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Impact of COVID-19 on University Activities: Comparison of Experiences from Slovakia and Georgia

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Abstract: The paper examines the recent trends in international mobility, attractiveness for international students, and the number of publications of two universities (Constantine the Philosopher University in Nitra, Slovakia, CPU and Tbilisi State Medical University, Georgia, TSMU) to understand whether the COVID-19 pandemic affected these processes and whether the adverse consequences of the pandemic were still retained after its end. In addition, we examined the influence of EU support for these processes. For this purpose, we analyzed the rates of international mobility (the number of outgoing and incoming students and employees, the number of international students, and the number of publications indexed in SCOPUS and the WoS database of CPU and TSMU before, during, and after the abolishment of administrative restrictions induced by the COVID-19 pandemic. The comparison of CPU and TSMU demonstrated the similarity between these universities in the development of international contacts and cooperation. The indexes of international mobility and the number of publications in the EU university CPU were higher than those in the non-EU TSMU. On the other hand, before COVID-19, the indexes of international mobility and the number of publications of TSMU were stable or tended to decline, but in CPU, they increased. COVID-19 had a negative impact on all indexes of international mobility, but the number of international students continued to increase in both universities, even during the pandemic. The use of home offices during the pandemic promoted an increase in the number of international publications among authors from CPU but not among those from TSMU. After the end of the pandemic, in both universities, the indexes of international mobility increased but sometimes did not return to pre-pandemic levels. In the post-COVID-19 period, in both CPU and TSMU, the number of international students continued to grow, and the number of publications declined. These observations highlight the trend of internalization experienced by both universities, the negative impact of COVID on their international mobility, and the importance of EU support for research.

Keywords: education; research; COVID-19; mobility; Slovakia; Georgia; EU



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1. Introduction

All universities around the world have similar tasks to promote education and to perform research, although the prioritization of these activities can be different at various universities. The development of modern telecommunication techniques is an important

factor that promotes teaching, research, and collaboration between universities in different countries. On the other hand, the COVID-19 pandemic has had a negative influence on university teaching, international mobility, and scientific collaboration in all countries [1,2].

The objects of the study were two universities located in Slovakia and Georgia—Constantine the Philosopher University in Nitra (CPU) and Tbilisi State Medical University (TSMU). Both are located in post-socialist countries, and both were established during the socialist period as institutions for teaching but not for performing research (in socialist countries, science was performed in research institutes). Both universities are promoting integration into the European scientific and educational area. These two universities have a similar number of students (seven and nine thousand, respectively) and some similarly dominant areas of education (natural science, medicine, and nursing); however, TSMU, in contrast to the more “universal” CPU, is focusing all its activities on medicine. Both universities faced similar problems after the start of the COVID-19 pandemic. On the other hand, CPU is located in an EU country and receives support from the EU in contrast to TSMU, which is located in a non-EU country. Therefore, comparisons of trends in CPU and TSMU could help detect the importance of this support for the activities of the university.

Although the administration at CPU [3] and TSMU [4] has done its best to minimize COVID-19-induced damages, the pandemic complicated teaching, international collaboration, and mobility at these universities [3]. The examples and experiences of these two universities enable an evaluation of current trends in higher education, adverse consequences of the COVID-19 pandemic on education, the ability of universities to resist negative impacts during the pandemic, the return to normal work, and the promotion of further development after the end of the pandemic. In addition, a comparison between universities in the EU (CPU) with those not in the EU (TSMU) could help evaluate the importance of EU support for the activities of the universities.

The aim of the present study conducted at both CPU and TSMU was to understand (1) the long-time trends in international mobility, studying abroad, and scientific productivity; (2) whether and how the COVID-19 pandemic affected these processes; and (3) whether and how the abolishment of administrative restrictions induced by COVID-19 resulted in a return to pre-pandemic levels and even induced further progress in these activities. We also (4) compared these processes in Slovak (CPU) and Georgian (TSMU) universities.

The problems arising from the use of home offices and online teaching due to the COVID-19 pandemic (lack of personal contact between members of the university staff and between university staff and students, requirements to learn and use distance learning technology, etc.) in CPU [1] and other universities in the world [1,2] have been described and analyzed in previous reviews. Therefore, the present study focused on international mobility, the number of international students, and the efficiency of scientific work. For this purpose, we evaluated the following factors:

- Number of students and employees leaving to work abroad;
- Number of students and employees incoming from abroad;
- Number of international students;
- Number of scientific publications in top international journals, as well as the popular indexes of and scientific efficiency of the universities [5] and their staff [6].

2. Materials and Methods

The data concerning outgoing and incoming students and employees were obtained from the archives of the Department of International Relations of CPU and TSMU. The number of international students was obtained from the Automatic Information System of CPU and from the Dept. International Relations of CPU and TSMU [7–9], which contained data on international students studying each semester. The number of international publications was obtained from the SCOPUS database of scientific publications [10], according to the affiliation of the authors.

We analyzed data for 2018, 2019 (before the start of the pandemic and the application of pandemic-induced restrictive measures), 2020, 2021 (the time of the pandemic), and

the first 6 months of 2022 (after the end of the massive pandemic and the abolishment of pandemic-induced restrictions) with 6- or 12-month intervals. All the obtained data were processed and presented in graphic form using SigmaStat/SigmaPlot 11.0. software (Systat Software, Erkrath, Germany).

3. Impact of COVID-19 on University Activities

Pandemic measures of the CPU and TSMU and their functioning.

With the arrival of the COVID-19 crisis, the rhythm of everyday life at CPU in Nitra changed radically. The school gradually adopted many preventive measures, which were intended to eliminate the possibility of access to and spread of the virus in the environment of the university and its community. From 9 March 2020, the face-to-face form of teaching was stopped, the interruption of which was later extended; according to the instructions of the deans of the various faculties, education was carried out remotely. The study, lecture stays, internships, the mobility of students and teachers, and visits from abroad to CPU became things of the past, as did international conferences, seminars, public cultural and social events, and other events. The deadline for submitting applications for bachelor's studies was extended until 30 April 2020. These changes were reflected in the schedule of the academic year of 2019/2020 in terms of graduating years. Final theses were submitted electronically via the AIS (Academic Information System). State exams for bachelor's and master's studies began on 1 June and lasted until 11 July 2020. Oral exams and defenses of final theses were conducted remotely via the CPU MEET video conference system. For students without the possibility of a home connection, rooms and technology for the videoconference form of the state exam were reserved on the premises of individual faculties. The development of the pandemic also significantly affected the CPU Student dormitories in Nitra. On 12 March, university management decided to close the CPU dormitories for domestic students. Rector CPU declared a state of emergency at the beginning of May. On the basis of the decision of the Ministry of the Interior of the Slovak Republic and according to the instructions of the Minister of Education, Science, Research, and Sports of the Slovak Republic, the university began preparing the Zobor Student dormitories for accommodation and catering for persons subject to mandatory quarantine, as well as other support services for the operation of the quarantine facility. International students who were still living in the Zobor dormitory at that time were transferred to the CPU Nitra dormitory. Since 5 May 2020, a total of 232 repatriates have passed through the Zobor dormitory, and the last 29 left for home isolation on 28 May. The Nitra student dormitory was reopened on 13 May for the accommodation needs of full-time CPU students, which was also offered during the months of July and August.

