



STCU-NASU Survey 2005:

Evaluation of Performance of Technical Units Fulfilling STCU Projects

STCU's Impact on Technical Units' activity

Kyiv- 2006





Key Findings from the 186 Technical Units that responded to the survey:

1. Slightly over half of the surveyed units (approximately 53%) were evaluated either to be fully sustainable or under sustainable but could reasonable expect to be sustained from support of their parent institute. Approximately 21% of the surveyed units would be considered under sustainable and without reliable support from a larger organization. However, this is not a complete picture in that 26% of the surveyed units did not provide enough data to determine their self-sustainability capability.
2. Government (state budget) financing remains the predominant source of budgetary support for the units (59% of financing came from state funds), although a significant portion now comes from non-governmental funds. STCU grant funds made up 20% of the total annual budgetary support to these units, but were a significant portion (48%) of the non-government financing. This suggests that STCU has a major influential role in promoting non-government, competitive financing of research activity.
3. Since the STCU institute survey of 2003, there appears to have been a relative increase in the number of units with diversified, multi-sources of income, and a decrease in the number of units evaluated as “reliant on STCU financing”. This can be said only for Ukrainian institutes because the 2003 and 2005 survey samples are only comparable between Ukrainian institutes.
4. STCU project participants had an average age of 48 years, with senior “doctor of science” researcher ages averaging 60 years. STCU projects are reaching an increasing portion of younger researchers (age 35 years or less), with 29% of the surveyed units reporting STCU project participants fitting this “young researcher” category.
5. STCU had a larger relative impact in promoting joint research, participation in conferences, and collaboration/contact with foreign scientific peers, and a lesser impact in commercialization of science and commercial contact with outside investors.
6. Some of the obstacles preventing STCU from having a larger impact in commercialization and technology transfer included the large majority of the surveyed units focused on fundamental science research, the weak domestic market for high technology, and the negative cost-effectiveness of applying for patents (i.e., the cost of patent application was equal to or greater than the profit/financial benefit received from the patent).
7. Even so, only 30% took advantage of STCU activities and support to develop or exploit the potential of their research results, suggesting that this part of STCU’s activities is not yet broadly known or used.
8. STCU was cited as having a positive impact on upgrading laboratory equipment, encouraging professional contacts and networking, and promoting financial diversity. STCU was criticized for overly bureaucratic processes and the long time it takes to process, evaluate, and render decisions on proposed work. To a lesser extent, the STCU also was criticized for its inflexibility in policies related to midstream changes to funds allocated to specific project budget categories.



Background. The STCU survey 2005 was conducted together with Dobrov Center for Scientific and Technological Potential and Science History Studies. The project started on 1 July, ending 31 March 2006.

The project objective was to develop a system of sustainability evaluation of Technical Units (TUs) that were working on active STCU projects in 2005 and are subordinate to NAS Ukraine. Technical Units can be independent institutes or laboratories, departments, or research teams within an institute. It is important to note the difference between *Institute* and *Technical unit*: Technical units are smaller than institutes, and for the most part, TUs are subordinate parts of an Institute. So, the share of STCU input into TU is always larger than into Institute because Institute has a several number of TUs and not all TUs inside an Institute have common projects with STCU. The majority of this 2005 survey results are derived from answers at the individual scientist or Technical Unit level. Where necessary, this report will clarify when survey results apply to the larger Institute level.

General Survey Description. The questionnaire was conductive in two parts: a set of questions for institute directors and a set of questions for the Technical Unit team members. During the survey, the methods for performance evaluation of Technical Units were developed and implemented, TUs' were evaluated by criteria of sustainability and level of STCU's impact was analyzed.

The questionnaires were sent to 80 institutes, whose 258 Technical Units (TUs) had active STCU projects in 2005 (a total of 270 projects). The response statistics were:

Name	Data
Institutes, which have sent questionnaires back	58
TUs, which have sent questionnaires back	186
Total questionnaires received	70%

The difficulty in gathering the necessary data on a volunteer basis was proven yet again during this 2005 survey effort. While not all TUs responded (even with strong encouragement to respond from NASU), it is felt that a 70% response rate provides a sufficient foundation for providing credible evaluations of the surveyed population.

