



Monitoring the development of entrepreneurial activity of Ukrainian higher education institutions in the scientific field

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ABSTRACT

One of the main activities of Ukrainian higher education institutions (HEIs) is scientific. State HEIs can provide paid services, in particular in the field of scientific and scientific and technical activities. The purpose of this article is to monitor the development of the entrepreneurial activity of Ukrainian HEIs in the scientific sphere based on data on the volume of receipts to the special fund based on the results of scientific activity for 2018–2020 and to formulate proposals for stimulating such activity. In the course of the study, the ABC-analysis method was applied for the phased (2018, 2019, 2020) distribution of HEIs of Ukraine into three groups: A – HEIs with a large amount of income from scientific activity (about 80% of the total amount); B – HEIs with an average level of commercialization of the results of scientific activity (about 15%); C – HEIs with little or no income from scientific activities (about 5%). It was found that in the analyzed period, there was a gradual increase in the results of entrepreneurial activity in the scientific field of 138 Ukrainian state HEIs: revenues of HEIs first increased from UAH 363.688 million in 2018 to UAH 378.522 million in 2019, and then to UAH 460.455 million in 2020. It was noted that a significant share of these revenues ($\approx 79-80\%$) was the receipts of approximately one-fifth of the HEIs: 19.57% in 2018, 18.84% in 2019, and 23.19% in 2020. The closest to the realization of the Pareto 20/80 principle was 2018, when the ratio of indicators of HEIs and their income was 20/79. It was found that in 2018–2020, 99 HEIs of Ukraine consistently fell into the same groups in terms of the amount of income to the special fund from scientific activities, 21 HEIs increased their positions (both smoothly and in leaps and bounds), 8 HEIs – on the contrary, decreased, and no trends were found for 10 HEIs. External and internal stimulation of the commercialization of scientific activity in HEIs of Ukraine is recommended.

KEYWORDS: entrepreneurial activity, scientific sphere, higher education institutions of Ukraine, ABC-analysis, Pareto principle, monitoring

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1. Introduction. One of the main tasks for Ukrainian universities, academies, and institutes is to carry out scientific activities by conducting scientific research and ensuring the creative activity of participants in the educational process, training highly qualified scientific personnel and using the obtained results in the educational process (Legislation of Ukraine, 2023a). According to the resolution of the Cabinet of Ministers of Ukraine (hereinafter – CMU), higher education institutions (hereinafter – HEIs) belonging to the state and communal forms of ownership can provide paid services, in particular in the field of scientific and scientific and technical activities (Legislation of Ukraine, 2023b).

The main motivation for the provision of services on a paid basis is to increase the inflow of funds to the accounts of HEIs. However, the CMU declared an additional incentive in the field of commercialization of the results of scientific activity of HEIs: the distribution of state budget expenditures for higher education among HEIs, taking into account the indicator of their scientific activity (Legislation of Ukraine, 2024). It is determined depending on the volume of inflows of funds to the special fund based on the results of scientific and scientific and technical works under international cooperation projects, economic contracts and the results of the provision of scientific services per one scientific and pedagogical worker at the main place of work on average over the three previous calendar years.

2. Literature Review. Entrepreneurial activity of Ukrainian HEIs and financing of their scientific activities was studied by a number of scientists: the reasons for the formation of an entrepreneurial university were highlighted (Voronkova & Gurova, 2018); the prospects for the creation and development of entrepreneurial universities in Ukraine are outlined (Durihina, 2021); verification of the Pareto principle was carried out for income from the scientific activity of the HEIs of Ukraine for 2016–2018 (Slav'yuk & Totska, 2021); the current state of funding of scientific activity in Ukraine is determined (Starostina et al., 2018); the financial aspects of the scientific activity of HEIs in the regions of Ukraine were studied and the commercialization of its results was strategized (Totska, 2022); the financing of scientific work in agricultural universities of Ukraine was investigated (Totska, 2023); statistical waves of budgetary funding of education and science in Ukraine was revealed (Totska, 2011). Despite the considerable number of studies on various aspects of the entrepreneurial activity of Ukrainian HEIs and the financing of their scientific activities, with the appearance of new statistical data there is a need for their detailed analysis and monitoring.