Nevertheless, employees and students of CPU in Nitra prepared 32 scientific events. Interested professional and public individuals could also participate in interesting lectures, seminars, discussions, workshops, competitions, and exhibitions in a virtual way and have the opportunity to take a look at the laboratories.

The COVID-19 pandemic also forced changes in education at TSMU. The most visible change was a transfer to the home office and distance learning of students. This transfer required the following measures at TSMU:

1. Study process modifications: transfer of clinical and theoretical subjects, including electives (during the full distance learning mode);
2. Making relevant modified program changes to the syllabi of subjects/modules (replacement of clinical components with theoretical ones);
3. Conducting virtual lectures and practice sessions in an interactive format;
4. Focusing on the formative component when evaluating work, including an electronic monitoring system and proctoring (<https://www.proctoru.com/>, accessed on 1 September 2022) in order to detect and prevent cheating. Nevertheless, despite its high cost, this system was not very efficient and appeared to be easily blocked. Therefore, TSMU, together with some other international medical education organizations, did not recommend using the platform for online examinations.

5. Use of e-learning resources.

3.1. Comparison of International Mobility, Number of International Students, and Number of International Publications of CPU and TSMU

A comparison of the two studied universities showed some differences in their indexes of mobility and scientific efficiency. CPU had a higher rate of mobility for both students and employees and a higher number of publications in the top-ranking international journals than TSMU, but TSMU had a higher number of international students.

The differences in international mobility between the universities cannot be explained by differences in the activities or skills of the university administration responsible for international collaboration, as the indexes of their efficiency were similar. For example, CPU is currently a member of nine international organizations in the area of higher education and has signed a bilateral agreement with 78 universities abroad. The largest number of such agreements (30) concerns collaboration with universities in neighboring countries (Czech Republic, Poland, Ukraine, and Hungary) [7]. TSMU is currently a member of nine international organizations and has collaborated with 11 other international organizations in the areas of higher education and health. TSMU has bilateral agreements related to collaboration with 88 foreign universities. The highest number of such agreements concerns the cooperation of TSMU with neighboring (Armenia, Azerbaijan, and Turkey) (15) and post-soviet (24) countries, except for the Russian Federation, which is now excluded from these cooperation partners [8].

The interest of both students and employees in international mobility and collaboration in both CPU and TSMU is high. CPU is able to meet this requirement by using EU mobility programs (Erasmus etc.). The support of Georgian universities by the EU through mobility programs and travel grants, however, is much lower. Stays abroad are generally arranged on the basis of bilateral or personal agreements with university employees. In addition, Georgia is a low-income country. Therefore, Georgian students and university staff have a low ability to cover expenses related to travel and staying abroad using their own stipends and salaries. Due to these financial reasons, the demands for international mobility in Georgia are currently much higher than available offers. This fact demonstrates the benefits of Georgia entering the EU for Georgian universities.

The relatively low number of scientific publications generated in TSMU in comparison to CPU could be explained by local tradition. Previously, in Georgia (as in the other parts of the USSR), research was concentrated in research institutes, while universities were responsible mainly for education. The second cause of low motivation to generate publications could be a lack of financial rewards for both Georgian universities and their employees to publish abroad. Other causes could be the lack of EU programs to promote research in this non-EU country and the modest financial support for Georgian universities and science currently provided by the local government, which is not sufficient for expensive experimental studies. The following statistic provides an indirect demonstration of the importance of international collaboration for scientific efficiency based on the demand for funding: 85–98% of papers published by the underfinanced TSMU in 2018–2020 were developed in collaboration with foreign institutions, while in the better-supported CPU, this rate was between 40 and 46% [8–10]. However, it must be noted that the integration of Georgia into the European scientific sector and the growing mobility of Georgian students and scientists to well-equipped laboratories would promote the scientific collaboration of Georgia with other countries and result in the generation of new scientific knowledge and publications. Finally, the entry of Georgia into the EU would accelerate the development of Georgian science after the implementation of EU criteria and support.

The differences between CPU and TSMU in the number of international students could be explained by several facts. For one, CPU prepares specialists mainly for Slovakia, but TSMU traditionally prepares medics not only for Georgia but also for other countries, especially India. Studying at TSMU is also attractive for foreigners because of the lack of a requirement to arrange a visa or obtain permission to stay in Georgia for one year; the

provision of study grants by the Government of Georgia and the students' home countries, and Georgia's security, hospitality, good climatic conditions, affordable prices for life, and educational processes, which use foreign languages. For example, in four of the faculties at TSMU, education is delivered in Georgian, English, and Russian. In contrast, at CPU, education is fully or partially free only for a limited group of foreigners (i.e., those of Slovak or Ukrainian origin), and education is delivered only using the Slovakian language or the language of the Hungarian minority from Slovakia. The implementation of education in English is limited by the small number of English-speaking students at CPU (the main international students in CPU come from Slavonic countries such as Ukraine, Russia, and Serbia) and vice versa. Additionally, the lack of education available in English and the requirement to know Slovakian are not attractive for English-speaking foreigners. Therefore, CPU could attract international students (and, therefore, promote its internationalization) through the implementation of education in foreign languages, as done by TSMU. The advantage of CPU could be the availability of relatively cheap accommodation for foreigners at university dormitories, which are currently absent at TSMU.

3.2. Time-Dependent Changes in International Mobility in CPU and TSMU

The above analysis showed substantial time-dependent changes in indexes of international mobility among CPU students and staff (Figure 1A–D). Despite the substantial variations in these indexes every 6 months (likely due to seasons, exams, etc., which can affect mobility), the numbers of outgoing students (Figure 1A), outgoing employees (Figure 1B), incoming students (Figure 1C) and incoming employees of CPU tended to increase up to the start of the COVID-19 pandemic. The most expressed increase was the time-dependent increase in the number of incoming international students (Figure 1C). The highest number of visits to and from abroad occurred in the Philosophical faculty at CPU, which is traditionally focused on studies of foreign cultures and languages, as well as in the Faculty of Natural Sciences and Informatics, which requires collaboration with foreign institutions.

