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A COMPARISON OF RUSSIAN PRACTICES IN INDUSTRIAL STATISTICS WITH UN RECOMMENDATIONS: SIMILARITIES AND DIFFERENCES IN CLASSIFICATIONS, DATA ITEMS AND INDICATORS

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A COMPARISON OF RUSSIAN PRACTICES IN INDUSTRIAL STATISTICS WITH UN RECOMMENDATIONS: SIMILARITIES AND DIFFERENCES IN CLASSIFICATIONS, DATA ITEMS AND INDICATORS[6]

This study compares Russian state information systems of industry with UN international recommendations. The harmonization of the Russian information system with successful international practices is necessary for measuring the main industrial indicator levels and dynamics in comparison with the information analogues of both cross-border and strategically important countries. This allows the estimation of the efficiency and competitiveness of Russian industry and the best decisions to be made at all levels of governance in Russia including in the technology and innovation policy sphere.

The study shows that a significant number of annual, quarterly, monthly and weekly reporting forms within the Russian statistical system in the absence of a single questionnaire for obtaining comprehensive information from an enterprise and unified methodological recommendations do not solve the information gap problem. The available disaggregated information is not sufficient to analyse the quality and effectiveness of industrial policy, especially in comparison with global levels and tendencies of re-industrialization. The state statistical system needs modernization to reduce the reporting burden on enterprises and improve information transparency and comparability at the detailed level.

Keywords: industrial statistics, statistical unit, economic activities classification

JEL Classification: C80, C82, C89

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Introduction

The aim of Russian industrial policy and the new strategy for scientific and technological development is to increase the competitiveness of national industries in world markets [Strategy, 2016; Industrial Policy Act, 2014]. A diagnosis of the effectiveness of industrial policy and the competitiveness of industrial (primarily manufacturing) activities, and of participation in global value chains is impossible without comparisons with international re-industrialization processes. A full-scale national information system should be harmonized with the best international practices. This would allow comparisons between the levels and dynamics of the main indicators of national industries and their counterparts in both cross-border and strategically significant countries.

Within the framework of the Sustainable Development Goals, the United Nations Industrial Development Organization (UNIDO), starting in 2013, implemented the concept of Inclusive Sustainable Industrial Development (ISID), recorded in the fundamental Lima Declaration [UNIDO, 2013, 2015]. Promoting ISID as a key driver of the successful integration of economic, social and environmental aspects through improving national industrial potential is the main priority of UNIDO.

Progress in industrialization technologies, without which there can be no development in any country is assigned a special role in promoting inclusive sustainable industrialization, encouraging innovation, and creating flexible infrastructure. These new technologies contribute to the efficiency of industrial production, increase the country's competitiveness in external markets, reduce its vulnerability zones, and expand national participation in the global flows of non-primary industrial production and international cooperation [UNIDO, 2015].

In countries that have managed to successfully and quickly industrialize, and achieve relatively sustainable economic growth, the main drivers were new technology, its quality and the timeliness of its implementation. However, other factors such as the environment, the possibility of financing industrial enterprises, especially technology-intensive and of high capital productivity, should be clear for all economic agents involved in national industrialization and for bodies targeting industrial policies and assessing their effectiveness.

The basic tools of statistical observation are an adopted system of statistical indicators and a statistical questionnaire. An important condition for international comparability is to harmonize the conceptual apparatus; as a result, standards for collecting internationally comparable statistics have been developed. When developing the definitions and terms, a priority is to

achieve the highest possible international comparability and harmonization of statistical practices but not to conceptualize a particular system. The main international standards in the field of science and technology and measurement techniques of basic statistical data on R&D and innovations are set out primarily in the Frascati Manual [OECD, 2015], the Oslo Manual [OECD/EC, 2005], the UNESCO Guide to statistics on science and Technology [UNESCO, 1984], and the technical paper of UNESCO Institute for statistics on measuring R&D in developing countries [UIS, 2010].

In the field of industrial statistics, UNIDO acts as a global forum to establish international standards in the context of ISID. UNIDO runs projects to provide methodological assistance to national statistical services on implementing international standards on industrial statistics and collecting internationally comparable information on industrial development. All UNIDO recommendations aim to converge statistical indicators and maximise mutual cross-country compatibility in the context of the economic integration of any country into the world economy.

