the Russian military and looters, as well as losses of documentation and archival materials (Ministry of Education and Science of Ukraine, 2023a; National Agency for Higher Education Quality Assurance (Ukraine), 2022).

Material losses, although incredibly heartbreaking (especially financially), are all repairable: facilities can be rebuilt, laboratories can be repaired, and equipment can be repurchased and reinstalled. But irreparable losses caused a loss of human capital: the death of employees and students through hostilities, physiological and mental health issues, and forced migration. It should be noted that most forced emigrants are young people.

Since a full-scale war lasts more than a year, there is a high probability that many forced displaced persons may stay abroad. Accordingly, because of the war, some students left universities; Ukrainian higher education institutions have lost some potential entrants who have become students of foreign higher education institutions. In addition, Ukrainian universities experience personnel concerns because some employees joined the Armed Forces of Ukraine or Territorial Defense; some were murdered and injured as a result of Russian attacks or emigrated (Governmental Ombudsman in Education, 2022; Ukrinform, 2023).

Almost all higher education institutions in Ukraine have been affected since the beginning of a full-scale war (Ministry of Education and Science of Ukraine, 2022, 2023b). However, the war was especially detrimental to educational institutions in the areas of active fighting, in temporarily occupied territories, or in frontline cities. Some of the universities of the border regions were forced to be relocated to safer areas. The rest made every effort to restore, reconstruct, modernize, and take enhanced measures to ensure the safety of their students and staff. Chernihiv Polytechnic National University (CPNU) was not relocated and continues to function in Chernihiv region of Ukraine. Therefore, this study aims to identify and systematize the functional attributes of CPNU under siege, bombing, and shelling.

1. RESULTS

1.1. CPNU in the pre-war period

CPNU is a higher education institution accountable to the Ministry of Education and Science of Ukraine. The structure of the university comprises 7 educational and scientific institutes (information technologies, mechanical engineering, architecture, law and social technologies, economics, management, and nature management and tourism) and 2 colleges (Chernihiv Polytechnic National University, 2023c). The university trains students in 40 bachelor's, 34 master's, and 7 Ph.D. programs.

Considering its close location to the borders with the aggressor countries, at the beginning of the war, Chernihiv region was one of the first to be attacked by invaders from several directions at once. Despite the hostile invasion, the city of Chernihiv stood, was not captured by the enemy, and was not occupied. However, the city (as well as Chernihiv region) was subjected to daily air raids, bombarding, and attacks, so there was large-scale destruction.

For many years, CPNU played a vital role in regional development, and with the beginning of a full-scale war, the university did not stand aside from the city's defense. From the first hours of a full-scale war, the university administration made every effort to support students and staff. The evacuation of some accounting workers in the

western, safer regions of the country has allowed them to charge and pay scholarships to students and salaries to employees. Changing the location of university servers made it possible in early April 2022 to restore the educational process in a remote format. In mid-spring 2022, most employees returned to their duties, and students resumed their studies (Chernihiv Polytechnic National University, 2023a).

Active war actions in Chernihiv city and Chernihiv region caused losses for the university, its staff, and students. The full-scale war disturbed the work of various university departments and delayed the implementation of educational, research, international, and other projects. This affected the positions of the university in the national and international ratings of higher education institutions.

Thus, in 2021 in Top-200 of Ukraine, CPNU ranked 48, then in 2022, it was 52; 53rd place in the Consolidated Ranking of Universities in 2021 changes to 54th in 2022. The rating positions of CPNU in international rankings deteriorated as well; for example, in the ranking on Scopus publications – 66th place in 2022 and 62nd – in 2021, which was caused by the transition to another domain name during the period of active war actions. However, these university losses in rankings positions are temporary and not critical; they are not due to a systemic failure but only the first shock reactions to the war and its consequences. Even so, in 2022, CPNU was the 8th of the 25 Ukrainian higher education institutions mentioned in Times

Higher Education Impact Rankings and 32nd of the 92 Ukrainian higher education institutions at U-Multirank-2022 World University Rankings (Chernihiv Polytechnic National University, 2023b).

