

International Cooperation of Ukraine: Barriers on the Way to Equal Integration

LIDIYA KAVUNENKO,

TATYANA GONCHAROVA

G.M.Dobrov Center for S&T Potential and Science History Studies of the National Academy of Sciences of Ukraine, 60 Shevchenko blvd., 02032, Kiev-32, Ukraine;

e-mail: steps@carrier.kiev.ua

Abstracts

For each nation, international scientific cooperation (ISC) is an imperative for integration into the international scientific community, a measure of contribution in the global stock of knowledge and an indication of progress. However, ISC in Ukraine had to face several significant barriers: financial, due to socio-economic transformations accompanied by severe financial crisis, that, however, led to building up the model of cost-ineffective market economy in Ukraine, insensitive to R&D and innovation; informational, related with shortage of funds for information supply to national R&D performers; motivational, as the standard international criterion for the R&D performance assessment, publications and reviews in distinguished international scientific journals, is not adopted in Ukraine for the R&D performance assessment. Due to these barriers, integration of the Ukrainian R&D into the international research community has been, by far, uneven, unequal and, consequently, inefficient.

1. Introduction

International scientific cooperation (ISC) is now admitted as an imperative for integration of a nation into the international scientific community, a measure of the nation's contribution in increasing the global stock of knowledge, and a rapid pace of ISC is usually regarded as an indication of its progress.

We define ISC as physical participation of researchers in international actions (projects) associated with production, diffusion and utilization of scientific knowledge, irrespective of their funding sources and profitability (non-profitability), as well as their participation in international flows of scientific information as either information producers or receivers.

We have analyzed barriers for equitable ISC of Ukraine on the basis of both official statistical sources and other sources (survey and expert interviews at the institutes of the National Academy of Sciences (NAS) of Ukraine NAS on line of the project: "Performance and Prospects of the NAS of Ukraine" (performed in 2003-2004); review of materials in mass media.

2. Methodological approach

We do not confine our approach to ISC to joint R&D efforts in or contributions in the world-wide knowledge base, but also regard it as a factor increasing the well-off of a collaborating nation. Following this approach, joint R&D effort and, thereby, linking the national R&D to

the outside area (European or world-wide) will be the first link in the chain: ISC _ integration of the national science into the world (European) research area _ innovation-driven restructuring of the national economy _ up-grading the national economy's competitiveness _ GDP growth due to the growing share high tech products _ growing national welfare. This chain is not a linear one, but implying a feedback between all the links.

Also, ISC, as any other social process, can be described and measured by use of parameters reflecting its resources, scales, dynamics, efficiency and factors that are external to ISC.

We define *ISC resources* as the stock of scientific knowledge accumulated in a country, and not any knowledge, but the one which will draw interest on the international research community's side, and the inputs required to produce new knowledge, and not any, but the one that will be demanded by the international research community. *ISC scopes, dynamics and efficiency* can be described by parameters of the involved financial, human, informational flows. *Factors of the external environment* are described by a broader range of data reflecting sensibility (insensibility) of this environment to ISC results and, accordingly, its friendliness or enmity to ISC, erecting barriers for it. *Barriers to ISC* are referred to as ones hindering participation in ISC at the level of individual ("average statistical") researcher, research team, research unit (institution), irrespective of funding sources (either from the central budget or from other sources).

To identify *barriers* for ISC in Ukraine, the above mentioned chain "ISC _ ... _ increasing the nation's well-off" should be looked at in the Ukraine's and world-wide context.

But to begin with, socio-economic liberalization and transformations reaching out the Ukrainian R&D changed ISC in Ukraine in the following terms:

(i) Institutional. Unlike in the USSR, ISC in post-soviet Ukraine could benefit from liberalization: agreements or contracts on ISC could be concluded at every level and by every corporate entity and physical person. As regards ISC on line of EU programs for ISC (TACIS, INTAS etc.), Ukrainian researchers became involved in nearly each one of the five funded projects.

(ii) Geographical. While ISC geography in the USSR was confined mainly to the Council for Mutual Economic Assistance (other cases included the UNESCO line, ISC contacts with the West being rare), ISC in post-soviet Ukraine reached out the whole world.

