Nickolay A.Pecherskykh
Svetlana P.Pecherskykh

Academicians' uclad

What is structure of economy?

Investigator can treat it a few ways. First, 'industries', species of factories, producing the same product may be taken as elements of economy structure. Second, meaningful, big corporation may be. But also economic structure may be considered as consisting from 'uklads'.

These Russian term have few meanings: socio-economical uclad, living uclad, uklad of technique and technology, etc.

Socio-economical uclad was threated in Soviet literature as system of social economy, social productive activity. U.I.Semenov (in Great Soviet Encyclopedy, III-d ed.) threat it as type of material economy (economy of production and consumption), which is based on defined form of property on means of production and on respective relation in process of that (social) production.

Socio-economical order of society may include one or few socio-economical uclads. Multi-uclad economy system always have one dominating uclad. It exactly determine character of socio-economical order of the society as concrete history unit, it's tending to named socio-economical formation. As dominating, it associate and subordinate all other uclads coexisting in economical life. An uclad becoming dominant, it save as base, pillar of total social organism. A socio-economical uclad dominating at concrete historical epoch may turn subordinated in next, and a subordinated uclad may turn dominating.

Soviet economist tradition was to divide all uclads into main (formative) and secondary (non formative). Formative uclads are primitive-communal, slave-ovning, feudal (and uklad of serfdom peasant), capitalist (and wage worker), communist. Non-formative uclads should newer became dominant because of it's specific, for instance petty-bourgeois or patriarchal. They exist as surplus to formative uclads more or less sizeable.

Historical development experience shows that economical order of society more often consist not from one uclad. Except the primitive-communal epoch, class societies (slave-ovning, feudal, capitalist, the more contemporary) show complex order of economies. Multi-uckladity of economy is reflection of it's dynamic and tendency. Some uklads regress, other being born at concrete historical stage win more and more economical positions.

Historically such periods took place when no one socio-economical uklad was dominant in economy of society. For instance, in middle of XIX century in Russia was 4 main uklad's: feudal-serfdom (dominant), serfdom peasant, petty-bourgeois handicrafts-man, capitalist (in active development) and some other, not wide presented. But already in 20-th of XX young Soviet economy consist of 5 main uclads – socialistic, which was growing but yet not dominant, and beside it natural economy peasant, petty goods peasant, private property capitalism, state capitalism[1] (one may divide every of these 5 into some partial forms). Some Asian and especially African contemprorary societies have no dominant uclad. Probably,

---

1 That is classification of V.I.Lenin from "A Great begining" and other works of 1918-1921.

mosaic picture of young Soviet Russia economy was precondition for upraise of set of economy theories of that time (Lenin, Bogdanov, Kondratiev, Chayanov, Leontiev).

A.V.Chayanov in one paper translated (into German) term 'uklad' as 'economical system'[2] (in Ru an ye always wrote 'uklad'). He suppose that existing in his time classification of economical system (by Marx and Weber) has abstract historical character by main, and do not reflex real state exactly enough. In his summary table Chayanov described capitalism, family economy in forms of commodity economy and natural economy, slave economy, quitrent economy, feudal system in forms of landlord and peasant economy, communism. But not only new list of uklads or systems is important. More meaningful are two points. First, Chayanov treat uklads through economic categories as commodity price, single indivisible family product, wage, rent (in various forms), land price, etc. His result is: every uklad have it's own set of categories, and every categories have meaning not for all uklads. Second, as he wrote: "The feudal economy is a symbiosis of the natural labour economy of tribute-paying peasants and exchange economic orientation of the commodity-trading feudal lords. Therefore, it has two economic objects of a different kind and two systems of economic categories, the element of which do not coincide."[3] So, feudal *system* include two *uklads.*

Every national-economic system is individual by it's nature. "Therefore, it seems much more practical for theoretical economics to establish for each economic regime a particular national economic theory."[4]

Thus, we have a chain of categories:

- National economy. It is a real society economy at given time, for instance Russian economy in 1920-th, or Chinese economy in 2000-th. Of course, it is system, and one may say: national economy system of Russia, China, etc.
- National economy system in the inner sense of word. It is type or form of national economy and is matter for economist. That is capitalist system, or communist system, or feudal system, etc. In Soviet Union we had communist system, Americans have capitalist system in US, etc. If society transits from one national economy system to another, it's system may be compound.
- Transitory *national economy system* may include few *partial economy system*, or socio-economy uklads.
- Economy system of the single economy unit, of enterprise, corporation, family household or public sector institution. That is uklad in inner sense of word.

Economy system (national or partial) may be a symbiosis of few uklads. Feudal system include 2 uklads, capitalist system include 3 at least: capitalist enterprise, worker family household and capitalist family household.

Uklad is social essence, but economist should describe it in economy terms. These description will include:

1. Outside statistic of uklad: does it exists and have meaning? Uklad is not self-

---

2 Tchayanoff A. Zur Frage einer Theorie der nichtkapitalistischen Wirtshaftssysteme // Archiv fur Sozialwissenschft und Sozialpolitik. - L.I, 1924, SS. 577-613.

3 Chayanov A.V.On the Theory of Non-capitalist Economic System. // A.V.Chayanov on The Theory of Peasant Economy. Ed. By Daniel Thorner, Basile Kerblay, R.E.F.Smith. – The American Economic Association: Homewood, Illinoise, 1966. – p. 98.

4 Ibid., p. 27.

dependent entity, it is form of entities. How many entities have such an uklad?

2. Typical living cycle of an entity. A person, a family, a corporation, a board may be typical entity with uklad investigated. In all case typical entity has its individual birth, growth, adult age, decline and death. A person will dye, corporation may bankrupt. Live of an entity (ontogenesis) consists in events, history of uklad (filogenesis) consists in change of frequency of such events.

3. Supply-use tables and tables of property. We are what we consume, produce and have in our property. That is material culture, as an social anthropologist would say.

4. Structure of activity in the form of Input-Output tables of uklad. IOT is system, IOT represent activity of subject. Leontieff form of IOT tables do the last implicitly, von Neumann form do it evidently.

5. Social characteristic of uklad. Outside opinion as well as self-consciousness will be taken in view. Happiness index may turn not to be explanatory but only to be in explanation, still one have to know it before explain.

6. Interest structure and value system of uklad. History have not its own will, humans make it. And humans make history on the base of their interests. Of course, interests may be aims and not result of action, but to predict action, one need to know interests of actor.

Lets look at academicians uklad from these point of view. (These paper is not finished study. Rather, it is programme of study.)

1. Does academician's uklad exist and have meaning in Russia? Does.

Tabl. 2 shows that academicians constitutes mass stratum in modern Russia, despite it is not complete. Statistic for Soviet Union (1987) is presented in Table 1. Russia Federal State Statistic Service do not publish data about number of academicians. Data about science in industrial institutions are not collecting at data all. Data about Medical, Agriculture and other specialised Academies are dispersed. We have well collected only for State High School Institutions (even in these row data about non-government institutions is missing). Number 391,1 thousand scientists and academicians is lowest approximation. Real estimation would be 450-500 thousand of persons (may be – to 550 th.). In all cases it is a mass stratum – 'class'. Because it also have its own way of labour, way of life, way and measure of income, relation to property, etc.

450-500 thousands of people make up 420-470 families. (Two or more person from that social group may live in one household, and thus constitute a unite family. Superficial observation give portion in one pair on 10 or 20 academician's person.) In average, one household in Russia consists of 3,3 person; so in total to academician group tends 1300-1750 thousands of people.

Will Research University become main scientific institution?

Research institutions of Academy of Science for long time tends to symbiosis with High School institutions. Academgorodoc of Novosibirsk is an instance, Tomsk academician cluster is another. Moscow Institute of Physics and Technology (State University) have old relations with RAS Department of Physics, and now this relation became more closed. In compare, relations between High School

institutions and industrial corporations fall tyrough 1990-th.