1.2. CPNU in the first shocking days of the russia-Ukraine war

February 24, 2022, will forever be etched in the memory of all employees and students of CPNU: instead of the ordinary lectures and presentations of student projects, students and teachers were forced to hide in basements and chaotically seek refuge from the bombings. At the beginning of the full-scale war, several dozen students stayed in the university's dormitories. Teachers tried to protect them, organize their food, and provide them with drinking water and comfortable living conditions. Mutual support and solidarity of teachers and students saved them, filled them with faith in victory, and helped them to calm themselves in stressful circumstances.

In the period of active war actions, the educational infrastructure of CPNU (approximately 30 thousand square meters) was incurred with shelling and bombing by the russian federation. As a result, many academic buildings, dormitories, and outbuildings were affected particularly roofs, walls, windows, doors, heating systems, material, and technical base of structural units and departments. In total, 10 facilities, including three out of five dormitories, have been damaged.

The most challenging period for the city and the university was March 2022, when Chernihiv and its residents, including university employees and students, had no access to electricity, mobile and Internet connection, water supply, and drainage. Disquieting nights with loud explosions were turned into days with the frightening sounds of enemy aircraft over the heads of students and teachers.

The night of March 11, 2022, was interrupted by the sounds of explosions; as a result, some educational buildings were affected. The area of destruction was 1,560 square meters, equal to 25% of the total area of the premises. Terrible military events on March 14, 2022, caused shelling hits and signif-

icant damage to four more educational buildings. 576 university teachers and staff worked, and 6800 students studied in these buildings before the full-scale war. The damage reached 25%, which was 8700 square meters, and the estimated cost of the current repair is 1.960.000 USD.

On March 11-15, 2022, the army of the russian federation damaged three university dormitories. The degree of destruction was 15%. The dormitories, before martial law, were home for 1175 students and employed 38 staff. The area of the damaged premises was almost 4000 square meters, and the estimated cost of the current repair is 725.000 USD.

On March 14-16, 2022, the sports and wellness recreation center "Fortuna" and the recreation center "Yunyst" suffered 80% and 85% of destruction, respectively. The destruction area was 2300 square meters, and the current repair is estimated at 275.000 USD. Before the commencement of the full-scale war of russia against Ukraine, the sports and wellness recreation center "Fortuna" organized and conducted education and training events and competitions and rehabilitated students, teachers, and staff. Based on the recreation center "Yunyst," traditionally, every year, the dedication of first-year students was conducted, within which various activities were organized and competitions were held. Also, university students, teachers, and staff enjoyed here the opportunity of summer recreation.

As a result of rocket attacks, the educational and production sector "Desnyanka" was almost destroyed. This sector ensured practical training and research for students and the scientific and pedagogical staff.

On March 16, 2022, the russian military destroyed a Professional College of Transport and Computer Technologies at the university, which enrolled 1068 students and employed 86 teachers and staff. Destruction is 15%, and the current repair is estimated at 375.000 USD (Appendix A). In addition, due to the explosive wave, the university's Business Innovation Center was damaged (5% destruction degree, the estimated cost of current repair is 37.500 USD).

In the first months of a full-scale war, the university created shelters for students and staff and began to actively restore educational infrastructure. By the end of 2022, the university had spent more than 406.159 USD of its own funds to carry out a complex of repair work and arrange shelters. The university has performed repairs, particularly installing (replacing) heating steel radiators and plastic windows and renovating study rooms. Many employees and students were involved on a volunteer basis in these works. However, it is impossible to repair damaged university buildings in full only at the expense of existing budgetary appropriations. Therefore, the administration of CPNU is constantly searching for additional sources of financing for repair (renewable) works and improvement of the material and technical base infrastructure.

1.3. CPNU education under shelling and bombing

At the beginning of the second semester of the 2021–2022 academic year, the university had 4499 students (3860 students in full-time education, 314 students in the correspondence form of education). From February 2022 to March 2023, 331 students were expelled from the university, including 143 students – due to academic failure, other students – at their own request or because they did not return to study after completing their academic leave. Actually, about 4% of the total number of students since the beginning of a full-scale war was expelled from the university with an official explanation “at their own request”, which in a number of cases was caused by evacuation, inability to continue full training due to hostilities or rocket attacks. Moreover, the most significant loss of the student contingent is observed in full-time training, mainly due to martial law: 257 full-time students, including 144 full-time students who left their studies at their own request or because they decided not to continue their studies after completing academic leave.

The number of expelled students in the correspondence form of study is relatively small, which can be explained by their best adaptability to independent and distance learning. In addition, their learning is organized in such a way that provides only periodic personal meetings with teach-

ers, unlike most regular contacts in classrooms. Accordingly, it was easier and more familiar for such students to adapt to changes.