The international mobility of TSMU in the pre-COVID-19 time showed a time-dependent reduction: The number of outgoing students (Figure 1A) and employees (Figure 1B), as well as the number of incoming employees (Figure 1D), decreased from 2018 to 2020, while no short-term visits of international students to TSMU were reported (Figure 1C).

During the pandemic (2020–2021), all these indexes of mobility were dramatically reduced, with few or no visits at both universities. This fact is in line with previous reports on the pandemic-related reduction of international travel at CPU [3] and other universities [1,2].

After the abolishment of pandemic-induced measurements, the number of outgoing and incoming students started to increase at both universities. On the other hand, only the number of outgoing CPU employees reached pre-pandemic levels in the first 6 months after this abolishment (Figure 1B). The number of outgoing CPU students (Figure 1A) and incoming CPU students (Figure 1C) and employees (Figure 1D) reached only 1/3 of the pre-COVID-19 levels. In TSMU, the pre-COVID-19 number of outgoing students was also not reached in post-COVID-19 times (Figure 1A), but the number of outgoing (Figure 2B) and incoming (Figure 1D) employees after the abolishment of pandemic-induced restrictions was restored to a level comparable to that of pre-COVID-19 times. The post-COVID-19 period was characterized by the onset of short stays among international students at TSMU through the Erasmus+ program, which was not reported before or during the pandemic (Figure 1C).

CPU in Nitra implements exchange stays for students abroad lasting up to 12 months, which help improve qualifications, increase foreign language competencies, and facilitate the employment of future graduates of the university. CPU students have traditionally made ample use of mobility within the ERASMUS+ program, Makovecz program, CEEPUS, and bilateral cooperation programs of the Ministry of Education and Culture of the Slovak Republic. As part of the ERASMUS+ program, 234 CPU students traveled abroad in 2019,

with 117 traveling for a study stay and 117 for a practical internship. The number of students sent abroad has increased, mainly as a result of greater interest in the Erasmus+ internship, which is increasingly being used by recent graduates within 1 year after completing their national studies. At the same time, the number of admitted students from abroad increased, which was also facilitated by CPU's cooperation with partner universities outside the EU within the Erasmus + KA107 project. During 2014–2019, CPU accepted a total of 361 Erasmus students, which is only 28% of the number of CPU students sent during the given period.

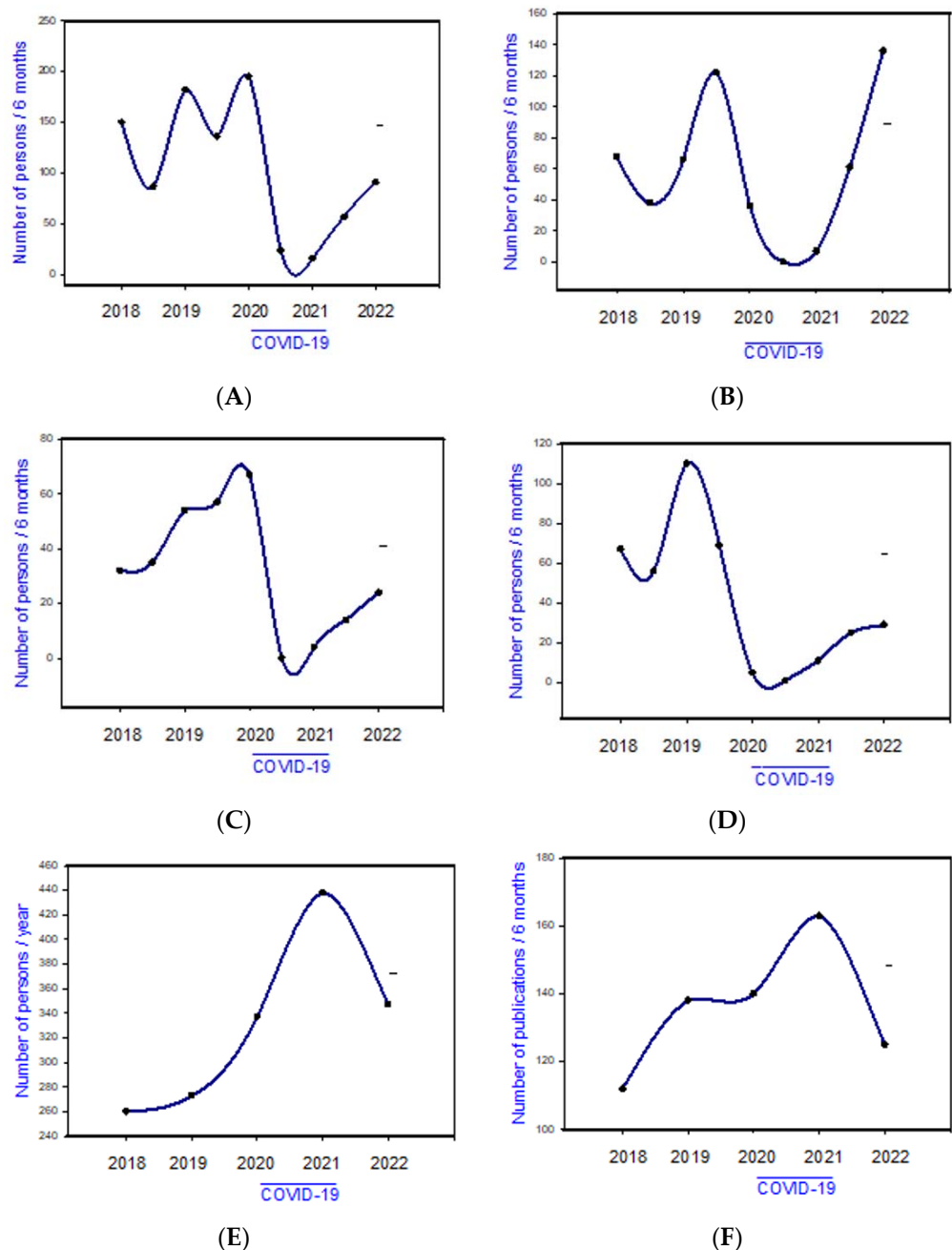


Figure 1. Time-dependent changes in the number of outgoing CPU students (A), outgoing CPU employees (B), incoming international students (C), incoming foreign employees (D), the number of international students studying at CPU (E), and the number of publications of CPU authors indexed in the SCOPUS database (F) before, during and after COVID-19 pandemic (the data for every 6 months).