Table 1. Number of scientists and academicians in USSR in 1987					
Source: Народное хозяйство СССР в 1987 г. Статистический ежегодник. / Госкомстат СССР - М.: Финансы и статистика, 1988.- (736 с.) - с.27					
	Total, thous. pers.	**In that number, persons with scientific degree:**			
		Doctor of science		**Kandidate of science**	
		thous. pers.	**%**	**thous. pers.**	**%**
Total number of scientific workers (including academicians from High school institutions)	1517,9	47,4	3,120	484,2	31,9
Scientific workers in scientific institutions of industrial profile	662,1	9,9	1,50	129,9	19,62
Scientific workers in scientific institutions of Academies profile	146,1	12,4	8,490	68,5	46,89
Academicians in High school institutions	709,7	25,1	3,54	285,8	40,27
Fundamental research had been lockated in in scientific institutions of Academies profile mainly. Applied research and design located in scientific institutions of industrial profile. Remarkable, that 'propensity for scientific career' (percent of persons with scientific degree) was in Academies and High school institutions on the similar level (difference by quarter), but in industrial profile institutions was twice below.					

Table 2. Number of scientists and academicians in Russia in 2008					
	Total, thous. pers.	**In that number, persons with scientific degree:**			
		Doctor of science		**Kandidate of science**	
		thous. pers.	**%**	**thous. pers.**	**%**
Total number of scientific workers (including academicians from High school institutions)	391,1	No data		No data	
Scientific workers in scientific institutions of industrial profile	No data	No data		No data	
Scientific workers in scientific institutions of Academies profile	55*	No data		No data	
Academicians in High school institutions (regular staff)**	341,1	42,1	12,34	173,5	50,86
*RSA only. No data about Medical, Agriculture and other specialised Academies. Source: Российская академия наук // Википедия - http://ru.wikipedia.org/wiki/ . Datum is presented in form: "At July 2008 the Academy number in total 470 scientific institutions, more than 55 thous. scientific workers, including more than 522 actual members and 822 correspondent members.					
**Source: Контингент штатного преподавательского персонала государственных образовательных учреждений ВПО российской федерации // http://mon.gov.ru/files/materials/4328/vpo-pps.pdf					

2. Living cycle of academician's family.
Typical CV of contemporary Russian academician look at Table 3

Table 3. Typical CV of contemporary Russian academician	
Event	**Age and duration**
Baccalaureate Graduation	22
Magisterial Graduation	24-27 (2 years)
Junior academician job	till 30-35
Aspiranture (doctoral graduation)	25-35 (3-5 etars)
Getting scientific degree "Kandidate"	27-45
Getting academician title "Docent"	30-50
Granting a pension	60 for men, 55 for women
End of academician career	65
Life expectancy at birth (in 2007)	67,51

Critique may say that variations should be considered: some disciplines "needs" continual career (mathematical physic), other "needs" practical experience (medicine). First, contemporary science and sciences have to be mathematical, medicine as well as physic as history yet, there no specific influence of mathematics on any discipline. Second, Soviet experience of 'rapid rise' of academician career if mathematical physic and adjacent show that such a politic needs three preconditions: highest motivation of 'careerist', hardest selection and first-class state financial supply. Scientific revolution occuring, discipline leading, every discipline (not only physic) may be accelerated, not only physic. Acceleration is problem social and not disciplinary. Would be scientific revolution – should be motivation and finance; hard selection became possible, 'rapid rise' became too.

But most meaningful is that even if 'careerist' of 26-27 getting degree (of 'kandidate' or 'doctor'[5]), he should to work at *junior'* academy position for 5-7 years. Self-dependant researcher of 30 should be 'rare resource', the more self-de pendant professor, the more leading organiser. Till 35 person belong to *junior class'* of academicians, having degree or not. After 35 person must became 'working horse' of High School and science. In Russia that is 'docent', pedagogical title.