Despite war challenges, in April 2022, CPNU resumed the educational process and successfully conducted the enrollment campaign in the summer of 2022. So, the university enrolled students in bachelor's, master's, and Ph.D. programs. Moreover, the number of enrolled students in master's and Ph.D. programs has increased compared to 2021. This testifies to the university's high trust and recognition in society and Chernihiv region.

It should be emphasized that due to the Russian attacks, from a physical point of view, the university was not ready to welcome students in its educational buildings (some windows were blown out by shock waves and explosions, walls were damaged by shelling, premises were destroyed, laboratory equipment was lost and damaged by Russian army, etc.). Still, thanks to digital technologies, the educational process was successfully resumed. The idea of resuming education, despite the war and the high risk of a re-offensive of the aggressor's troops, was supported by university teachers and students. Actually, meetings, lectures, and practical classes, even in the remote format, were like a breath of fresh air, a hope for a happy and peaceful future.

The educational process in war conditions is a considerable challenge for the university. Air alarms enhance stress and anxiety among teachers and students because they constantly have to be ready to descend into the shelter and monitor that their students are safe. In addition, nighttime air alarms that last for hours cause sleep disturbances, but in the morning, students and teachers join online classes on time.

1.4. Research and teaching under siege and bombs

The core of the higher education institution is formed by its staff (Table 1). In the phase of active war actions in Chernihiv region, 37 scientific and pedagogical staff of the university went abroad. Only 20 of them returned back to Ukraine; 1 person stays abroad under the academic mobility program, 12 – under internship programs, and 4 – for

projects. During martial law (from February 2022 till the present), 11 people were fired from the university because they went and now stay abroad.

Unfortunately, 17 scientific and pedagogical staff of the university have lost their houses as a result of russian aggression. The university provides humanitarian aid to the victims (food, medicines, household chemicals, clothing). In addition, it offers rooms in university dormitories and financial support for employees who have lost their houses. As of the beginning of 2023, 11 employees of CPNU are still abroad; some university employees joined the Armed Forces of Ukraine.

Table 1. CPNU personnel

Indicator	Year		Change, %
	2021	2022	
Number of full-time scientific and pedagogical employees, total	263	252	95.82
Number of full-time employees, total, including:	263	252	95.82
• Doctors of Sciences	49	47	95.92
• Candidates of Sciences (PhDs)	167	155	92.81
• employees without a scientific degree	47	50	106.38
Number of part-time scientific and pedagogical personnel, total, including:	16	7	43.80
• Doctors of Sciences	2	1	50.00
• Candidates of Sciences (PhDs)	7	3	42.85
• employees without a scientific degree	–	3	100.0
Number of young scientists	36	31	86.11
Share of young scientists in the total number of scientific and pedagogical personnel, %	13.69	12.30	89.87

Table 1 reflects some personnel issues that CPNU has faced as a result of a full-scale war. The university management had to promptly replace employees without reducing the quality of educational and research processes. In addition, some departments had to be merged due to teachers' emigration. Other large-scale structural changes in the university did not occur during martial law, which testifies to the desire of management to preserve its intellectual capital, which has been formed for several decades.

Both in the period of active war actions in Chernihiv region and after the retreat of russian troops from the region, students, Ph.D. students, and staff are actively volunteering, helping mili-

tary persons affected by the war and vulnerable categories of the population.

1.5. Financial restrictions due to the war

Financial support is not decisive but an essential component of the post-war restoration of higher education institutions. Before the full-scale russian invasion, 65-68% of the CPNU funding was from the state budget; in 2022, this figure reached 70.45%. At the same time, in monetary terms, the university's funding from the state budget in 2022 decreased compared to 2021 by 19.342.5 USD, i.e., by 0.615%. On the other hand, financing from the special fund decreased by more than 5% (from 34.91% in 2018 – to 29.55% in 2022). Such reduction is explained, firstly, by a decrease in the solvency of households during martial law; and, secondly, by relocation or closure of local businesses due to the war, which limited their ability to invest in education.