3. Results

To proceed with analyzing barriers, the first link in the above chain is "ISC _ integration of the Ukrainian R&D in the world-wide (European) research area". Existence of this chain in Ukraine can be proved by key data on R&D funding by sources: funds from abroad for Ukrainian R&D grew twofold over the last 10 years (from 15.6% in 1995 to 26.2% in 2003, although decreased to 23.3% in 2004). These data lead to the conclusion about high scopes and rates of international integration of the Ukrainian R&D.

However, such intensive integration due to the high share of foreign funds for the national R&D is an outward consequence of the reducing share of budgetary appropriations on R&D and R&D expenditures in the national GDP (see Table 1). This tendency could be excused in the first decade of the Ukrainian independence, when the country experienced systemic transformations. But it looks alarming after 2000, when basic market institutions were already established in Ukraine, its economy recovered and started to grow up. (Note, that the dynamics of both *Budgetary appropriations for R&D* and *R&D expenditures in GDP*

remained volatile after 2000, not featuring an explicit upward tendency. But another assumption is the series after 2000 are too short to make sound conclusions.)

Table 1: R&D expenditures in Ukraine

	1990	1992	1994	1996	1998	1999	2000	2001	2002	2003	2004
<i>Budgetary appropriations for R&D (%)</i>	2,3	0,82	0,41	0,57	0,31	0,22	0,28	0,37	0,27	0.40	0.44
<i>R&D expenditures in GDP (%)</i>	3,11	1,54	1,4	1,16	1,21	1,22	1,14	1,19	1,16	1.35	1.37

Source: Official Statistical Data issued by the Ukrainian State Statistics Committee.

It follows from Table 1 that although market economy has become a reality in Ukraine, factors determining its growth remained the same as they used to be in times of the soviet planned and administrative economy: cheap energy, material and human resources, against extremely low innovation activity at industrial enterprises. This can be shown by several indicators:

(i) The share of completed R&D in GDP: 0.75% in 1991 (the eve of the Ukrainian independence); 0.31% in 1995 (transformations period); 0.38% in 2000, 0.30% in 2002, 0.20% in 2003, 0.20% in 2004, e.g. a downward tendency even in the period of economic recover and growth.

(ii) The share of industrial enterprises introducing innovations: while in 1995 (transformations period) their share was 22.9% of the total number of surveyed enterprises, by the period of economic growth it further reduced and in 2000-2004 featured a volatile tendency: 14.8% in 2000; 14.3% in 2001; 14,6% in 2002, 15.1% in 2003, 13.7% in 2004.

As can be seen, *the model of cost-ineffective market economy* established in post-soviet Ukraine, along with the relevant *social, political etc. environment*, which are insensitive to R&D. Being as such and not featuring an effective customer demand for R&D and, hence, not allocating the required sources in R&D (including sources required for ISC), this economy and its environment can only encourage the national R&D to ISC by way of “pushing” it to the outer area. Due to lack of the effective demand for R&D in the whole and for ISC in particular, the chain “ISC _ ... _ increasing national well-off” breaks as early as after the first link, e.g. after “integration of the national R&D in the world-wide (European) research area”. Furthermore, the final link in this chain, e.g. “increasing well-off” cannot be implemented [1, P.15].

The aforementioned implies that *the model of cost-ineffective market economy tends to establish specific stimuli for ISC, stemming from financial barrier to R&D inside the country. But, at the same time, this financial barrier becomes a barrier for the ISC efficiency and performance.*

As regards the sources required for ISC, according to experts, Ukrainian researchers have it. For example: “... even in unfavorable conditions in which our science exists, researchers achieve good results of a world-wide level... In informatics field, a new model of neuron associative memory has been designed, which is used to design a national neuron computer. Researchers in mechanics field have designed a basically new technology for underground cleansing from gases... Works by national astronomers... are highly merited... Researchers in material science were first in the world practice to design a technology for welding thick

pipes by pressure, with heating by electric arch controlled by magnetic field [2, P.18]; Ukraine still keeps leading positions in spacecraft, aircraft, dual use technologies, in production of new materials, welding technologies [3].