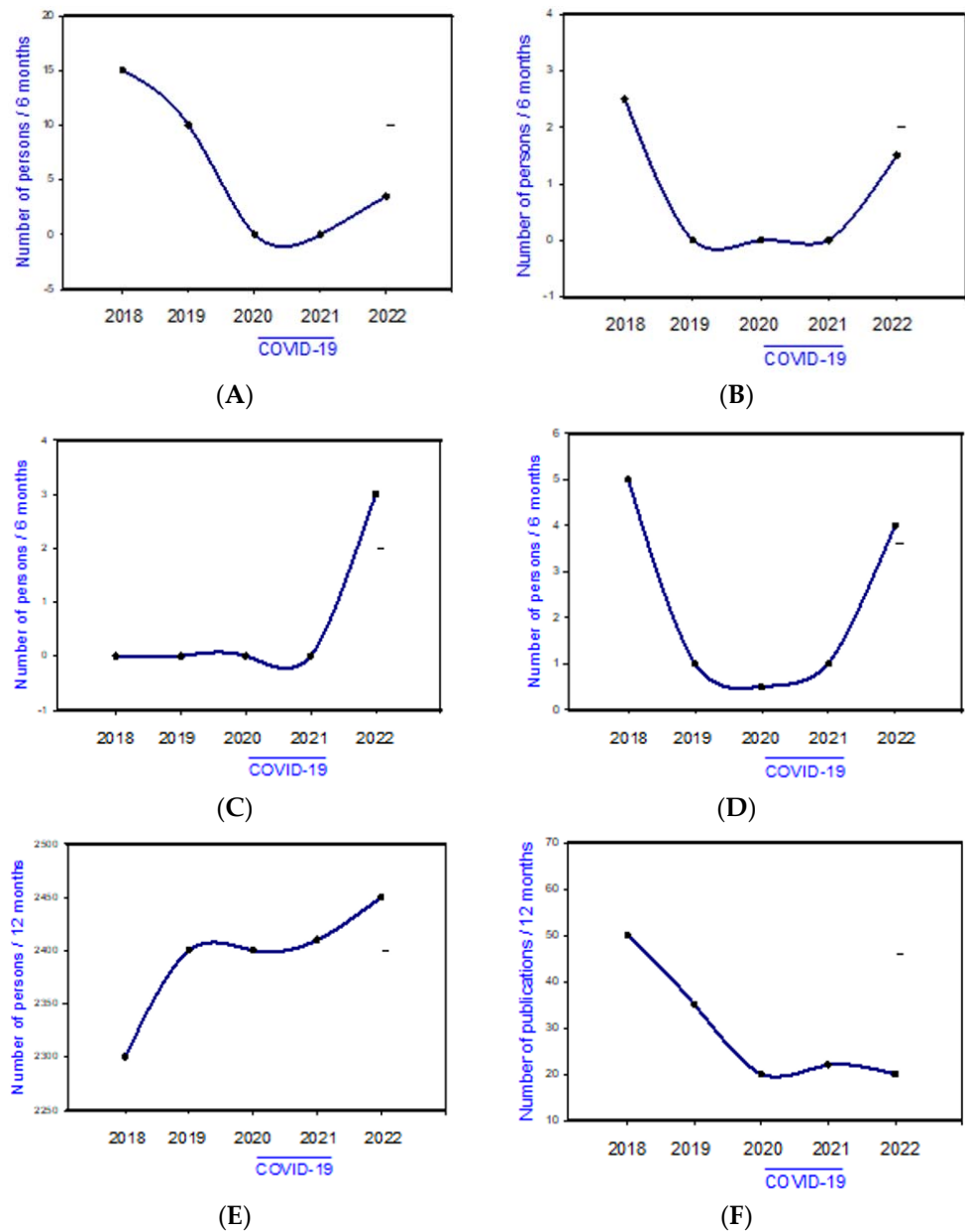


Figure 2. The time-dependent changes in the number of outgoing TSMU students (A), outgoing TSMU employees (B), incoming international students (C), incoming international employees (D), number of international students studying at TSMU (E), and number of publications of TSMU authors indexed in the SCOPUS database (F) before, during, and after the COVID-19 pandemic (the data for each covers 6 months).

As part of the ERASMUS+ program, 166 CPU students traveled abroad in 2020, 71 for a study stay and 95 for a practical internship. The number of students sent abroad decreased significantly due to the travel ban and not recommending traveling abroad due to the health concerns caused by the ongoing global COVID-19 pandemic. The number of admitted students from abroad was also negatively affected by the COVID-19 pandemic and the need to cancel the admission of any foreign Erasmus students to mobility programs in the summer and winter semesters of 2020. On the other hand, CPU's cooperation with partner universities outside the EU within the Erasmus+ KA107 project, through which we sent 2 students and accepted 18 students, contributed significantly to these numbers for 2020. During 2015–2020, CPU accepted a total of 367 Erasmus students, which represented only 29% of the number of CPU students sent during the period.

To support the mobility of its students and employees, TSMU is using the 2015 EU Erasmus + KA 107 program. Like other institutions, TSMU is using this program to support teaching mobility. Within the framework of this mobility, academic staff of the university have the opportunity to teach at partner higher education institutions and achieve training mobility. The aim of this type of mobility is to support the professional development of administrative staff at TSMU.

The following institutions participated in the Erasmus + KA 107 program: Austria—Tyrol Hospitals Union—the Western Education Centre (AZW); Belgium—University of Liege; Bulgaria—Medical University of Pleven; Croatia—The University of Zagreb and The University of Zadar; Estonia—Tallinn Health Care College and The University of Tartu; France—Paul Sabatier University Toulouse and Paris-Est Créteil Val-de-Marne University; Germany—Charité—University Medicine Berlin; Greece—Aristotle University of Thessaloniki; Hungary—University of Debrecen; Italy—University of Pisa, University of Sassari, University of Pavia, and University of Perugia; Latvia—Riga Medical College of the University of Latvia; Lithuania—Lithuanian University of Health Sciences and Klaipeda State University of Applied Sciences; Poland—Poznan University of Medical Sciences, Medical University of Lublin, Powislanski University in Kwidzyn, West Pomeranian University of Technology in Szczecin, Medical University of Gdańsk, and Jan Kochanowski University in Kielce; Portugal—University of Porto and University of Coimbra; Romania—University of Medicine, Pharmacy, Science, and Technology of Tirgu Mures, University of Medicine and Pharmacy of Craiova, and Iuliu Hatieganu University of Medicine and Pharmacy; Slovakia—Constantine the Philosopher University in Nitra; Spain—University Santiago de Compostela; Turkey—Sivas Cumhuriyet University; and United Kingdom—Middlesex University, University of Chester, Cardiff Metropolitan University, and University of Keele.