The above trends reflect the financial aspects of the university's educational activity. At the same time, special attention is needed to R&D funding at a higher education institution (Figure 1). 2022 was characterized by a decline in funding for the university's science. Applied research at CPNU was financed from the state budget for 3.131.63 USD less than in 2021 (a 20% reduction compared to the previous year). Nevertheless, the number of applied research projects in 2022 remained the same compared to 2021. During martial law, the team of young scientists successfully obtained grants for three research projects. This made it possible to increase the revenues of the university's budget. But in 2023, the funding of all young scientists' projects was reduced by 20% of their planned, estimated cost at the state level. In addition, there was a significant reduction in 2023 in the state financing of scientific projects of other categories.

In 2022, the CPNU budget did not receive grant funds at all, and other revenues from scientific activity significantly decreased. R&D funding from the business sector has reduced radically – more than 6 times compared to 2021. The main reason for this decrease is the war, which destroyed many enterprises and their production premises, caused a decline in profit and personnel loss, and

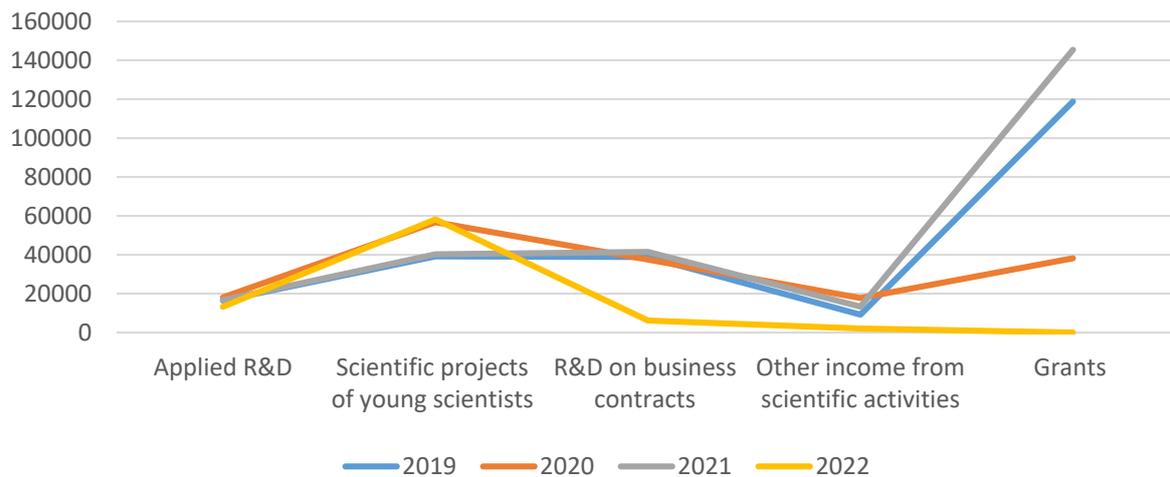


Figure 1. Structure of R&D funding in CPNU in 2019–2022, USD

provoked their closure or relocation to other, safer regions of Ukraine. Accordingly, the investment opportunities of local companies have significantly decreased, which has caused a reduction in the funding of university R&D from the business sector.

Despite the war and the losses incurred, scientific activism is resumed at CPNU. This concerns not only research projects financed by the state budget but also the grants for international projects. In particular, since January 2023, the university has become a member of the Consortium of three EU international projects under the Erasmus+ KA2 Capacity Building for Higher Education.

1.6. Challenges in the conditions of the russia-Ukraine war

Under martial law, CPNU encountered the following main challenges:

- loss of human capital because many students and teachers went abroad or to other regions of Ukraine, which limits their participation in the educational process; some employees and students were mobilized; some died or were severely injured in the war zones, at the front, or as a result of hostile air attacks and bombing;
- physical large-scale destruction, theft, and damage of specialized and computer equipment on the premises of the university (educa-

tional buildings, research laboratories, lecture halls, administrative rooms, etc.);

- lack of funding, reduction of financing from various sources (state budget, business sector funds, maecenas, etc.), and the emergence of no projected expenses that were not laid in the budget of the university for 2022 (restoration of premises, stolen equipment and destroyed educational premises and research laboratories; financial assistance of employees and students affected by russian military aggression);
- violation of the educational process, which was forced to delay training in the first weeks of a full-scale war of russia against Ukraine; significant difficulties arose with the organization of the undergraduate practical training and dual education of students since a lot of enterprises of the region has relocated to other areas or reduced their production volumes;
- increased cyber security threats, due to which it was necessary to remove the servers of the university, completely update the operation of the educational platform MOODLE, and take extraordinary measures to create an effective system of protection of information resources and databases;
- reduction in the number of students since many young people went abroad or to other regions of Ukraine and decided to study there;