However, as far as resources required to produce new knowledge and organize ISC are concerned, “the share of equipment with utilization term of 11-20 years exceeds 20% in the institutes of the NAS of Ukraine, while the rate of R&D funding per researcher in the NAS of Ukraine is 5% of the average European one. Such condition with research facilities does not only stem from qualitative cut of the research funding, but also from restructuring of expenditures by expenditure category. The share of salary in the NAS of Ukraine has grown from 50% to 60% since 1993, followed by overheads on premises maintenance and utility services (more than 20%). And the rest are expenditures for performing R&D and equipment renovation (although the required share must account for 20% of the total expenditures)”[4, P.13].

If the economic environment fails to provide sufficient resources for R&D and for ISC in particular, *it's true* that it will fail to identify *priorities, conditions, scopes* and *symmetry* for ISC. (Note that as follows from an analysis of researcher's trips abroad by funding source, 80% of trips are funded by a hosting party, e.g. from abroad. In fact, only 8% of trips are funded by Ukrainian research institutions).

The conditions for ISC when the internal economic environment fails to provide sufficient resources for R&D can be shown by the following example. At early 90s, a basically new funding source such as individual and team international grants appeared in Ukraine (from Soros, INTAS, NATO foundations). Individual grants from Soros foundation amounted 500 \$ (and were not covered by the official statistical records), and used to be spent as the receiver's salary only. They played a role in sustaining researchers' living condition, but they also had their back side, mentioned by respondents in the sociological study [5, P.69]: “Work on line of various foundations will have negative consequences for us in future. We... give out very cheaply our ideas and the most important that we possess, our intellectual potential. But we receive miserable sums in return. This should be put to the end”; “This idea... is not well-conceived [by the state]. Because our researchers had to give all the best they had had in their possession with this earliest inflow of grants...” [5].

It can be said that *the parallel effect of the two factors* predetermined the nature of ISC in post-soviet Ukraine (as across the post-soviet region): *liberalization which benefits ISC, and financial deficit which seemingly hampered it. But, actually, the latter factor had a dual effect on ISC: an upward tendency, on the one hand, and a strong dependence of ISC on foreign sources and, therefore, insignificant scopes of ISC and its uneven distribution across the national R&D.*

Besides data on foreign R&D funding, an upward quantitative dynamics of ISC in Ukraine is proved by official statistical data on several other indicators (see Table 3).

Table 3: Dynamic of quantitative indicators on ISC in Ukraine

Indicator	1997	2000	2003	2004
Number of trips abroad	11686	15085	18289	19100
Number of international conferences held in Ukraine	825	1031	1525	1636
Number of grants from international foundations	1161	1138	1428	1427
Number of those working on contracts in foreign R&D institutions	418	565	652	448

As shown by Table 3, the number of foreign trips grew by nearly 40% in 1997-2004; the number of grants per researcher grew by nearly 20%, although stabilized in the latest period.

As for the scopes of ISC in Ukraine, they featured a rapid increase in 90s and stabilized in parallel with economic recovering (see Table 4), although remaining very low.

Table 4: Dynamics of ISC per researcher in Ukraine

Indicator	1997	2000	2003	2004
Number of trips abroad	0,082	0,169	0,218	0,223
Number of international conferences held in Ukraine	0,006	0,012	0,018	0,019
Number of grants from international foundations	0,008	0,013	0,017	0,017
Number of those working on contracts in foreign R&D institutions	0,003	0,006	0,008	0,005

On the other hand, correlation between the ISC scopes and financial deficit can be judged by respondent data from the sociological study [6] (referred to hereinafter as sociological study 2003-2004): financial constraints (along with other options, which details will be given below) were referred to as a barrier for ISC by 88.2% of department heads and 90.2% of researchers.

Hence, ISC still by far and large remains a means for “survival” of R&D in Ukraine, which is also confirmed by experts’ opinions. The role of ISC for the NAS of Ukraine is judged as follows: “The Ukrainian Academy of Sciences still retains the necessary level, mainly due to the international S&T cooperation and international grants, thanks to highly qualified, although ageing, staff, and good traditions of research work...” [7, P.9-10]. “Up-to-date achievements by basic science in Ukraine is a result of the exhaustive labor of the NAS researchers... Part of this success comes from foreign sponsorship for joint research projects... and special courses graduated by young Ukrainian researchers abroad...” [8, P.59]. “... in fact, a large part of Ukrainian researchers, remaining in the staff roll of their institutes, do works for foreign firms and organizations” [8, P.70].