Higher phase of academician's career (professor-tutor in US system, doctor-professor-member of an Academy in Russian) is not an obligatory one. Typical academician career take 38 years (from 27 to 65 age). Junior position take 5-7 years; that is 1/9 of life cycle. One professor-tutor can tutor 5-7 junior academicians. Consequently, near 2% of academicians should occupy that position. An academician get these phase at 52-52 (in Russian system), and work at these position 10-15 years (1/3 academician career). Consequently, it will be normal that only 6% of academicians get these position.

Selective inspection "Family and Fertility" held by "Rosstat" at september-

---

5 Russian system of scientific degrees have 2 levels: 'kandidate' and 'doctor'. If one consider degree of 'magister' in Russian system as equivalent to 'master's' in European, than () 'kandidate' is near equivalent (but actually some below) 'Ph.D', and 'doctor' is high up. State politic in this sphere is not defined. One line is to rise up quality of kandidate quite up to Ph.D. Second line is to abolish division. Both meets obstacles in real state of scientists and academicians.

October 2009 show[6] average age of marriage by 20, average age of mother bearing first 22,5, bearing second 26,6, bearing third 28,6. Husbands are elder then those wife's on 2,7 year. Concluding level of fertility was 1,59 for married women. So, fo the family pair with children we hawe (Table 4):

Table 4. Living cycle of academitian's family							
Year	Wife		Husband		Children, age		
	Age	Academician's position	Age	Academician's position	1-th	2-th	3-th
0	20	Baccalaureate student	23	Magisterial student			
1	21		24				
2	22	Magisterial student	25	Master Junior academician position	0		
3	23		25		1		
4	24		27		2		
5	25	Master Junior academician position	28		3		
6	26		29		4	0	
7 эмансипация	27		30	Post-graduate student	5	1	
8	28		31		6	2	0
9	29		32		7	3	1
10	30		33	Kandidate degree	8	4	2
11	31		34		9	5	3
12	32	Post-graduate student	35		10	6	4
13	33		36	Docent	11	7	5
14	34		37		12	8	6
15	35	Kandidate degree	38		13	9	7
16	36		39		14	10	8
17	37		40		15	11	9
18	38	Docent	41		16	12	10
19	39		42		17	13	11
20	40		43		18	14	12
21	41		44		19	15	13
22	42		45		20	16	14
23	43		46		21	17	15
24	44		47		22	18	16
25	45		48		23	19	17
26	46		49		24	20	18
27	47		50		25	21	19
28	48		51		26	22	20
29	49		52		27	23	21
30	51		53		Emancipation	24	22
31	52		54			25	23
32	53		55			26	24
33	54		56			27	25
34	55	Granting pension	57			Emancipation	26
35	56		58				27
36	57		59				Emancipation
37	58		60	Granting pension			
38	59		61				
39	60		62				

6 http://www.gks.ru/free_doc/2010/family.htm

Table 4. Living cycle of academitian's family							
40	61		63				
41	62		64				
42	63		65	End of academician career			
43	64		66				
45	65	End of academician career	67				
Life expectancy at birth	74,34		62,09				
Probability of birth of one, two or three children*					85%	62%	10%
* Calculated on the base of expected number of children in family to get concluding level of fertility 1,59.							

3. Supply-use tables and tables of property.

Chayanov put forward the principle of consumption-labour-balance. But that is not single balance principle may to be considered.

The simplest is to calculate living wage in relation to living cycle, though it is not much meaningful. Living wage in Russia by Rossstat on average in 2009 was: for family of 2 adult – 11124 roubles, for 2 adult and 3 children – 25890 roubles, for 5 adult – 27810 roubles, etc.

Young family would reach full economic self-dependence (emancipation) near 7 years from marriage. At that moment both adult achieve academician's position. In fact, young family with two academicians reach emancipation in Russia more and more later. Remarkable, that emancipation in contemporary social system coincide with birth of second child. Children will have parents financial support before finishing education and achievement of some social status...