- increase in doubts of foreign partners on the investment expediency in the reconstruction of the university and launch of new projects facing the conditions of war and high probability of further attacks (with their complete readiness to support the university in the post-war period and provide significant humanitarian aid in wartime);
 - deterioration of mental health of students and employees who were in the occupied territories, in the area of active war actions, lost their relatives and friends, had difficulties with evacuation, and lost housing. Currently, the university supports the psychological center at CPNU in every possible way; this center aims to minimize the negative impact of the war among students and all employees.
- The war proved that the university is more than just premises, walls, and laboratories. The university is its human capital; it is a team of like-minded people, and it is mutual support and assistance. The cohesion of employees, teachers, and students allows the university to gradually restore the educational and research infrastructure, dormitories, and buildings. Due to the war, the management approaches at CPNU have changed; the university administration, together with students, researchers, and teachers, formulated 7 pillars of post-war development: Renovation, Recovery, Reconstruction, Revampment, Reinforcement, Relationship, and Resilience. These pillars are planned to be integrated into the university's strategy. Applying the comprehensive approach to implementing the "7R" pillars will allow for positive transformations in the educational process, research, cooperation with stakeholders, and in the international activities of CPNU.

CONCLUSION

The purpose of this study was to outline the peculiarities of the functioning of Chernihiv Polytechnic National University in the conditions of the Russia-Ukraine war. CPNU is a university located in the northern region of Ukraine bordering Russia and Belarus. Due to its proximity to the border, Chernihiv region was one of the first in Ukraine to be attacked by Russian troops, and CPNU has undergone large-scale destruction.

As this analytical study showed, during martial law, the educational and research infrastructure of CPNU was destroyed, and staff and students were forced to relocate. Furthermore, the war caused a reduction in university funding, R&D investment, a violation of the educational process, and a delay in research and implementation of international projects. However, in the joint efforts of administrative staff, teachers, and students in April 2022, the university resumed its educational activities and continued implementing scientific projects.

Currently, the university faces several challenges; thus, management is developing strategic vectors and tactical measures for post-war recovery. Such recovery should be based on the principle of complexity, covering different areas of the activity of higher education institutions (training, research, social actions, innovative development, international cooperation, interaction with stakeholders, financial, logistical, and infrastructure support of the university). Furthermore, the methodological fundament of the university recovery should consider the sustainable development concept. Accordingly, further research can develop a model for the post-war recovery of border universities of Ukraine under the sustainable development concept.

AUTHOR CONTRIBUTIONS

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Writing – original draft: Nataliia Kholiavko, Olha Popelo.

Writing – review & editing: Oleh Novomlynets, Viktoriia Marhasova.

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APPENDIX A

Table A1. Consolidated indicators of the CPNU infrastructure destruction

Damaged/destroyed infrastructure	Information on damage		Number of students and employees of a damaged object, persons		Characteristics of the damaged building		Estimated cost of repair, USD
	Reason / Date	Degree of destruction, %	students	workers	Indicative area, sq.m.		
					total area	damaged area	
Educational Buildings No. 22 and 23	Shelling / March 11, 2022	25	in rent	in rent	4678	1560	125 000
Educational Buildings No. 1, 2, 3, and 4	Shelling / March 14, 2022	25	6000	492	26154	8700	1 925 000
Dormitory No. 1	Shelling / March 15, 2022	15	450	15	5700	950	225 000
Dormitory No. 3	Shelling / March 11, 2022	15	225	11	4021	2000	250 000
Dormitory No. 6	Shelling / March 15, 2022	15	400	12	4076	1000	250 000
Educational Building No. 8	Shelling / March 11, 2022	5	800	84	3313	500	37 500
Professional College of Transport and Computer Technologies	Shelling / March 16, 2022	15	1068	86	6504	975	375 000
Sports and Wellness Recreation Center "Fortuna"	Shelling / March 14, 2022	80	0	0	1600	1280	150 000
Recreation Center "Yunyst"	Shelling / March 16, 2022	85	0	1	1200	1020	125 000
Business Innovation Center	Explosive wave / March 3, 2022	5	0	10		0	37 500
Total			3 500 000				