Experts’ opinions about the significance of ISC for renovation of research facilities at the NAS of Ukraine are confirmed by data obtained in the sociological study 2003-2004. Foreign grants, transfer of equipment by foreign organizations and use of equipment at foreign research organizations were referred to as sources for the equipment supply by 30.3%, 10.1% and 13.5% of respondents (total 53.9%). And this total is nearly the same as the total of respondents who referred to Ukrainian grants from the central budget (28.1%), Ukrainian national programs (10.1%) and contracts from Ukrainian ministries and administrative departments (15.7%). Yet, contracts from enterprises were referred to by only 13.6% of respondents.¹

Besides this, financial barrier for ISC, arising due to the shortage of funds required for ISC, on the one hand, and streamlining researchers’ effort on its overcoming, on the other, entailed stratification in the researchers’ community on the basis of criteria unknown by the

¹ There may come an objection that the data concern the Academy of Sciences only, which is involved in basic research and has no large-scale cooperation with enterprises. But the Academy in post-soviet Ukraine does not differ from the soviet Academy functionally or institutionally. That is, the Academy is still a governmental ministry having a large number of research institutions with a technological profile. Note that all the technological institutions have been kept within the Academy by now. The only distinction is that the post-soviet Academy can freely cooperate with business sector.

soviet science. These criteria, although associated with ISC, are not always linked to researchers' R&D performance or the demand for their results from the international research community.

Also, financial barriers for ISC tend to erect information barriers. We give below an expert's opinion: "... To produce new knowledge, one needs to have information... firsthand. This implies systematic, full and constant access to Western sources... Annual subscription to a foreign journal costs around 1,000 \$, while the price of a book is more than 200 \$. As for me, to keep doing research, I need annual access to two dozens of journals and a dozen of new scientific books... My institute that spends as much as 2,000 GRN [about 400 \$] on purchase of literature per year, is not able to offer me this access, and my annual salary is tenfold lower than the minimal cost of the literature that I need. The amount of new national and foreign research literature coming to the Central Research Library of the National Academy of Sciences (NAS) of Ukraine, is thousands fold smaller than the amount available at a peripheral library in the West.

Reliance on Internet frequently voiced in high governmental offices responsible for R&D and education prove that their hopes on Internet as a main source of research information is but void. [By use of it] bibliographic information can be received... But extraction of information will cost 20 or 30 \$ per research paper. It's true... that representatives from several fields (biology and medicine) from countries with smaller than 1,000 \$ per capita GDP (and Ukraine is one of them) have the possibility for free access... Of course,... one can ask foreign authors for copies of their papers, but in case of monographs, in view of their prices, this becomes ethically impossible" [9, P.11-12].

The expert proceeds stating that science of science points out to a phenomenon such as washing out of most of the Ukrainian researchers (e.g. "average statistical researcher") from information mainstream flows: not having sufficient information, they fail to be not only active agents in advancement of the world science, but even its passive watchers. And rare exceptions are but confirm this sad tendency.

We are going to check this opinion on the basis of respondent data from the sociological study 2003-2004. Note that our expert works in the Institute for Philosophy of the NAS of Ukraine, e.g. in an organization of "modest means" in terms of its incapability to earn money by commercial contracts (recall, that Ukrainian R&D receives very small scopes of international grants, and grant scheme of funding as such has a too minor role: according to the official statistics, the share of grants on line of the central budget didn't exceed 1% in the total R&D expenditures, while private national R&D foundations do not exist in Ukraine).

Respondents were asked to give details about shortage of resources required for their R&D (material and informational). Only 1.9% of dept heads and 11.4% of researchers informed that they had everything required. But 50% of dept heads and 48.3% of researchers informed they had all kinds of shortages (e.g. both information and material facilities). And note that the same share of dept heads and 48.3% of researchers informed about shortage of experimental materials. A larger share of respondents only occurred when it came to the shortage in equipment and devices (63.9% dept heads and 58.5% researchers). And, importantly, in the section of social sciences and humanities (SSH), where other-than-material resource (e.g. information) is the prevailing (if not the only) means for doing R&D, its shortage was referred to by about 73% department heads and 73% researchers.