3. Methodology. The purpose of this article is to monitor the development of the entrepreneurial activity of Ukrainian HEIs in the scientific sphere based on data on the volume of receipts to the special fund based on the results of scientific activity for 2018–2020 and to formulate proposals for stimulating such activity. In the course of the study, data from the Ministry of Education and Science (hereinafter – MES) of Ukraine were used regarding the results of modeling the formula for the distribution of expenses under the article “Training of personnel of HEIs and ensuring the operation of their practice bases” for

the year 2022 (MES of Ukraine, 2024). The ABC-analysis method was used for the phased (2018, 2019, 2020) distribution of HEIs of Ukraine into three groups:

A – HEIs with a large amount of income from scientific activity (about 80% of the total amount);
B – HEIs with an average level of commercialization of the results of scientific activity (about 15%);

C – HEIs with little or no income from scientific activities (about 5%).

The basis of ABC analysis is the Pareto 20/80 principle, according to which 20% of the causes lead to 80% of the consequences.

Note that the ABC-analysis method was used to diagnose the university's admissions campaign (Totska, 2017, 2018a, 2018b), the ranking of HEIs by the number of winners of the All-Ukrainian Student Olympiad (Totska, 2020).

4. Results. We will monitor the development of the entrepreneurial activity of Ukrainian HEIs in the scientific sphere on the basis of data on the volume of receipts to the special fund based on the results of scientific activity for 2018–2020, since the MES of Ukraine has not yet published more recent data. The obtained results of the ABC analysis are shown in **Table 1**. To save space, intermediate indicators are not shown in it.

Table 1. Distribution of HEIs of Ukraine by receipts to the special fund from scientific activities (Created by the author on the basis of data from the MES of Ukraine (MES of Ukraine, 2024))

| | Name of the HEI | The volume of revenues in 2018, UAH | ABC group | The volume of revenues in 2019, UAH | ABC group | The volume of revenues in 2020, UAH | ABC group |
|----|--|-------------------------------------|-----------|-------------------------------------|-----------|-------------------------------------|-----------|
| 1 | NTU of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" | 35 189 216 | A | 39 701 580 | A | 50 177 647 | A |
| 2 | Lviv Polytechnic NU | 33 260 234 | A | 25 300 562 | A | 43 409 356 | A |
| 3 | Sumy SU | 23 283 130 | A | 17 474 388 | A | 31 878 571 | A |
| 4 | Prydniprovsk State Academy of Civil Engineering and Architecture | 18 111 469 | A | 13 776 467 | A | 7 830 948 | A |
| 5 | Ukrainian SU of Science and Technologies | 13 887 615 | A | 14 871 412 | A | 9 470 974 | A |
| 6 | Ivan Franko NU of Lviv | 13 490 826 | A | 9 666 023 | A | 17 418 344 | A |
| 7 | NTU "Kharkiv Polytechnic Institute" | 12 865 129 | A | 25 045 500 | A | 5 833 663 | A |
| 8 | National Aerospace University "Kharkiv Aviation Institute" | 11 971 643 | A | 3 596 189 | A | 9 233 103 | A |
| 9 | Kryvyi Rih NU | 11 731 899 | A | 14 397 426 | A | 19 369 436 | A |
| 10 | NU of Kyiv-Mohyla Academy | 11 075 909 | A | 8 922 655 | A | 12 468 265 | A |