Sustainability Evaluation Parameters

To evaluate the level of self-sustainability of the surveyed Technical Units, the following basic parameters were chosen:

1. **Financing Sources Diversity:** A measure of the extent of independent funding sources of a Technical Unit. The assumption is that the unit that receives money from different sources could continue its level of activities even if one of funding sources were to disappear.
2. **Share of Non-Government Financing:** A measure of the extent of non-government interactions and relationships that a unit possesses. If these relations are broad and stable, the assumption is that the Technical Unit that receives a stable share of Non-Government financing is more adapted to the market and innovation cycles which drive the major world economies.
3. **Share of TU Budget Devoted to Applied Research:** A measure of the "practical" orientation of the Technical Unit's activity - it shows the likelihood of the TUs research work developing into a marketable technology that would receive commercial benefits and income.



Also, these additional criteria for sustainability evaluation were considered, to identify the share of the surveyed TUs that could be considered "leaders" on the path of self-sustainability:

1. Quantity of young scientists: A measure of the long-term viability of the TU - more than 5% of TU staff is categorized as "young scientists" and whose average age was less than 55 years old.
2. International Reputation: A measure of the Technical Unit's integration into the global S&T community – a minimum 2 articles in the foreign journals.

Using the above parameters and the survey results, the Technical Units' "self-sustainability" was categorized as follows:

Sustainability Evaluation of Technical Units*

Name	Data
Sustainable units	46 (25%)
Under Sustainable units – Within Large, Well-Supported Institutes	52 (28%)
Under Sustainable units – Within Smaller, Less-Well-Supported Institutes	39 (21%)
Units with unclear status (not enough data for ranking)	49 (26%)
<i>Of the total 186 TUs, those which are "Leaders" according to the extra criteria</i>	<i>38 (20%)</i>

* **Sustainable** - TU has different sources of financing, bigger part of its income is non-government financing and it is practically oriented.

Under Sustainable – Within Large, Well-Supported Institutes: TU is primarily dependent on a single source of financial support, that being governmental financial support, with perhaps a few (if any) non-governmental income sources. However, TU is a subordinate unit to a large institute with stable governmental financial support, and therefore the TU is likely to receive additional financial or administrative support from its parent institute.

Under Sustainable – Within Smaller, Less-Well-Supported Institutes: Criteria same as previous Under Sustainable category, however the TU is within an institute that receives smaller amounts of government funding support, has limited non-governmental funding sources, and has no regularity in its income flows. Therefore, the TU is likely to receive additional financial or administrative support from its parent institute.

Unit with unclear status - respondent did not answer the questions connected with their sustainability, and therefore cannot be evaluated here.

The surveyed Technical Units were asked to estimate the individual shares of their income, categorized by specific financial source.

Source of Budgetary Financing for Technical Units

Name	Data
From Government Budget	59%
Non-Government Sources - Total	41%
• Non-Government – Non-Competitive Sources (e.g., private sector contracts)	10%
• Non-government – Competitive Sources (e.g., grant assistance, competitive research programs)	31%
Share of STCU Grant Funding	20%
Share of Others Types of Non-Competitive Funding	11%
Total STCU Share of All Non-Government Funding	48%
Total STCU Share of Non-Government Funding from Competitive Sources	64%

While STCU financing commands a minor share (on average) among all the surveyed institutes, STCU financing plays a major role in the Technical Unit's income from competition-based financing. Of the non-



governmental funds received by the surveyed technical units, 41% came from sources that granted funding on a competitive and contract basis. Of competition-based financing, STCU funding took a 64% share. Therefore, STCU can be seen as playing a key role in diversifying the sources of income for R&D in Ukraine by instilling competitive principles within the research grant distribution of the surveyed units.