Also, respondents were offered to indicate barriers for up-grading qualification, which options included information supply. This barrier was indicated by 26.5% of researchers and 18.5% of dept heads (36.2% of researchers in SSH section). As such, this share won't appear too large. But when compared with shares on other kinds of barriers, it ranks second after insufficient funding, being far behind it (63% of researchers and 57.7% of dept heads). As for

the other kinds of barriers, the share of their references was much smaller than the reference on information shortage: reference to the poor qualification of colleagues didn't exceed 3% of researchers, references on slack communications with foreign colleagues didn't exceed 6%, other factors were indicated by about 7%.

But can the motivation aspect be regarded as a barrier for ISC? To have an answer, we are going to address data about barriers for ISC, obtained from respondents in the sociological study. Respondents could give several options (see Table 5).

Table 5: Barriers for ISC, % of respondents

Options	PEM*		CB**		SSH***		Average	
	DH	R	DH	R	DH	R	DH	R
Language	32.0	34.5	38.0	38.0	50.0	45.5	37.3	37.5
Funding	92.0	89.5	85.0	88.4	83.3	95.5	88.2	90.2
Mutual distrust	8.0	8.0	5.9	-	-	7.6	5.9	5.4
Poor R&D performance	6.0	10.0	5.9	15.7	5.6	3.0	5.9	10.6
Underrating of Ukrainian R&D	38.0	32.0	44.1	41.3	50.0	31.8	42.2	34.9
Inaccessibility to Ukrainian periodicals abroad	38.0	44.0	38.2	63.6	72.2	42.4	44.1	49.9

*PEM – physics & engineering & mathematics section

**CB – chemistry & biology section

***SSH – social sciences & humanities section

(DH-department heads, R-researchers)

Our analysis will cover all the barriers except for financial ones. We will try to prove that several other significant barriers arise from the above mentioned approach to the R&D performance assessment. Note, that respondents give high self-assessment of their performance (only about 10% of respondents believe that their performance doesn't meet international criteria). As a consequence, respondents tend to blame the foreign party for inadequate ISC, emphasizing that the foreign party underrates their R&D performance, especially due to inaccessibility of Ukrainian scientific periodicals abroad (but why to make their translations when its accessibility to foreign colleagues, meaning its appraisal and rating by them, is not of the criteria for the R&D performance assessment in Ukraine). Although another, smaller, part of the blame, but anyway large, respondents take on themselves (more than 37% of respondents), by acknowledging their poor language proficiency. But, once and again, the situation with knowledge proficiency is a consequence of the approach to the R&D performance assessment: one knows a foreign language only when one uses it. So, according to respondent data, other-than-financial barriers appear mainly due to the above criterion for the R&D performance assessment, applied in Ukraine.

It's surprising that the largest variation between judgments by researchers and dept heads is found for only two barriers: R&D performance and underrating of Ukrainian R&D. Department heads (DH) better judge their own results and put more blame on the foreign party for the inadequacy of ISC, while with researchers everything is vice versa (5.9% and 42.2% by DH, against 10.6% and 33.9% by researchers). It can be assumed that researchers tend to have a better awareness (conscious or not) of the inadequacy of the criteria applied in Ukraine for the R&D performance assessment, while dept heads are more inclined to view

these criteria as normal. Hence, research administrators in the Ukrainian R&D seem to be more conservative than line researchers.

Now we are going to look at variations in researchers' judgment by disciplinary section. First and foremost, SSH section features a distinctive tendency: its researchers assess own R&D performance several fold higher than others (only 3% of researchers in SSH section believe it's poor, against 10.0% and 15.7% researchers in PEM and CB sections). Second, there's a too large variation for "underrating of the Ukrainian R&D" between researchers and dept heads within SSH section (about 20 percentage points). And note that while researchers in this section give the least criticizing judgment in respect of the foreign party, the situation with dept heads is vice versa. The reason why this section features such variations requires an additional study. As much as surprising is a strong by section variation between judgments for "inaccessibility of Ukrainian scientific periodicals": while in the sections related with natural sciences, they are regarded as the least accessible by researchers (especially in CB section), whereas in SSH they are regarded as the least accessible by dept heads. (Here's an expert's opinion: "As far as I know, neither of journals on social sciences is translated into English, and the number of translated academic journals² does not exceed ten. This means that works by Ukrainian social researchers do not become subject to publicity" [9, P.13].