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|----|---|------------|---|------------|---|------------|---|
| 11 | NU of Life and Environmental Sciences of Ukraine | 10 236 852 | A | 12 913 770 | A | 9 746 133 | A |
| 12 | National Aviation University | 9 307 279 | A | 11 590 986 | A | 12 005 184 | A |
| 13 | V. N. Karazin Kharkiv NU | 8 057 881 | A | 10 856 134 | A | 8 271 343 | A |
| 14 | National Transport University | 7 503 126 | A | 11 691 788 | A | 12 087 100 | A |
| 15 | Kharkiv National Automobile and Highway University | 7 295 944 | A | 7 551 809 | A | 6 796 846 | A |
| 16 | Mykolaiv NAU | 6 865 520 | A | 3 500 676 | B | 5 398 727 | A |
| 17 | Ivano-Frankivsk NTU of Oil and Gas | 6 858 870 | A | 8 688 061 | A | 15 665 327 | A |
| 18 | Kyiv NU of Construction and Architecture | 6 476 240 | A | 6 041 741 | A | 4 820 389 | A |
| 19 | Chernihiv Polytechnic NU | 5 458 682 | A | 2 959 072 | B | 3 270 645 | A |
| 20 | Kyiv NU of Technologies and Design | 5 050 491 | A | 12 333 591 | A | 10 099 707 | A |
| 21 | O. M. Beketov NU of Urban Economy in Kharkiv | 5 035 137 | A | 5 058 318 | A | 5 529 486 | A |
| 22 | Kharkiv NU of Radio Electronics | 4 964 957 | A | 4 393 009 | A | 15 253 798 | A |
| 23 | Odesa State Academy of Civil Engineering and Architecture | 4 422 355 | A | 7 607 674 | A | 6 273 289 | A |
| 24 | Ternopil Ivan Puluj NTU | 4 015 743 | A | 820 817 | C | 845 241 | C |
| 25 | Ukrainian SU of Railway Transport | 3 814 255 | A | 4 146 824 | A | 3 671 648 | A |
| 26 | Dnipro University of Technology | 3 715 545 | A | 4 433 366 | A | 7 495 446 | A |
| 27 | Lutsk NTU | 3 644 017 | A | 1 751 047 | B | 2 624 964 | B |
| 28 | Sumy NAU | 3 376 324 | B | 2 306 946 | B | 2 831 641 | B |
| 29 | Odesa I. I. Mechnikov NU | 3 352 827 | B | 12 728 180 | A | 5 441 681 | A |
| 30 | NU of Water and Environmental Engineering | 3 214 641 | B | 4 272 572 | A | 2 197 783 | B |
| 31 | Dnipro State Agrarian and Economic University | 3 056 548 | B | 2 476 095 | B | 3 239 140 | B |
| 32 | Lesya Ukrainka Volyn NU | 3 013 947 | B | 2 359 147 | B | 4 825 314 | A |
| 33 | Podillia SU | 2 319 919 | B | 2 396 582 | B | 3 506 927 | A |
| 34 | Pryazovskiy STU | 2 229 989 | B | 2 877 828 | B | 2 501 633 | B |
| 35 | The NU of Ostroh Academy | 2 221 324 | B | 595 333 | C | 2 244 206 | B |
| 36 | Vasyl Stefanyk Precarpathian NU | 2 185 900 | B | 1 781 000 | B | 8 797 051 | A |
| 37 | NU "Yuri Kondratyuk Poltava Polytechnic" | 2 153 387 | B | 3 616 048 | A | 2 646 319 | B |
| 38 | Kremenchuk Mykhailo Ostrohradskiy NU | 1 844 091 | B | 769 629 | C | 1 416 529 | B |
| 39 | SU of Intellectual Technologies and Communications | 1 830 933 | B | 2 588 305 | B | 1 080 671 | C |
| 40 | NU "Zaporizhzhia Polytechnic" | 1 828 312 | B | 1 432 040 | B | 1 086 311 | B |
| 41 | Oles Honchar Dnipro NU | 1 803 351 | B | 3 447 223 | B | 1 744 418 | B |
| 42 | Vinnitsia NTU | 1 707 192 | B | 2 644 489 | B | 1 150 137 | B |
| 43 | Mariupol SU | 1 696 191 | B | 1 522 658 | B | 1 248 670 | B |
| 44 | Black Sea NU named after Petro Mohyla | 1 640 995 | B | 2 509 399 | B | 2 085 348 | B |
| 45 | Zaporizhzhia NU | 1 603 567 | B | 2 709 798 | B | 693 539 | C |
| 46 | Ukrainian SU of Chemical Technology | 1 584 786 | B | 2 751 931 | B | 4 143 506 | A |
| 47 | Kharkiv NU of Construction and Architecture | 1 554 770 | B | 945 757 | B | 951 239 | C |