The first STCU institute survey, an informal survey conducted in 2003, had 6 questions which were addressed not only to institutes but also to other entities that were participating in STCU activities (Commercial Entities, Universities, etc.). Answers were received from 77 institutes and other organizational types from Ukraine (53), Georgia (14,) and Uzbekistan (10). Here is the comparison of the 2003 and 2005 survey results, based on the criteria of financing sources, (which was one of the main indexes chosen in the 2003 survey to evaluate institute sustainability) index. In the 2005 survey, only institutes of the National Academy of Sciences of Ukraine were involved. Therefore to compare the two surveys, the table shows the total results from the 2003 survey, a subset of the 2003 survey results filtered to Ukrainian institutes, and the 2005 survey.

Type	Characteristics	2003 in total	2003 filtered for Ukraine	2005
Government oriented	More than 60% of budget from government	40%	38%	49%
Commercially oriented	Private companies contribute more than 40% of budget	21%	21%	13%
Diversified multi-source	No single category accounts for more than 58% of budget	19 %	20%	38%
STCU reliant	40% or more of budget attributed to STCU grants	8%	11%	0%*
Unidentified sources	These sources include subcontracting from other organizations, which are difficult to identify, or other sources	12%	10%	0%

*The largest share of financing from the STCU for the single institute was 32% (one institute), while only 8 institutes had the share of 10% or higher, 49 institutes received less than 10% in their total 2005 financing from STCU. For the entire survey sample, the average share of institute financing that came from STCU activities was about 5%.

STCU Impact on Promoting S&T Sustainability

The table below shows that fundamental research is the strongest direction of research among the responding STCU project grantees, i.e., the strongest direction of STCU grant funding application. While a significant number of respondents noted Applied Research as one of their research directions, it appears that STCU project grants have a weaker influence in this direction as compared to the Fundamental Research direction. STCU project support plays a minor role in the direction of technology development or establishing contract research or consultations.

Type	% Share between Types	% of respondents**
Fundamental research*	63%	86%
Applied research	21%	78%
Technologies development	10%	42%
Scientific service, consultation, trainings	6%	22%

* Technical units which fulfill less quantity research themes (1-5) pay more attention to large-scale fundamental researches.

** Total percentage exceeds 100% because respondents could choose multiple categories in the question.



This trend suggests that in the 2 years since STCU reorganization, the research directions most likely to build diverse, sustainable, and long-term research avenues (and income) remain weak among the surveyed STCU grantees. Further, only 30% of respondents mentioned STCU's impact on commercialization; the assumption is the remaining 70% of respondents do not think of STCU activities as strongly connected to commercialization, in spite of STCU organizational efforts to strengthen its supplemental programs (e.g., patent support grants, training opportunities, consultations, travel grants) to encourage more effort in implementing STCU project research results in the commercial market. There is an opinion that STCU's influence on commercialization is weak because of weakness in Ukraine's domestic high-technology market, which makes it difficult to find customers among Ukrainian producers and limits the tangible opportunities for Ukrainian technical units to match their research to an available customer.

Commercialization of Research Results*

Name	Data
Those who fulfilled work to apply in industry (% of respondents)	30%
Quantity of firms which applied	274
Influence of STCU on commercialization (% of respondents)	30%

* For commercialization of results joint research (68% of respondents), exchange of S&T information (68%), informal contacts (67%), joint publications (66%) are most important, then – joint conferences (39%), research for business partners (37% of respondents), trainings (consultations) for employees (24%) and joint commissions (work groups).

One aspect that may be discouraging scientists from being more active role in implementing their research is the difficulty in obtaining patent protection and, therefore, in exploiting opportunities to make beneficial use of the protected intellectual property. From the total number of survey participants, 37% provided responses or information on their patenting experiences. According to the majority (75%) of the respondents who answered questions related to patents, the cost of obtaining a patent was greater than the financial benefits received from that patent. In spite of this financial hurdle, only about 16% of these respondents made use of STCU patent support services in applying for patents, and a miniscule 1.6% of these were use for foreign or international patents (both patent types being more expensive that obtaining national patents).

This highlights a key unfulfilled goal of the STCU: supporting and facilitating more applications for patent protection, particularly in the foreign and PCT patents, by encouraging scientists to take advantage of STCU's Patent Support program, sustainability development support, and commercialization training material.