Besides the Erasmus+ KA 107 program, TSMU is participating in other Erasmus programs, which are specific for medical universities or for Georgia. One such project is ERASMUS+ Capacity Building in Higher Education SPRING Project (Setting Peer Review Instruments and Goals For Medical (Health) Education). This project seeks to enhance the potential of universities in the field of higher education in medicine. Another country-specific ERASMUS project is the ERASMUS+ Capacity Building in Higher Education project HERD (Raising the Research Capacity of Georgian HEIs through Developing R&D Units). This project aims to upgrade the research capacity of Georgian universities by developing R&D units within the target universities.

In addition, TSMU, in contrast with CPU, uses the mobility program MEVLANA to achieve bilateral cooperation with Turkey. In the framework of this program, TSMU cooperates and exchanges through visits with the following universities in the following Turkish cities: Adana—Chukurova University and Aksaray University; Erzurum—Atatürk University; Giresun—Giresun University; Hatay—Mustafa Kemal University; Izmir—Sifa University; Kars—Kafkas University; Mus—Muş Alparslan University; Rize—Recep Tayyip Erdoğan University; Samsun—Ondokuz Mayıs University.

TSMU students and staff also participated in the following international summer schools: Summer School Language Courses at Atatürk University, Turkey; Summer Internship at Lublin and Poznan universities, Poland; Foreign Language Center at the Charité University Hospital (Cottbus, Germany); and Summer Internship for Students at Kharkiv Medical Academy (Ukraine).

These observations demonstrate the trend of growth in some indexes of international mobility at both CPU and TSMU, which was broken by restrictions on international travel during the pandemic but restored (and even initiated) after the abolishment of such restrictions. Only the number of outgoing CPU and TSMU employees reached pre-COVID-19 levels. The higher activity of employees in comparison with domestic students could be explained by the wishes of scientists to continue pre-established collaborations hindered by the pandemic. Another explanation could be the better support of employees than students through international grants and the university administration, which was interested in the restoration and promotion of international collaboration and the realization of scientific

and financial plans generated before the COVID-19 pandemic. On the other hand, the appearance of international students at TSMU after the end of COVID-19 indicates the success of the Erasmus+ program in the promotion of visits from European students to non-EU (including Georgian) universities.

On the other hand, many projects featuring international cooperation at both CPU and TSMU, which required implementation over several years, were not canceled but hindered, as such projects require mutual visits between people, which were restricted during the COVID-19 pandemic (see above).

3.3. *The Time-Dependent Changes in the Number of International Students in CPU and TSMU*

Both CPU (Figure 1E) and TSMU (Figure 2E) have faced a permanent time-dependent growing number of international students in pre-COVID-19 times, during the pandemic, and after it. These data suggest the growing popularity of both CPU and TSMU for international students. Even the COVID-19 pandemic did not stop the growth of foreign student numbers at both universities. Notably, despite the reduction of students attending CPU for a short period of time and their absence at TSMU, the number of international students studying at these universities grew during the pandemic. The increase in international students during the pandemic might be explained by the difficulties of these students in returning home due to the global measures to reduce the adverse effects of the pandemic, including a reduction in public transport, health control at the borders, and requirements for testing and vaccination. Additionally, during the pandemic, learning was remote, and students could study while in their home countries. Furthermore, for some international students, staying in closed half-empty dormitories without domestic students, the restriction of movement inside and outside the country of study, the monitoring of health (regular testing and vaccination, which were arranged and paid for by CPU or the Georgian government) offered a safer alternative to returning home. In addition, some young people from abroad may have preferred to spend the pandemic in relatively safe countries such as Slovakia and Georgia.

Notably, the war in Ukraine could be one of the causes of movement among some young people, including students, to Slovakia and Georgia. The war between these countries promoted the international migration of people from both Ukraine [11] and Russia [12]. One of the ways for young people to immigrate while avoiding army service and other consequences of war is to study at foreign universities. Nevertheless, the war was not the main cause of the growth in the popularity of CPU and TSMU among students from Ukraine and Russia. First, a high number of international students was observed at both CPU, where the main international students are Ukrainians and Russians, and at TSMU, where these students represent only about 1% of international students. Second, the growth of foreign student numbers at both universities began a long time before the war, which started in 2022 (Figures 1E and 2E).

Over the longer term, the number of students studying at CPU in Nitra showed a slightly decreasing tendency. In 2019, the university registered 7029 full-time and part-time students in all three degrees of higher education. The year-on-year decrease was found to be less than 1.6%. Of this number, 5562 students studied full-time, which is a decrease of 1.3% compared to 2018. Despite the overall decrease in the number of students, we recorded an increase in the number of newly admitted students by 1.8% in daily form, from which we assume that the number of newly admitted students for bachelor's degrees will only increase in the future. Out of the total number of students, 345 foreigners studied at CPU.

In 2019, 81 international students completed their ERASMUS+ study stay at CPU. The number of admitted students was only 26% of the number of sent students. From the perspective of the type of scholarship (mobility) program, the ERASMUS+ program clearly dominated in terms of the number of sent and accepted international students. For the academic year 2018/2019, out of the total number of 266 outgoing and 68 accepted students, 182 sent, and 45 accepted students were accounted for by ERASMUS+ mobility. Compared

to the 2017/2018 academic year, there was a significant increase in the number of outgoing students but also an increase in the number of accepted/incoming students.

In 2020, 61 international students completed their ERASMUS+ study stay at CPU. In this case, the number of sent/outgoing and accepted/incoming students was also negatively affected by the COVID pandemic and the necessity to cancel or significantly limit mobility during the summer and winter semesters of 2020. The number of students sent abroad in 2021 dropped significantly due to concerns about travel and the threat to health and life caused by the ongoing global COVID-19 pandemic. The number of admitted students from abroad was also negatively affected by the pandemic and the necessity to cancel or limit the admission of foreign Erasmus students to mobility programs, especially in the summer and winter semesters of AY (Academic year) 2020/2021. During 2016–2021, CPU accepted a total of 312 Erasmus students, which represents only 28% of the number of CPU students sent during the given period. Even in this case, the number of sent and accepted students was negatively affected by the COVID pandemic and the necessity to cancel or significantly limited mobility during AY 2020/2021.

The number of admitted students was only 8% of the number of sent students. Again, in terms of the mobility program, ERASMUS+ clearly dominated in the number of sent and accepted international students. For the academic year 2020/2021, out of the total number of 50 sent and 4 accepted students, 49 sent and 2 accepted students were accounted for by ERASMUS+ mobility. Compared to the academic year 2019/2020, there was a significant decrease in the number of both sent and accepted students.