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|----|---|-----------|---|-----------|---|-----------|---|
| 48 | Odesa National Academy of Food Technologies | 1 524 104 | B | 749 916 | C | 1 627 147 | B |
| 49 | Odesa National Maritime University | 1 479 942 | B | 1 091 313 | B | 714 148 | C |
| 50 | Uzhhorod NU | 1 454 246 | B | 1 010 114 | B | 1 908 098 | B |
| 51 | Banking University | 1 384 918 | B | 2 146 119 | B | 1 850 718 | B |
| 52 | Yuriy Fedkovych Chernivtsi NU | 1 237 356 | B | 442 552 | C | 557 764 | C |
| 53 | Ukrainian National Forestry University | 1 079 874 | B | 1 361 394 | B | 3 554 885 | A |
| 54 | Khmelnyskyi NU | 1 036 475 | B | 1 078 589 | B | 1 215 563 | B |
| 55 | West Ukrainian NU | 971 567 | B | 1 163 258 | B | 1 516 484 | B |
| 56 | NU of Food Technologies | 945 112 | B | 567 221 | C | 826 129 | C |
| 57 | SU of Trade and Economics | 920 781 | B | 1 297 143 | B | 1 159 750 | B |
| 58 | Donbas National Academy of Civil Engineering and Architecture | 884 457 | B | 913 469 | B | 2 004 841 | B |
| 59 | Lviv NAU | 816 831 | C | 267 588 | C | 636 397 | C |
| 60 | Vinnitsia Mykhailo Kotsiubynskyi SPU | 809 000 | C | 40 000 | C | 63 960 | C |
| 61 | Simon Kuznets Kharkiv NU of Economics | 789 218 | C | 373 000 | C | 610 215 | C |
| 62 | Vinnitsia NAU | 782 000 | C | 648 658 | C | 4 400 240 | A |
| 63 | Dniprovsky STU | 774 148 | C | 1 092 622 | B | 879 413 | C |
| 64 | Bohdan Khmelnytsky NU of Cherkasy | 766 507 | C | 1 078 156 | B | 1 984 848 | B |
| 65 | Volodymyr Vynnychenko Central Ukrainian SU | 745 437 | C | 634 125 | C | 28 000 | C |
| 66 | State Biotechnological University | 729 186 | C | 800 900 | C | 973 600 | C |
| 67 | Odesa Polytechnic SU | 688 093 | C | 505 885 | C | 2 883 991 | B |
| 68 | NU of Ukraine on Physical Education and Sport | 684 635 | C | 774 458 | C | 224 907 | C |
| 69 | National Pedagogical Dragomanov University | 682 713 | C | 244 277 | C | 588 732 | C |
| 70 | Yaroslav Mudryi National Law University | 681 917 | C | 1 080 888 | B | 983 583 | C |
| 71 | Odesa State Environmental University | 607 941 | C | 594 491 | C | 352 094 | C |
| 72 | Zhytomyr Polytechnic SU | 607 187 | C | 1 581 437 | B | 2 890 818 | B |
| 73 | Ukrainian Engineering Pedagogics Academy | 596 479 | C | 555 818 | C | 560 252 | C |
| 74 | Admiral Makarov NU of Shipbuilding | 591 091 | C | 1 032 677 | B | 647 754 | C |
| 75 | Drohobych Ivan Franko SPU | 550 844 | C | 588 282 | C | 3 236 612 | B |
| 76 | Dmytro Motornyi Tavria State Agrotechnological University | 531 489 | C | 383 772 | C | 926 752 | C |
| 77 | Central Ukrainian NTU | 521 500 | C | 473 300 | C | 106 177 | C |
| 78 | T. H. Shevchenko NU "Chernihiv Colehium" | 425 000 | C | 571 917 | C | 423 934 | C |
| 79 | Bohdan Khmelnytsky Melitopol SPU | 381 002 | C | 83 333 | C | 1 620 957 | B |
| 80 | Kherson State Agrarian and Economic University | 371 537 | C | 477 500 | C | 447 583 | C |
| 81 | Bila Tserkva NAU | 362 355 | C | 869 475 | C | 1 881 500 | B |
| 82 | Uman NU of Horticulture | 360 255 | C | 335 745 | C | 415 101 | C |
| 83 | State Institution "Luhansk Taras Shevchenko NU" | 324 100 | C | 34 | C | 105 296 | C |
| 84 | Ternopil Volodymyr Hnatiuk NPU | 313 268 | C | 110 417 | C | 2 558 279 | B |
| 85 | Volodymyr Dahl East Ukrainian NU | 310 333 | C | 602 667 | C | 369 550 | C |
| 86 | Poltava SAU | 234 855 | C | 434 425 | C | 1 451 745 | B |
| 87 | Sumy Makarenko SPU | 234 554 | C | 181 371 | C | 311 864 | C |
| 88 | Odesa NU of Economics | 231 500 | C | 555 001 | C | 315 784 | C |
| 89 | Kherson SU | 226 283 | C | 734 499 | C | 647 253 | C |