Patenting

Name	Data	Supported with STCU **
Total patents*	367 (100%)	64 (17,4%)
in Ukraine	283 (78%)	58 (15,8%)
abroad	84 (22%)	6 (1,6%)

Efficiency of patent use

Name	Data
Profit < costs	75%
Profit = costs	15%
Profit > costs	10%

* Activities of TUs connected with STCU is better than such activities in Institutes generally in comparison with results 2003-2004.

** Financial support, consulting (forming of patenting strategy, consultation in patenting legislation), assistance to scientists in selling the licenses.



STCU Impact on Promoting S&T Excellence

Among the survey respondents, the following demographic profile of STCU project participants was obtained. Of note, there was an opinion among the respondents that the number of “young scientists”, those who are under 35 years of age, was growing and that the proportion of this next-generation of senior researchers participating in STCU projects was increasing.

Profile of STCU Project Participants

Name	Data
Average age	48
Candidate of Science (PhD) (average age)	50
Doctor of Science (average age)	60
Retired researcher	24%
Young researcher (under 35 years)*	29%
Have an academic degree	60%

* Respondents commented that trend appears to be an increase in young scientist participants

STCU appears to have a positive impact on equipment renewal, with 6% of the respondents citing this aspect as the primary reason for working with STCU. But the main sources for buying laboratory equipment remains government financing of institutes, grants from national programs, and orders of ministries and state enterprises.

Basic scientific equipment*

Name	Data
More than 20 years old	42%
10-20 years old	25%
5-10 years old	18%
less than 5 years old	15%

* Equipment: reagents, apparatuses (except of office equipment like computers, printers etc.).

As in the past, STCU activities were cited as providing critical support to scientists publishing their research and creating new professional collaborative relationships with their peers within Ukraine and abroad. However, respondents cited STCU support for helping with contacts with foreign company contacts as much less than in the sphere of scientific collaboration.

International collaboration

Name	Data	Due to STCU's projects or support, %
International conferences: in Ukraine	579	182 (31%)
abroad	557	234 (42%)
Joint publications with foreign colleagues	642	214 (33%)



Joint research projects	157	78 (49%)
Contracts with foreign companies: in Ukraine	80	22 (17%)
abroad	78	22 (17,6%)
Trainings abroad	84	19 (16%)

* Total percentage exceeds 100 per cent since it is a multiple choice question and respondents responded more than once

Publishing activity

Name	in Ukraine	abroad
Monographs	39	22
Articles	1588	718
Conference papers	1185	580

STCU's Overall Impact on Scientific Community

Respondents cited the strong positive impact of STCU activities on the general improvement in financing, strengthening contacts with foreign partners, upgrading the equipment, improvement of personnel qualification and access to information sources. The respondents provided specific ratings on the general contribution of STCU activities and estimated the level of influence of these contributions:

STCU Contribution	Level of Impact (1=Weak Influence ... 5=Great Influence)	% Respondents Citing this Contribution
Improvement of financial state*	4.18	90%
Strengthening contracts with foreign partners	4.16	77%
Renewal of equipment	4.08	87%
Widening of TU perspectives	4.08	81%
Improvement of personnel qualification	4.08	80%
Facilitating patenting process	3.96	24%
Creation new contracts in Ukraine	3.57	30%
Implementation of results	3.50	20%
Creation of new companies to commercialize results	3.14	3%

* The improvement of financial state means the possibility to receive a competitive salary, take part in international conferences, communicate with foreign colleagues or business partners, to publish articles, have patenting activity, and make business trips.

When asked what are the primary advantages and benefits for participating in STCU activities, the respondents provided the following reasons:

- Financial Reasons (57% of Respondents) – The necessity to fund new scientific research, development of certain research directions; funding implementation of technologies; improvement of financial ability of the Technical Unit to participate in conferences, publish articles, pay for patent applications, communicate



with foreign colleagues, and renew equipment; extra income which can encourage scientific personnel to remain in Ukraine and with the Technical Unit (particularly young researchers);

- Expansion of Scientific Contacts and Perspectives (37%) – Communications and collaboration with foreign colleagues, finding possibilities to implement results in Ukraine and abroad, to start new researches or to extend present-day investigations;
- Increasing Salaries (28%) – Grant funds provide important supplementary financial support to enterprising and active scientists;
- Re-equipping of a unit (6%) – Providing financial support for replacing outdated laboratory equipment with modern, state-of-the-art equipment.