Living wage is such a level of income when family do not save, but also do not disinvest. If family budget data would be grouped well, it may be defined directly. Income level should be such that family save and invest so much as society need to save and to invest. Through academician's career family should save for pension insurance, for dwelling, for medicine and other insurance, for children education. Family means of professional income activity are to be mentioned apart.

Family budgets being grouped in even groups by income, would premiss to calculate living wage, and function of save, and some other parameters for the income politic. But Rosstat publishes another grouping – that by percentage groups of population. Even that grouping is robust – 5 or 10 groups, in 20% or 10% respectively. One can't build function of save high quality. Family balance micro-data was published first in 2012, and that may change situation.

4. Structure of activity in the form of Input-Output tables of uklad.

Ground layer of the model is I-O table for academic workers 'uklad'. For some form of family activities (consumption) S-U table exist (income-expenditure balans). But decomposition S-U table into I-O is complicated because even set of forms of activity ("industries") have not been work out yet. We can suppose that consumption activity of family consists from 400-500 forms. But we can't eliminate this number to be set for every year activity as well as set for all life cycle. Next, big

number of forms makes structure empirically not observable. Rosstat work out 45-48 thousands consumption budgets, and only 300-500 budgets belong to analysing grope. On the other hand, aggregation into low number forms of activity (10-15) generates danger of forecasting power loose. For instance, cellphone introducing in Russia in the early 2000th is a fraction activity, but it forecasting was meaningful for economy just right.

Additionally, productive activity of family ought to be taken in view. As we analyse academic workers, we need to solve problem of observation of results of scientific and educational activities. However, possible the problem will solve itself in main when substantiated forms of productive activity will be setted. Another possibility is of composition-decomposition technique.

Middle layer of the model consists in needs and utility models. Previous paper (N.A.Pecherskykh. Deficit of Resource, Tension of Need and Utility of Wealth (12 p.) – International Input-Output association – 19th International Input-Output Conference. 13-18 June 2011. Alexandria, VA, USA // http://www.iioa.org/files/conference-2/417_20110403081_PtcerskykhDeficit.odt (24 June, 2011)) was dedicated to modelling tension of needs and utilities of goods on the base of deficit uprising from activity of economical subject. Data for utility functions and for analysis of deficit in family's activity are accessible.

5. Social characteristic of uklad.

Outside opinion as well as self-consciousness will be taken in view. Happiness index may turn not to be explanatory but only to be in explanation, still one have to know it before explain.

6. Interest structure and value system of uklad.

Top layer consist in structure of interest properly. This is the contradiction of benefits and expenses as analysing class evaluate them. We suppose for Russian academy workers these contradiction to be of labour character (by A.V.Chayanoff): (limit) disutility of labour contradicts against (limit) utility of income. On the one hand, differential change in intensity of labour produce (differential) change in tension of needs. Tension of needs increase, and that is disutility of labour properly. On the other hand, change in intensity of labour produce (differential) change in income, and by that change ability of family to enjoy needs (limit utility of income). Alternative hypothesis would be: a) academicians are interested in maximal income (refuted); b) academicians have interest of *rantier* (investor).

In the early XX A.V.Chayanoff verified his hypothesis (labour character of interest of Russian farmers) with the effects of family size. In XXI labour interest hypothesis verifying effect would be threshold change in activity structure of academy workers. Throw first decade Russian academy workers get near five time rise of wage. Consequently all the class get possibility fulfil but direct training activity only, also methodical study, some investigation activity, etc. Academicians evaluate results of work upon "3rd generation of educational standards" with "sharp self-critic". But 10 years ago one can't think about time expenditure 2008-2011 for than methodical studies. With existing organisation research and critic activity is almost impossible for Russian academicians. Further rise of wage will made them

possible – first research, second critic. For the Science reverse order is desirable.

Also pure sociological features of interests are observable: motivational system of group, labour ethics, labour satisfaction, etc.