To make the best decisions at all levels of governance, the availability of statistics, their completeness, timeliness and international comparability are important criteria to evaluate national industrial efficiency and competitiveness. It seems appropriate to compare the Russian state statistical practice with the UN Statistical Division [UN, 2008a] and the UNIDO Statistical Division [UNIDO, 2010] international recommendations developed to arrange a harmonized international information space in industry along the following lines:

- Industrial sector coverage and structure;
- The composition of statistical units;
- The main characteristics of statistical units;
- The sources, methods and strategies of data collection;
- A comparative analysis of the data items in the UNIDO Large Questionnaire for industrial surveys with the reporting forms of the Federal State Statistics Service of the Russian Federation (Rosstat);
- The quality of data, metadata and their dissemination.

An overview of the basic approaches to industrial statistics

In international statistical practices, two basic approaches to data collection can be identified. North America, Japan, and most developing countries use a single questionnaire for their annual manufacturing survey; it covers all the key figures at the level of the “establishment” and

production by types of products, including data on total and export incomes from sales; employment and wages; expenditure; inventories (current assets), capital expenditure. These business registers serve as the basis for general populations of statistical observation units with full or sampled coverage. Such a register is a multi-purpose information system, where the characteristics of economic entities reflecting the processes of their creation, changes in the constituent documents, and liquidation are linked with the quantitative attributes required for conducting statistical surveys (for instance, the revenue from sales indicator).

The list of data collected through integrated questionnaires has some peculiarities across countries. For example, in Canada, the data items of the Annual survey of manufactures and logging[7] at the level of "establishment" can include supplementary information on raw material and component purchases by types; data on employment and wages are grouped in accordance with the "local units" of their territorial jurisdiction.

The approach used in most European countries involves data collection by type of industrial production through specific questionnaires for each kind of activity, excluding indicators of the number of employees, wages and salaries, and enterprise characteristics as a whole. In this manner, the annual questionnaire PRODCOM is formed [Eurostat, 2016]. All surveys in European countries conducted beyond this observation are structural surveys to collect information on turnover, production volumes, expenditure, income, changes in stock, investments in tangible assets (including environment), the number of employees, hours worked, wages and other indicators. To regulate such surveys in the EU, the European Parliament and the Council of the European Union have developed Regulation 295/2008 concerning structural business statistics. All the required information is collected at the enterprise level and only a few data are collected in more detail using more than one statistical reporting form. In addition, in Europe business registers include a very limited number of records and they are not economic data repositories.

The comparison of these approaches to annual industrial surveys allows us to specify the differences concerning the integration of questionnaires and the statistical units. In North America, the observation unit is an "establishment", as recommended by the UN International recommendations on industrial statistics [UN, 2009]. The main deviation of European practice from the UN recommendation is the absence of a single integrated questionnaire for industrial surveys, and the use of "enterprise" as the main observation unit.

[7] Statistics Canada: http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&Id=287916.

UN and UNIDO recommendations and Rosstat statistical practices: a comparative analysis

Classifications

According to the UN International Recommendations for Industrial Statistics [UN, 2008a], the term "industry" refers to the class of the International Standard Industrial Classification of All Economic Activities (ISIC), Rev. 4 [UN, 2008b], which covers all kinds of economic activities, including agriculture and services activities within an economy. Therefore, it is much broader than the term "industry" in its common interpretation (usually only mining and manufacturing). However, the economic activities included in these recommendations, relate to a limited set of activities carried out by all resident units in the reporting country and are active mainly in the following sectors:

a) Mining and quarrying (ISIC Rev. 4, Section B);
b) Manufacturing (ISIC Rev. 4, Section C);
c) Electricity, gas, steam and air conditioning supply (ISIC Rev. 4, Section D);
d) Water supply; sewerage, waste management and remediation activities (ISIC, Rev. 4 Section E).

The scope of industrial activities according to ISIC, Rev. 4 is presented using a detailed four-digit level [UN, 2008a, b].