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|-----|--|---------|---|---------|---|-----------|---|
| 90 | NU "Odesa Maritime Academy" | 178 253 | C | 419 797 | C | 1 851 897 | B |
| 91 | Kryvyi Rih SPU | 175 000 | C | 0 | C | 115 310 | C |
| 92 | Donbas State Engineering Academy | 171 621 | C | 409 016 | C | 321 289 | C |
| 93 | Donbas SPU | 156 270 | C | 7 170 | C | 4 040 | C |
| 94 | H. S. Skovoroda Kharkiv NPU | 152 459 | C | 35 700 | C | 9 962 | C |
| 95 | SU of Telecommunications | 142 478 | C | 179 389 | C | 126 936 | C |
| 96 | Donetsk NU of Economics and Trade named after Mykhailo Tugan-Baranovsky | 141 062 | C | 199 000 | C | 369 644 | C |
| 97 | Zhytomyr Ivan Franko SU | 126 291 | C | 9 167 | C | 455 055 | C |
| 98 | Kyiv NEU named after Vadym Hetman | 114 167 | C | 155 610 | C | 333 675 | C |
| 99 | Hryhorii Skovoroda University in Pereiaslav | 111 000 | C | 0 | C | 220 000 | C |
| 100 | Vasyl' Stus Donetsk NU | 104 000 | C | 0 | C | 51 000 | C |
| 101 | SU of Infrastructure and Technologies | 98 800 | C | 195 834 | C | 567 340 | C |
| 102 | Polissia NU | 94 900 | C | 210 000 | C | 679 575 | C |
| 103 | Donetsk NTU | 82 500 | C | 347 200 | C | 441 400 | C |
| 104 | Kherson State Maritime Academy | 79 933 | C | 150 000 | C | 684 621 | C |
| 105 | Kherson NTU | 73 500 | C | 161 917 | C | 1 086 851 | B |
| 106 | Nizhyn Mykola Gogol SU | 67 062 | C | 25 750 | C | 2 000 750 | B |
| 107 | Cherkasy State Technological University | 60 000 | C | 36 000 | C | 66 667 | C |
| 108 | SS of NU of Life and Environmental Sciences of Ukraine "Berezhany Agrotechnical Institute" | 46 224 | C | 197 447 | C | 0 | C |
| 109 | Ukrainian Academy of Printing | 42 500 | C | 0 | C | 287 750 | C |
| 110 | Berdiansk SPU | 11 000 | C | 0 | C | 73 487 | C |
| 111 | Kyiv NU of Culture and Arts | 0 | C | 0 | C | 0 | C |
| 112 | Pavlo Tychyna Uman SPU | 0 | C | 0 | C | 28 458 | C |
| 113 | Stepan Gzhytskyi NU of Veterinary Medicine and Biotechnologies Lviv | 0 | C | 0 | C | 170 990 | C |
| 114 | Rivne SU of the Humanities | 0 | C | 0 | C | 0 | C |
| 115 | NU "Odesa Law Academy" | 0 | C | 4 000 | C | 2 924 202 | B |
| 116 | Lviv SU of Physical Culture named after Ivan Boberskyj | 0 | C | 0 | C | 0 | C |
| 117 | Kamianets-Podilskyi Ivan Ohienko NU | 0 | C | 0 | C | 25 000 | C |
| 118 | Poltava V. G. Korolenko NPU | 0 | C | 338 371 | C | 871 152 | C |
| 119 | South Ukrainian NPU named after K. D. Ushynsky | 0 | C | 0 | C | 220 337 | C |
| 120 | Flight Academy of the National Aviation University | 0 | C | 0 | C | 0 | C |
| 121 | Kharkiv State Academy of Physical Culture | 0 | C | 0 | C | 0 | C |
| 122 | Kyiv National Linguistic University | 0 | C | 0 | C | 0 | C |
| 123 | Oleksandr Dovzhenko Hlukhiv NPU | 0 | C | 33 333 | C | 91 683 | C |
| 124 | V. I. Vernadsky Taurida NU | 0 | C | 0 | C | 0 | C |
| 125 | University of Customs and Finance | 0 | C | 0 | C | 0 | C |
| 126 | V. O. Sukhomlynskyi Mykolaiv NU | 0 | C | 57 000 | C | 835 880 | C |
| 127 | Odesa SAU | 0 | C | 0 | C | 135 833 | C |
| 128 | Prydniprovsk State Academy of Physical Culture and Sport | 0 | C | 0 | C | 0 | C |
| 129 | Mukachevo SU | 0 | C | 0 | C | 50 901 | C |
| 130 | Horlivka Institute for Foreign Languages of the State HEI "Donbas SPU" | 0 | C | 0 | C | 1 859 586 | B |
| 131 | Izmail SU of Humanities | 0 | C | 0 | C | 2 012 978 | B |

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|-----|---|---|---|---|---|---------|---|
| 132 | Luhansk NAU | 0 | C | 0 | C | 0 | C |
| 133 | SU of Economics and Tehnology | 0 | C | 0 | C | 0 | C |
| 134 | SS of NU of Life and Environmental Sciences of Ukraine "Nizhyn Agrotechnical Institute" | 0 | C | 0 | C | 240 000 | C |
| 135 | Vinnytsia ITE of State UTE | 0 | C | 0 | C | 0 | C |
| 136 | Azov Maritime Institute of NU "Odessa Maritime Academy" | 0 | C | 0 | C | 0 | C |
| 137 | Chernivtsi ITE of State UTE | 0 | C | 0 | C | 0 | C |
| 138 | Uzhgorod ITE of State UTE | 0 | C | 0 | C | 0 | C |