Also, emphasis should be put on high estimates given by department heads in SSH section for language barrier (50.0% against average 37.3%), underrating of the Ukrainian R&D (50% against average 42.2%) and inaccessibility of Ukrainian scientific periodicals (72.2% against average 44.1%). Such considerable deviations of estimates given by department heads in SHH section from averages derived for these barriers may indicate the existence of stronger barriers for ISC for this section, and not only in terms of publications in distinguished international journals, but also in conveying their information to foreign consumers of scientific knowledge.

To check the last statement, we are going to look at respondent data about average number of monographs per research department and average number of research papers per research department over 1998-2002 (see Tables 6 and 7).

Table 6: Average number of monographs per research department for period 1998-2002, according to respondents' data

Section	Ukraine	NIS	Other countries
PEM*	2.08	1.33	1.8
CB**	3.14	1.25	2.5
SSH***	9.25	1.67	2.0
Average	4.27	1.40	2.1

*PEM – physics & engineering & mathematics section

**CB – chemistry & biology section

***SSH – social sciences & humanities section

Table 7: Average number of monographs per research department, according to respondents' data for period 1998-2002

Section	Ukraine	NIS	Other countries
PEM*	47.75	14.26	25.6
CB**	45.82	13.31	18.07

² E.g. scientific journals on other, mostly natural science, disciplines.

SSH***	122.73	5.38	13.0
Average	58.24	12.78	21.0

*PEM – physics & engineering & mathematics section

**CB – chemistry & biology section

***SSH – social sciences & humanities section

Low level of publication activity for the NIS can be explained by shrinking ISC with them due to factors related with breakdown of the USSR and further tendencies, as well as with intentional re-focus of the publication activity on other-than-NIS countries. Such tendency in respect of publications in the NIS is unlikely to have a positive effect; moreover, publications in ISC do not face language barrier, and if they had been encouraged they could have become a basis for barter exchange in the least and could contribute in the renewal of library stocks.

As regards publication activity in other countries, we are going to calculate the ratio of publication activity in other countries for monographs, by dividing the number of monographs published by research department in other countries by the total number of monographs published by research department. By the overall publication activity, SSH section leads (12.92 published monographs per research department in 1998-2002), followed by CB section (6.89) and PEM section (5.21). However, the publication activity of SSH section in other countries is more than twice lower than in PEM and CB sections (0.15; 0.35 and 0.36, respectively).

As regards research papers, SSH section is also ahead by the number of papers (141.1, against 87.61 and 77.2 for PEM and CB sections). But publication activity in other countries for SSH section is more than thrice lower than for PEM section (0.09 and 0.29, respectively), and more than 2.5 lower, than in CB section (0.09 and 0.23). To confirm the high publication activity abroad for PEM section, we are going to cite expert data: “Leading foreign publishers have printed about 40 monographs of Ukrainian mathematicians over the latest five years. In 2004, each two of the three works by the Institute for Theoretical Physics were published in distinguished international journals. In several institutes performing mainly experimental research, this indicator makes about 50% per year” [10] And, on the contrary: “... as far as I know, since 1991 only two monographic works on philosophy [expert gives names of the Ukrainian authors] were published in the West” [9, P.13].