Until the end of 2016, Russian industrial statistics covered three sections of the currently used All-Russian Classification of Economic Activities (OKVED-2007) harmonized with the International Standard Industrial Classification of All Economic Activities (ISIC, Rev. 3)[8] – mining (section C), manufacturing (section D), electricity, gas and water production and supply (section E). Rosstat started using the new OKVED-2 harmonized with the ISIC, Rev. 4 from January 2017 [Rosstat, 2016]. Industrial activities in the new classification are divided into four sections: mining; manufacturing; electricity, gas, steam and air conditioning supply; water supply, sewerage, waste management and remediation activities. The scope of industrial activities in accordance with OKVED-2 is presented using a six-digit level. Significant structural changes in the OKVED-2 necessitate extensive work transcoding virtually all the statistical information and a recalculation of the retrospective time series of statistical indicators. Table 1 presents the correspondences between OKVED-2007 and OKVED-2 within the industrial sectors

[8] See UN Statistic Division, http://unstats.un.org/UNSD/cr/registry/regcst.asp?Cl=2

[Egorenko, 2014].

Table 1. Comparison of OKVED-2007 and OKVED-2 at the section level, relating to the industrial sectors

OKVED-2007		OKVED-2	
Section	Description	Section	Description
A	Agriculture, hunting and forestry	A	Agriculture, hunting, forestry, fishing, and fish farming
B	Fishing, fish farming	E	Water supply; sewerage; waste management and remediation activities (irrigation)
		N	Administrative and support service activities (landscaping activities)
C	Mining and quarrying	B	Mining and quarrying (more detailed structure)
D	Manufacturing	C	Manufacturing
		E	Water supply; sewerage; waste management and remediation activities (recycling)
		J	Information and communication activities (publishing)
E	Electricity, gas and water production and supply	D	Electricity, gas, steam and air conditioning supply
		E	Water supply; sewerage; waste management and remediation activities (water supply)
K	Real estate, renting and business activities	D	Electricity, gas, steam and air conditioning supply
		L	Real estate activities
		M	Professional, scientific, and technical activities
		N	Administrative and support service activities
		J	Information and communication activities (IT)
O	Other community, social and personal services activities	E	Water supply; sewerage; waste management and remediation activities
		J	Information and communication activities (radio and television broadcasting)
		R	Cultural, sport, leisure and entertainment activities
		S	Other service activities

Statistical units

A statistical unit for both UN and Rosstat is an entity about which information is requested and for which statistics are ultimately compiled [UN, 2007, 2008a]. The UN Statistics Division recommends subdividing statistical units into observational units (entities which are able to supply data about their activities) and analytical units (artificially created constructs to compile more detailed and more homogeneous statistics). The main kinds of statistical units are following:

- *Institutional unit* (the core unit of the System of National Accounts) is an economic entity capable of owning their own assets, incurring liabilities, carrying out economic activities and engaging in transaction with other entities. In most cases, a single legal entity acts as an institutional unit;
- *Enterprises groups* under the control of the same owner; they are formed to achieve a competitive advantage, controlled by parent enterprise, and used by statisticians for financial analysis only because they are too unstable to be a unit for statistical surveys;
- *Enterprise* as a basic statistical unit, a manufacturer of goods and services with autonomy in making financial and investment decisions and responsibility for their decisions; also, they can be a legal entity;
- *Establishment* as an enterprise or an enterprise part that is located in one place and carries out only one kind of economic activity;
- *Kind-of-activity unit* represented by an enterprise or an enterprise part, which carries out only one kind of economic activity, but there are no restrictions on geographical location;
- *Local unit* is an enterprise or an enterprise part (a workshop, a factory, a warehouse) carrying out one economic activity in one place or from one place.

According to the international recommendations, an establishment is the ideal statistical unit for industrial statistical surveys. Choosing a statistical unit may be guided by a number of factors, such as observation purpose, the needs of users, data availability and quality. Therefore, in some cases, an enterprise can also be a statistical unit. It is considered that in most cases an establishment and an enterprise are the same concept, excluding enterprises consisting of several establishments [UN, 2007, 2008a].

The Rosstat Statistical register is the informational basis for conducting surveys and compiling official statistics in Russia. Rosstat traditionally considers entities and individual entrepreneurs as statistical units for the Statistical register. In particular, they are: legal entities, which have state registration; organizations not having the status of a legal entity (for example, representatives of foreign legal entities that passed accreditation in accordance with Russian legislation, mutual investment funds, social movements); territorially separate structural subdivisions of organizations (local units); branches, representative offices and other organizations subdivisions; individual entrepreneurs.