Note: ITE – Institute of Trade and Economics, NAU – National Agrarian University, NEU – National Economic University, NPU – National Pedagogical University, NTU – National Technical University, NU – National University, SAU – State Agrarian University, SPU – State Pedagogical University, SS – Separated Subdivision, STU – State Technical University, SU – State University, UTE – University of Trade and Economics

Note that the official Ukrainian hryvnia exchange rate (average for the period) in the analyzed period was as follows:

2018: USD 100 = UAH 2,720.05;

2019: USD 100 = UAH 2,584.56;

2020: 1 US dollar = 26.96 UAH (National Bank of Ukraine, 2024).

As you can see, according to the data of 2018, group A included 27 HEIs of Ukraine, which earned from 3.644 to 35.189 million UAH based on the results of scientific activity. The top three HEIs-leaders with revenues of more than UAH 23 million look like this:

- 1) NTU of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute";
- 2) Lviv Polytechnic NU;
- 3) Sumy State University.

Note that the accumulated revenue share of 27 HEIs in group A totaled 79.08%.

Group B included 31 HEIs of Ukraine with the amount of income to the special fund based on the results of scientific and scientific and technical works from 0.884 to 3.376 million UAH. Their contribution to the total amount of income was 15.71%. The difference between the lower income position in group A (3.644 million UAH) and the upper position in group B (3.376 million UAH) amounted to 268 thousand UAH.

Group C included the remaining 80 HEIs of Ukraine, in which income from scientific activities did not exceed UAH 817,000 or was absent. The share of the income of the HEIs of this group in the total amount was 5.21%. The difference between the lower position of income in group B (884 thousand UAH) and the upper position in group C (817 thousand UAH) amounted to approximately 68 thousand UAH.

The resulting indicators of the ABC-analysis for 2018 by individual groups of HEIs are shown in **Fig. 1**.

| Group of HEIs | Number of HEIs | Share of HEIs, % | The volume of revenues in 2018, million UAH | Revenue share, % |
|---------------|----------------|------------------|---|------------------|
| A | 27 | 19.57 | 287.590 | 79.08 |
| B | 31 | 22.46 | 57.138 | 15.71 |
| C | 80 | 57.97 | 18.960 | 5.21 |
| Together | 138 | 100.00 | 363.688 | 100.00 |

Figure 1. The resulting indicators of the ABC-analysis of the HEIs of Ukraine by receipts to the special fund from scientific activities in 2018 (Compiled by the author on the basis of Table 1)

So, in 2018, approximately 20% of Ukrainian HEIs provided 79% of total revenues to the special fund from scientific activities. The distribution of the sums earned by the HEIs ranged from UAH 11,000 to UAH 35.189 million, and the ratio between these sums was 3,199 times. In addition, 28 HEIs (20.29%) did not provide paid scientific services in the analyzed period.

According to 2019 data, group A included one HEI less than in the previous period – 26. According to the results of their scientific activities, they earned from UAH 3.596 to 39.702 million. The top three HEIs with revenues of more than UAH 25 million have changed somewhat: NTU “Kharkiv Polytechnic Institute” joined NTU of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute” and Lviv Polytechnic NU. Note that the accumulated share of income of 26 HEIs of this group in the total amount amounted to 79.43%.

Group B included the same number of HEIs as in the previous period – 31. The amount of their income to the special fund based on the results of scientific and scientific and technical works was from 0.913 to 3.501 million UAH. Their contribution to the total amount of income was 15.56%. The difference between the lower income position in group A (3.596 million UAH) and the upper position in group B (3.501 million UAH) amounted to approximately 96 thousand UAH.

Group C included the remaining 81 HEIs of Ukraine, in which income from scientific activities did not exceed UAH 870,000 or was absent. The share of the income of the HEIs of this group in the total amount was 5.01%. The difference between the lower position of income in group B (913 thousand UAH) and the upper position in group C (869 thousand UAH) amounted to 44 thousand UAH.

The resulting indicators of the ABC-analysis for 2019 by individual groups of HEIs are shown in **Fig. 2**.

| Group of HEIs | Number of HEIs | Share of HEIs, % | The volume of revenues in 2019, million UAH | Revenue share, % |
|---------------|----------------|------------------|---|------------------|
| A | 26 | 18.84 | 300.676 | 79.43 |
| B | 31 | 22.46 | 58.887 | 15.56 |
| C | 81 | 58.70 | 18.958 | 5.01 |
| Together | 138 | 100.00 | 378.522 | 100.00 |

Figure 2. The resulting indicators of the ABC-analysis of the HEIs of Ukraine by receipts to the special fund from scientific activities in 2019 (Compiled by the author on the basis of Table 1)

So, in 2019, approximately 19% of Ukrainian HEIs provided 79% of total revenues to the special fund from scientific activities. The distribution of the sums earned by the HEIs ranged from UAH 34 to UAH 39.702 million, and the ratio between these sums was 1,167,701 times. 29 HEIs (21.01%) did not provide paid scientific services in 2019.