As part of the ERASMUS+ program, 8 CPU employees traveled for a lecture stay in 2021. Seventy-six CPU employees participated in training under this program, and another three employees traveled for the purpose of a preparatory visit to Erasmus+. A total of 87 employees traveled. In 2021, 21 foreign teachers from partner universities engaged in an ERASMUS+ lecture stay at CPU.

The number of admitted students in 2020 was only 34% of the number of sent students. From the perspective of the scholarship (mobility) program, the ERASMUS+ program again dominated the number of sent and accepted international students. For the academic year 2019/2020, out of the total number of 229 sent and 77 accepted students, 174 outgoing and 73 incoming students were accounted for by ERASMUS+ mobility. Compared to the 2018/2019 academic year, there was a decrease in the number of outgoing students but an increase in the number of incoming students.

In 2021, the number of outgoing employees under the ERASMUS+ program was greater than the number of incoming employees. Although the numbers were higher than those in 2020, in both cases, they still fell short of the numbers from 2019 and earlier. As in the case of student mobility, there were restrictions on travel abroad, as well as a cancellation of the admission of foreign employees to mobility programs in 2020/2021 due to health concerns under the ongoing pandemic. In 2016–2021, CPU received a total of 415 people from abroad, which is approximately 35% less than the number of posted employees for the given period. As part of other scholarship programs supporting the academic mobility of CPU employees, only three employees were hired (again due to the COVID pandemic) through the bilateral cooperation programs of the Ministry of Education and Culture of the Slovak Republic (2) and through the European Structural and Investment Fund—Research, Development, and Education Operational Program (1).

3.4. The Time-Dependent Changes in the Number of International Publications at CPU and TSMU

A time-dependent increase in the number of international publications indexed in the SCOPUS database published by CPU authors was observed before and during COVID-19 (Figure 1F). This fact underscores the gradual increase in the scientific efficiency of CPU scientists and their students over recent years. Notably, the rise of productivity among CPU scientists was promoted by the growth of international mobility and the internationalization of CPU activities supported by EU programs. The COVID-19 pandemic was associated with a substantial increase in the number of papers published by CPU authors. The increase in

publication activity during the COVID-19 pandemic suggests that the lack of experimental work and the use of home offices during the pandemic had a positive influence on the analysis and publication of results obtained before the pandemic. After COVID-19, the number of publications decreased, with a shortage of experimental data obtained during COVID-19. Indeed, after the abolishment of COVID-19-related restrictions, the number of published papers was reduced. This fact can also be explained by the return of scientists to experimental studies, leaving less time for paperwork.

In 2021, CPU researchers published 376 articles in the SCOPUS database. Of these, 151 studies were carried out in international collaboration (40.1%). In total, CPU collaborated with authors from 51 countries.

In contrast to CPU, the number of publications among TSMU authors decreased before, during, and after the pandemic (Figure 2F). This negative trend in research activities at TSMU could be explained by the insufficient support for these activities from the Georgian government and EU institutions for non-EU universities (see above).

3.5. International Cooperation of CPU and TSMU with Ambassadors and Other Official Representatives of Foreign Countries

COVID-19 and anti-pandemic rules have interrupted CPU's in-person contact with representatives of diplomatic groups in Slovakia and the possibility of face-to-face meetings with ambassadors, as well as their visits and lectures at CPU in Nitra. The ambassadors are relatively regularly informed about the scientific and project-based cooperation at CPU in Nitra within the educational, scientific, and cultural institutions in the countries they represent. Reciprocally, these ambassadors are helpful in developing other scientific and cultural activities and representing their countries at CPU. During the period from June 2021 to June 2022, the following ambassadors visited CPU: H. E. Abbas Bagherpour Ardekani (the Islamic Republic of Iran), H. E. Roman Vassilenko (the Republic of Kazakhstan), H. E. Catherine Flumiani (the Italian Republic), H.E. Gustavo Eduardo Ainchil (the Republic of Argentina), and H. E. Tomáš Tuhý (the Czech Republic).

In recent years, the following foreign official representatives visited TSMU: German Delegation at Tbilisi State Medical University; Ambassador Extraordinary and Plenipotentiary of the Czech Republic to Georgia and Deputy Minister of Health of the Czech Republic at the TSMU Givi Zhvania Academic Pediatric Clinic; Ambassador Extraordinary and Plenipotentiary of the Czech Republic to Georgia; the French Delegation of Ministry of the Interior (France) Office for Immigration and Integration; and distinguished foreign experts in medicine such as Professor Thomas Eichhorn (Germany) and Professor Eugene Minevich (USA).

3.6. COVID-19's Impact on International Cooperation of CPU and TSMU in Scientific Fields

The interplay between mathematics and technology in cooperation on international projects did not stop even during the pandemic. This was also confirmed by the first online meeting of the project partners STEMkey (Teaching standard STEM topics with an emphasis on key competencies). The STEMkey project belongs to the Erasmus+ KA2 grant scheme and is formed by a consortium of 11 European universities, most of which are partners of the ICSE consortium (International Consortium for Teaching STEM subjects). The consortium was established in 2018 under the leadership of the University of Pedagogy in Freiburg, Germany. CPU in Nitra is the only Slovak university and, at the same time, a founding member of the ICSE consortium, mainly due to successful participation in the projects COMPASS (Comenius), PRIMAS (7RP), and IncluSME (Erasmus+). In the STEMkey project, the Department of Mathematics from FNS and the Department of Technology and Information Technologies from PF joined forces and combined their experience. The focus of the STEMkey project is the creation and verification of professional university texts for teaching students STEMkey subjects. The successful scientific journal of the Department of Translation, the FA International scientific online journal BRIDGE: Trends and Traditions in Translation and Interpreting Studies, was approached to become one of the founding

members of the board of editors of publications in the field of translation and interpretation science as part of an initiative to promote open science (the Council of Editors of Translation and Interpreting Studies for Open Science). The founding members met for the first online session at the Università di Bologna in Italy. The Department of Translation Studies was represented by the editor-in-chief of the journal, Mgr. Soňa Hodáková, Ph.D. The main goals of the Council of Editors of Translation and Interpreting Studies for Open Science are open access to scientific publications, the support of open-science practices, and initiatives to ensure high-quality scientific research work.