When asked what are the primary disadvantages or disincentives for participating in STCU activities, the respondents provided the following critiques:

- The STCU proposal application process and funding consideration procedures are bureaucratic and proposal evaluation criteria/terms are excessive: the complexity of the required paperwork as well as the steps involving the Host Government Concurrence process; the geographic centralization of approved projects in Kyiv; the frequent changes of STCU application forms and submission procedures, etc. (67% of respondents noted this).
- There were difficulties in using project funds as allocated in the workplan when a proposal remains under STCU Party consideration for a long time before finally being approved. During such a long period, changes in domestic conditions and the situation in the Technical Units and among the project participants causes the financial part of the original proposal becoming outdated and this complicates cost planning (31.9%);
- Other factors that contribute to an inflexibility in the project budgets are (a) that payments in local currency (a requirement imposed on STCU by the Ukrainian national financial authorities), (b) there is a prohibition on combining several grant funds, (c) there is restricted ability to buy expensive equipment; (d) only a small proportion of funds can be allocated for equipment in overall project funding structure; (e) and the daily salary rates established for scientists is very rigid (9% of responses).
- There is insufficient information from STCU on its ability to help with deficient software, help with finding partners and subcontractors, and on commercialization and implementation of research results (15% of respondents).



Recommendations for Survey 2006 (proposed to begin in August)

Limit Survey to Technical Unit level – While Institute Directors can provide insight at a strategic or national level, most institute leaders do not have detailed knowledge of the STCU activities involving their Institute's Technical Units; in some cases, Institute Directors were unaware of their subordinates' involvement in STCU projects. Therefore, the information received from directors was not as informative as expected.

Focus Survey More on Sustainability –The survey questions can be tailored more towards obtaining a fuller description and more data on Technical Unit sustainability and STCU's impact on this sustainability.

Devise a Combined Survey Method. The 2005 survey used a “drop and collect” method which raised the risk of the respondents misinterpreting survey questions. A “face-to-face interview” method would allow for explanation to respondent questions, thus avoiding mistakes and increasing the quality of the responses. However, the “face-to-face” method is more labor intensive for STCU, particularly if STCU expands the survey to places outside Ukraine. Therefore, a combination of “drop-and-collect” and “face-to-face interviews” methods is recommended, assigning a statically representative sample of Technical Units (approximately 40) for face-to-face interviews, and assigning the remaining Unites to an e-mail and “drop-and-collect” method.

Modification to questionnaire. The 2005 questionnaire content needs to be adjusted to the object and criteria chosen for evaluation of Technical Unit sustainability. There were cases when respondents referred to the protection of “state secrets” and refused to take part in the survey – for this case a special note had to be provided.



Main data about STCU's impact on Technical units' activity in 2005

Name	Data
TUs, to which questionnaires have been sent	258
TUs, which have sent questionnaires back	186 (72%)
Source of financing (budget of TUs)	
Non-government	41%
STCU input (into 100% of Total Government and Non-government financing)	20%
STCU input into Non-government financing -Total	48%
STCU input into Non-government financing - on Competitive basis	64%
Technologies (worth promoting to the market, number)	215
Impact on international collaboration	
International conferences in Ukraine	182 (31%)
abroad	234 (42%)
Joint articles with foreign colleagues	214 (33%)
Joint research projects (with foreign partners)	78 (49%)
Contracts with private companies in Ukraine	22 (17%)
abroad	22 (17,6%)
Training programs abroad	19 (16%)
Impact on publishing activity	
Monographs in Ukraine	23 (59%)
abroad	6 (38%)
Articles in Ukraine	376 (24%)
abroad	278 (29)
Conference papers in Ukraine	297 (25%)
abroad	299 (44%)
Impact on patenting	64 (17,4%)
In Ukraine	58 (15,8%)
Abroad	6 (1,6%)
Sustainable units	46 (25%)
Under sustainable units	91 (49%)
Units with unclear status (not enough data for ranking)	49 (26%)