According to 2020 data, group A included more HEIs than in previous years, – 32. According to the results of their scientific activities, they earned from UAH 3.271 to 50.178 million. The top three HEIs with revenues of more than UAH 31 million were the same as in 2018: NTU of Ukraine “Ihor Sikorskyi Kyiv Polytechnic Institute”, Lviv Polytechnic NU, Sumy State University. Note that the accumulated share of income of 32 HEIs of this group in the total amount was 79.95%.

Group B included 34 HEIs, the volume of which revenues to the special fund based on the results of scientific and scientific and technical works amounted to UAH 1.086 to 3.239 million. Their contribution to the total amount of income was 14.89%. The difference between the lower income position in group A (3.271 million UAH) and the upper position in group B (3.239 million UAH) amounted to 32 thousand UAH.

Group C included the remaining 72 HEIs of Ukraine, in which income from scientific activities did not exceed UAH 1.081 million or was absent. The share of the income of the HEIs of this group in the total amount was 5.16%. The difference between the lower position of income in group B (1.086 million UAH) and the upper position in group C (1.081 million UAH) amounted to approximately 6 thousand UAH.

The resulting indicators of the ABC-analysis for 2020 by individual groups of HEIs are shown in **Fig. 3**.

| Group of HEIs | Number of HEIs | Share of HEIs, % | The volume of revenues in 2020, million UAH | Revenue share, % |
|---------------|----------------|------------------|---|------------------|
| A | 32 | 23.19 | 368.145 | 79.95 |
| B | 34 | 24.64 | 68.545 | 14.89 |
| C | 72 | 52.17 | 23.765 | 5.16 |
| Together | 138 | 100.00 | 460.455 | 100.00 |

Figure 3. The resulting indicators of the ABC-analysis of the HEIs of Ukraine by receipts to the special fund from scientific activities in 2020 (Compiled by the author on the basis of Table 1)

So, in 2020, 23% of Ukrainian HEIs provided almost 80% of the total revenues to the special fund from scientific activities. The distribution of the sums earned by the HEIs ranged from UAH 4,000 to UAH 50.178 million, and the ratio between these sums was 12,420 times. 16 HEIs (11.59%) did not provide paid scientific services in the analyzed period. Note that this number has significantly decreased compared to previous years.

As can be seen from **Table 1**, in 2018–2020, 99 HEIs of Ukraine consistently fell into the same groups in terms of the amount of income to the special fund from scientific activities, 21 HEIs increased their positions (both smoothly and by leaps and bounds), 8 HEIs – on the contrary, they decreased, and no trends were detected for 10 HEIs. This is shown in detail in **Fig. 4–5**. Please note that there are no positions with a sequential increase (group C → group B → group A) and a sequential decrease (group A → group B → group C) of the HEIs.