CPU offers the largest research and innovation program of the EU to project managers through the H2020 program, Horizon 2020. As part of the challenge H2020-MG2020-SingleStage-INEA, CPU became one of the partners that received a grant within a consortium of 39 partners from Austria, Belgium, the Czech Republic, Denmark, France, Germany, Greece, Italy, Ireland, Israel, Romania, Poland, Spain, Sweden, and Switzerland. The goal of the project BISON (Biodiversity and Infrastructure Synergies and Opportunities for European transport Networks) during the period from January 2021 to June 2023 is to solve the issue of biodiversity integration with the development of transport infrastructure, including roads, railways, waterways, airports, harbors, and energy networks. Four scientific-pedagogical workers from CPU and a doctoral student from the Faculty of Natural Sciences are involved in this project. The Department of Translatology of the FA CPU welcomed guests to the 10th annual Creative Translation Reflections jubilee with the subtitle Books, Film, and Media in the New Decade. This year, the jubilee was unconventionally held online but with high quality. The Horizon 2020 project, named Social and Innovative Platform On Cultural Tourism and Its Potential Towards Deepening Europeanisation (SPOT), featuring participation from the staff of the Faculty of Natural Sciences and the Faculty of Arts at CPU in Nitra, is in its second year of implementation. Fifteen partners from the European Union and beyond analyzed the diversity of cultural tourism and its benefits for host communities and regional economies. One innovative aspect of this project is the development of a tool for analyzing the potential of cultural tourism and its development. Through this project, the concept of cultural tourism will be expanded, and basic scientific knowledge will be enriched by developing an integrated analysis of various forms of cultural tourism in different regions of Europe. One exceptional international success of the CPU is the financially subsidized project Erasmus+ Mentor training (MENTRA). The international project Erasmus+ (KA201 no: 2020-1-SK01-KA201-078250), Mentor Training (Education of trainee and introducing teachers), was awarded by CPU in the academic year 2020/2021. This project is being implemented by six universities from four countries. The coordinator of this project is CPU, and partners include the J. Selye University in Komárno (SR), the University of Ostrava in Ostrava, the University of Economics in Prague (CZ), the K. Esterházy University in Eger (Hungary), and the University of Novi Sad in Novi Sad (Serbia). The anticipated period of project implementation is from September 2020 to August 2023.

After last year's pause due to the pandemic situation, the organizers of the event—the Department of Romanistics FA CPU and civil association (CA) Romanistica Nitriensia—decided to hold the event online for the first time. This event was extremely popular among the Hispanic community in Slovakia, as evidenced by the high level of participation from the external environment, as well as the patronage of the DHC 2021 once again being taken over by the ambassador of the Kingdom of Spain in Slovakia, J.E. Luis Belzuz de los Ríos, who addressed those present during the official opening.

CPU received the Erasmus Charter of Higher Education (ECHE) in the new Erasmus+ program period 2021–2027. This charter sets the general quality framework for European and international cooperative activities that a higher education institution can carry out within the Erasmus+ program. The granting of a charter is mandatory for all higher education institutions located in a country participating in the program and interested in participating in the mobility projects of individuals in the field of education and/or cooperation in the field of innovation and best practices under the Erasmus+ program.

This charter was granted for the entire duration of the Erasmus+ program 2021–2027. In order to obtain the Erasmus charter, it was necessary to submit an extensive application in English and Slovak, which was prepared by the vice-rector for international relations in cooperation with the Department for International Relations at CPU.

The success of the Department of Informatics in publication field output (the collection of scientific articles) from the 13th annual DiVAI 2020 international conference (Distance Education in Applied Informatics) was indexed in the world database of scientific publications Web of Science (Clarivate analytics). Since the ninth year of the conference (i.e., the last five years), conference articles have been indexed in the Thomson Reuters WoS database (Clarivate analytics). Proceedings from the last five years are published by the publishing house Wolters Kluwer.

The FITPED (Work-based Learning in Future IT Professionals Education) international project was completed at CPU, in which universities and companies from Slovakia, the Czech Republic, Poland, the Netherlands, and Spain participated. The project received 250,000 euros in support from the Erasmus+ program under Key Action 2 Strategic Partnerships, which provided organizations with opportunities to collaborate with colleagues from Europe. Over three years, partners under this program developed and tested the unique PRISCILLA system for supporting the teaching of 19 introductory programming language courses using the most modern approaches. Introductory courses provide students with the knowledge and skills that they will develop in the implementation of larger projects related to the study of data analysis, information systems, web and mobile technologies, and working in teams.

The most significant collaborations were as follows: Czech Republic (60.9%); Russian Federation (11.9%); Poland (10.6 %); Saudi Arabia (7.9%); Germany (7.2%); Hungary and Italy (6.6%); Spain and Vietnam (5.9%); Canada, Romania, and Turkey (5.2%); India (4.6%); Austria, Belgium, Iran, Portugal, Serbia, Sweden, and the United Kingdom (3.9%); and Australia (3.3%).

The most important cooperation was carried out with the following universities: Tomas Bata University Zlin, Palacky University Olomouc, Czech Technical University in Prague, Academy of Sciences of the Czech Republic, King Saud University, Charles University, Univerzita Pardubice, and RUDN University.

According to the relevant departments, CPU mostly collaborates internationally in the following scientific fields: Social Sciences (35%); Environmental Science (20.5%); Computer Science (15.2%); Arts and Humanities (14.5%); Agricultural and Biological Sciences (11.9%); Physics and Astronomy (11.2%); Engineering (9.9%); and Biochemistry, Genetics, and Molecular Biology (7.9%). When compared to the first half of 2022, 42 countries participated in a total of 150 studies, of which 68 were performed with international cooperation/in the SCOPUS database. The year 2022 yielded a reduction in database studies, as well as the number of co-authors from abroad. Nevertheless, international cooperation in database records increased to 45% [13–37].

By June 2022, 105 studies were published in databases. CPU's most significant scientific cooperation currently takes place with Czech scientists from the following institutions: Czech Academy of Sciences, Charles University Prague, Mendel University of Brno, Czech Technical University in Prague, Palacky University of Olomouc, Tomas Bata University of Zlin, and College Applied Psychology of Terezin. The main reasons for this collaboration include a) high linguistic proximity and b) a common history (i.e., Czecho-Slovakia). Other foreign countries with which CPU scientists cooperate include Saudi Arabia (King Saud University), University of Granada (Spain), I. N. Ulianov Chuvash State University and Peoples' Friendship University of Russia—RUDN University (Russia), and Polish Academy of Sciences (Poland). Cooperation with Italian scientists from various institutions is also noteworthy [38–45].

The COVID-19 pandemic negatively influenced international scientific cooperation among TSMU staff. Nevertheless, during the pandemic, scientific cooperation between TSMU departments and research institutes and several foreign research institutions was

continued and even established. Examples of continuing international scientific collaboration include the following departments and research Institutes of TSMU:

Department of Immunology: London Imperial College (UK), University of Catania (Italy), Brazilia University Medical Center (Brazilia), Ben-Gurion University of the Negev (Israel), University of Burgundy (France), and University Hospital Erlangen (Germany).