So, part of the information produced on a more regular basis (e.g. research papers), is even more focused on internal consumption in SSH section than in the other sections. As regards the number of reports at conferences in Ukraine, the NIS and other countries, their distribution looks as follow (see Table 8):

Table 8: Average number of reports at conferences per research department, according to respondents

Section	Ukraine	NIS	Other countries
PEM*	28.33	12.16	25.6
CB**	26.29	12.45	18.07
SSH***	53.85	5.00	13.00
Average	31.06	11.55	18.66

*PEM – physics & engineering & mathematics section

**CB – chemistry & biology section

***SSH – social sciences & humanities section

Note that SSH section has much smaller scopes of ISC with the NIS by all the above indicators, e.g. both categories of publications and especially reports at conferences. Such

situation looks very odd, especially due to, first and foremost, a greater significance of language in these disciplines than for natural science (especially in view of most frequent references by respondents from SSH section to language barrier); second, similarity of many social, economic, legal, humanitarian and other problems faced by economies in transition. Therefore, specifics of SSH section is that it lacks capabilities required for its integration in the international research community (linguistic proficiency and others), but it has nevertheless abandoned ISC with the NIS for several reasons which, we believe, include merely subjective and political ones (but this aspect has not been subject to analysis in the sociological study 2003-2004).

As regards the total number of reports by research department, the leading position is still with SSH section (71.85), the gap with PEM and CB sections not being so wide (55.19 and 56.81) as by publications: while the gap by monographs is nearly twofold (between SSH section and PEM section having the least number of published monographs) and by research papers it's about 1.6 (between SSH and CB), by reports at conferences it is 1.4 (between SSH and PEM). However, as far as the activity at conferences in other countries is concerned, the leader is only one, that is PEM section (0.46), leaving behind CB section (0.32) and much farther behind SSH section (0.18). So, SSH section is 1.8 and 2.6 less active at conferences in other countries than, accordingly, CB section and PEM section.

According to the above analysis, ISC assessed by publication activity and reports at conferences in other countries is the least active for social sciences and humanities. As this kind of participation in ISC is much more significant for these disciplines, they appear to be the least integrated in the international research community. This situation in SSH case occurs because the R&D performance criterion practiced in Ukraine is added by the influence of other factors not occurring in case of natural sciences, where theories and research objects (rules of nature) have always been one for all. This, however, cannot be said about socio-humanitarian disciplines which results can comprise "certified scientific knowledge" on when their research is done by internationally recognized (certified) methodological standards and criteria. Hence, SSH in Ukraine (and across the post-soviet area) had to deal with a specific type of inner transformations, e.g. theoretical and methodological, which completion will required additional resources (time, intellectual etc.).

4. Conclusions

The analysis of barriers for ISC made in the paper enables to outline its nature and main underlying factors.

Systemic transformations launched in post-soviet Ukraine at early 90s and accompanied by financial crisis shrank the R&D in the whole and ISC in particular. However, these transformations ended by 2000, could only build up a model of cost-ineffective market economy in Ukraine, which is insensitive to R&D and ISC in particular. Not featuring effective demand to anything associated with R&D and innovation, such model is only able to stimulate the national R&D to ISC by one way, e.g. by pushing the R&D to the outer area, with creating a barrier for the ISC efficiency by failing to fund it. Such model, by failing to fund ISC and leaving this function to foreign partners of Ukrainian R&D, will fail to outline concept, priorities, conditions or scopes of ISC in Ukraine. Consequently, ISC in Ukraine tends to be an autonomous activity that develops by its own rules, features insignificant scales and uneven distribution across the national R&D.

Financial barriers will erect information barriers for ISC, as information, being a foremost resource for R&D, requires heavy expenditures which the Ukrainian R&D often cannot afford.

Furthermore, a model of cost-ineffective market economy, not demanding from R&D the performing standards that an innovation model demands, doesn't put the requirements and criteria to R&D, that are put by an innovation model. One this criterion is publication activity of researchers in distinguished international scientific journals, substituted in Ukraine by the need to publish in the so called "specialized" journals. This tends to cut researchers' stimuli to publish abroad, especially socio-humanitarians who, above all, face additional linguistic and cognitive problems.

So, ISC and Ukraine, still being at the initial phase and in unfavorable environment, is only capable to ensure asymmetrical, e.g. uneven and unequal, integration of Ukraine in the international research area. Much can be discussed as for how much funding is necessary to improve the situation etc. but one thing is clear: such situation with ISC stems from the model of cost-effective market economy erecting barriers on the way of everything not based on cheap resources. To abandon this model will entail gradual transformation of ISC.

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