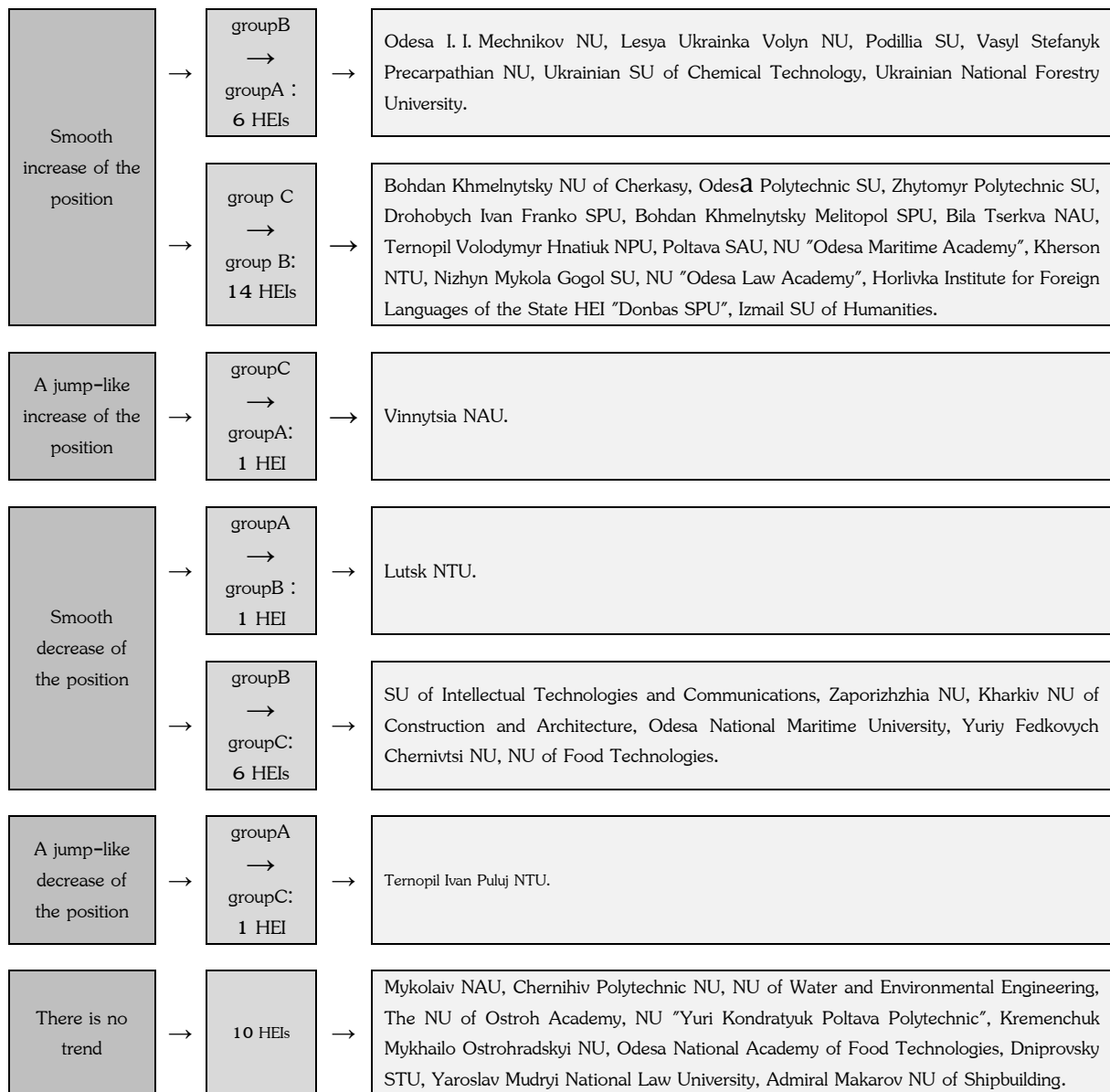


Figure 4. HEIs of Ukraine with a variable position in 2018–2020 in terms of income to the special fund from scientific activities (Compiled by the author on the basis of Table 1)



Figure 5. HEIs of Ukraine with a stable position in 2018–2020 in terms of revenues to the special fund from scientific activities (Compiled by the author on the basis of Table 1)

5. Conclusions. So, in the analyzed period, a gradual increase in the results of entrepreneurial activity in the scientific field of 138 state Ukrainian HEIs was observed: the revenues of HEIs first increased from UAH 363.688 million in 2018 to UAH 378.522 million in 2019, and then to UAH 460.455 million in 2020. However, a significant share of these revenues ($\approx 79-80\%$) was the receipt of approximately one-fifth of the HEIs: 19.57% in 2018, 18.84% in 2019, and 23.19% in 2020. The closest to proof of the 20/80 Pareto principle, was 2018, when the ratio of indicators of HEIs and their incomes was 20/79. Then the proportions began to move away from the reference value: 19/79 in 2019, 23/80 in 2020.

During the analyzed period, 15 HEIs did not receive funds from scientific activities at all. This is evidence of the low activity of Ukrainian institutes, academies and universities in the direction of commercialization of the results of scientific and scientific and technical works under international cooperation projects, economic contracts and the results of the provision of scientific services.

In view of the obtained results, it will be appropriate for Ukrainian HEIs to continue external stimulation of such activities by the MES of Ukraine, as well as internally – for example, rating stimulation by the management of HEIs of teachers to such activities. In addition, it will be positive to learn from the experience of HEIs-leaders, to borrow international experience, as well as to form special units of HEIs, which will carry out work on the commercialization of the results of scientific work.

We see further directions of research in the study of the experience of Ukrainian HEIs regarding the rating stimulation of teachers for entrepreneurial activity in the scientific field. It would also be interesting to compare the obtained data of state HEIs with indicators of entrepreneurial activity in the field of science of private HEIs of Ukraine.

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