Kutateladze Institute of Pharmacochimistry Division of Terpenic Compounds: University of Quebec (Canada), University of Salerno (Italy), University of Sassari (Italy), University of Innsbruck (Austria), University of Innsbruck Institute of Pharmacy (Austria), University of Leuven (Belgium), University of Iowa (USA), University of Buffalo (USA), University College London (UK), Philipps University of Marburg (Germany), University of Geneva (Switzerland), and the Armenian National Academy of Sciences, Scientific–Research Centre of Organic and Pharmaceutical Chemistry (Armenia).

Bakhutashvili Institute of Medical Biotechnology: University Hospital Erlangen (Germany), University of Lodz (Poland), Tel Aviv University (Israel), and University of Oregon (USA). Therefore, although the number of in-person visits at both universities was reduced during the COVID-19 pandemic (see Figures 1 and 2), this pandemic was not able to halt international cooperation at CPU or TSMU. This fact is confirmed by the active participation of both CPU and TSMU in international organizations. Ultimately, the COVID-19 pandemic did not influence the onset of new, and the implementation of current, international projects. International projects were promoted remotely during the pandemic by using digital mobility and telecommunications techniques. On the other hand, COVID-19 suppressed the physical mobility (travel abroad) of people involved in these projects (see above).

3.7. Membership of CPU and TSMU in International Organizations

Membership in international organizations is important for every university and leads to the development of international cooperation, provides the opportunity to gain valuable knowledge about trends in education and research, establishes and develops contacts, and contributes to raising the overall level of higher education. Through its academic staff, CPU in Nitra is represented in several international organizations:

- EUA—European University Association;
- DRC—The Danube Rector’s Conference;
- Magna Charta Observatory;
- EASSW—European Association of Schools of Social Work;
- ESN—Erasmus Student Network;
- TAUS—Translation Automation User Society;
- AUF—Agence Universitaire de la Francophonie;
- European Cultural Route St. Cyril and Methodius;
- SocNet98—European Network of Universities/Schools of Social Work.

In 2021, CPU scientific–pedagogical and scientific employees were members of 580 international organizations (including editorial boards), including FA (246), FNS (152), FSŠ (94), PF (56), and FSVaZ (32). TSMU is a full member of the following international organizations and associations:

- EUA—European University Association;
- Magna Charta Universitatum;
- AMEE—International Association of Medical Education;
- IAUP—International Association of University Presidents;
- EMSA—European Medical Students’ Association;
- IFMSA—International Federation of Medical Students’ Associations;
- ESRUC—Eurasian Silk Road Universities Consortium;
- International Scientific-Educational Innovative-Technological Consortium of Higher Medical and Institutions Of Physical Education and Sports;
- ANSER—Academic Network for Sexual and Reproductive Health and Rights Policy.

Therefore, both CPU and TSMU are actively participating in general and professional international organizations.

4. Conclusions

The present comparison of CPU and TSMU demonstrated some similarities between these universities in the development of international contacts and cooperation. Both CPU and TSMU experienced growth in their number of international students. Both universities based their mobility on Erasmus projects, although TSMU also used specific Erasmus and non-Erasmus programs focused on Georgia. The possible causes of these changes and the differences between universities were discussed above.

This comparison also demonstrated the higher international mobility and scientific productivity (generation of publications in the top international journals) of CPU in comparison with TSMU. Part of these differences could be due to the better support of CPU by the EU, demonstrating the benefits of such support in post-socialist countries. On the other hand, TSMU, due to several reasons listed above, was found to be more attractive than CPU for international students. CPU could better attract students from abroad by introducing education in foreign languages.

The present observations demonstrated the long-term trends in the internationalization of activities at CPU, such as an increase in the outgoing and incoming visits of both students and employees, an increase in the number of international students studying at CPU, and the growing number of publications in international journals generated by CPU. Despite relatively modest indexes of mobility and international publications produced by TCMU, the high (and increasing) numbers of international students studying at TCMU and the onset of short-term visits of students from foreign universities are signs of the growing internationalization of TCMU's work, as well. This process corresponds with the modern trends in the internationalization and globalization of education and science, as well as the politics of the EU in these areas. Some of these trends (the mobility of both domestic and international students and employees) were partially ruptured by the COVID-19 pandemic. Nevertheless, the time after the abolishment of COVID-19-induced restrictions on international travel was characterized by the partial or full restoration of pre-COVID trends in the growth of international mobility in both CPU and TCMU and the onset of stays from international students at TCMU. The pandemic also did not break the growth trend in the study of international students at CPU or TCMU and even promoted the generation of publications by CPU.

We recognize that the present study has serious limitations. The differences in specialization between CPU and TSMU (CPU has both medical and non-medical departments, while TSMU is oriented exclusively toward medicine) and the economic and political situations in the host countries of these schools could have influenced their development and responses to COVID-19. The significance of the COVID-19 pandemic on the particular indexes measured in our study was suggested mainly on the basis of the temporal coincidence of the pandemic with some changes to these indexes, while the number of publications could not be directly linked with particular times due to the sometimes long and variable periods between the studies themselves and the publication of the results. Therefore, it is possible to determine the exact time of publication for experimental data but not the time at which those data were obtained. The variable and usually long period between setting up experiments, obtaining the results, and achieving publication complicate establishing a direct link between the timeframe of COVID-19 and research output. The direct action of the pandemic can be determined only based on the implementation of anti-COVID-19 measures, such as the prohibition of travel abroad. Other statements are based instead on indirect evidence, personal claims of students and employees, and our own interpretations, which should be considered only as hypotheses, not concrete statements. Some speculations concerning the causes of the phenomena described in this paper require additional confirmation.

Despite such limitations, the observations presented here could have some predictive value. For example, the growth of the world's population and the political instability in some countries could yield further growth of international students at CPU, TSMU, and other universities around the world. The current lack of financial support will likely yield a further reduction in the number and quality of publications generated by TSMU in the future. The same consequences are expected if CPU were to face financial shortages. Moreover, the continuation of pandemic-induced home office work for a period longer than 2 years would result not in research growth but a reduction in the number of generated publications due to the lack of new experimental data. The inability to set up new experiments could promote the replacement of published experimental data with the results of official statistics, foreign partners, or compilations of previously published data. Universities should be prepared to minimize the negative consequences of such external factors.

We hope that the data presented in this study will help universities around the world predict and face complications induced by pandemics such as COVID-19 by better understanding the general trends in higher education, as well as the role of the EU's support of experimental work. The present data demonstrated trends toward internalization at both universities, the negative impact of COVID on their international mobility, and the importance of EU support for research.

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