The definition *enterprise* that Rosstat uses differs significantly from the concept of *establishment*

recommended by the UN as a minimum surveyed statistical unit (see Table 2). *Enterprise* is a legal entity, an organization that may have subdivisions. These subdivisions may perform one or more economic activities and be located in a different place from the parent company and other subdivisions. There are no restrictions on the number of economic activities carried out by these subdivisions or their location. In the Rosstat questionnaires, such an enterprise is called a *geographically separate structural unit (TOSP*). A TOSP is defined as a part of an enterprise located in the same place and performing economic activities at this place or from this place; it does not depend on whether the creation of the TOSP is recorded in the constituent documents and of organization's mandate. TOSPs possess traits of both local units and kind-of-activity units. In international practice, such TOSPs are called *local units*.

Table 2. Basic statistical units for industrial surveys in Russia and the European Union: "enterprise" (Rosstat) and "establishment" (UN)

<table>
<tr><th></th><th>UN</th><th>Rosstat</th></tr>
<tr><td>Parent enterprise</td><td><u>Legal entity</u>
Parent enterprise may consist of one or more establishments</td><td><u>Legal entity</u>
Parent enterprise may have one or more geographically separate structural unit (TOSP)</td></tr>
<tr><td>Group 1:
Local unit</td><td>Economic activity is carried out in the same place or from the same place</td><td rowspan="3">TOSPs may perform one or more kinds of economic activity;
TOSPs located geographically apart from the parent company</td></tr>
<tr><td>Group 2:
Kind-of-activity unit</td><td>One kind of economic activity;
There are no restrictions on geographical location</td></tr>
<tr><td>Establishment
(unit identified for the observation purpose)</td><td>One kind of economic activity;
Activity in one particular place</td></tr>
</table>

Comparing the statistics units of the informal sector according to the International recommendations [UN, 2007, 2008a] and individual entrepreneurs allocated by Rosstat, we can identify some common features:

- A high degree of mobility (creation, liquidation);
- The location and economic activity being carried out (a private apartment, a small workshop, a market);
- The economic activity can be performed by a single entrepreneur involving unpaid work or workers may be hired;
- Capital and fixed assets belong to an employer or his family members and can be used

for commercial and domestic purposes.

The 15th International Conference of Labour Statisticians [ILO, 1993] adopted criteria on limiting the informal sector scope; according these criteria, individual businesses are divided into the following groups:

- Among enterprises that produce goods for their own use, all individual enterprises and those not registered in accordance with the national legislation should be considered as informal;
- Enterprises are considered informal if they have a small number of employees and there is no registration of the enterprise and its employees.

Rosstat defines individual entrepreneurs as persons who are registered in the prescribed manner and engaged in entrepreneurial activities without forming a legal entity. Rosstat observes only officially registered individual entrepreneurs, which are not included in the informal sector, but are statistical units of full value contributing to economic development. At the same time, enterprises and individual entrepreneurs engaged in activities but not registered in accordance with the Russian legislation or concealing the real volume of economic activity belong to informal or shadow economy.

The main characteristics of statistical units

According to the International recommendations for industrial statistics [UN, 2008a], the main characteristics of statistical units are:

- The identification code – a unique number assigned to a statistical unit. In the majority of Rosstat forms, the unique identification codes are assigned according to national classifications of technical, economic and social information: the All-Russian classifier of enterprises and organizations, a taxpayer identification number, and a primary state registration number – for legal entities; a taxpayer identification number, a main state registration number of the individual entrepreneur – for individual entrepreneurs; and classifiers of economic activities, ownership, territories, and others;
- Location – the actual location of the economic activity;
- The type of activity – currently in Russian practice these are assigned according to the All-Russian Classification of Economic Activities (OKVED-2 from 2017);

- The type of economic organization (for determining whether an establishment is a single institution or a part of an enterprise consisting of many establishments);
- The type of legal organization and type of ownership;
- Size.

The Rosstat Statistical Register is compiled by the Rosstat Main inter-regional centre for processing and disseminating statistical information and in the subjects of the Russian Federation by Rosstat territorial bodies [Rosstat, 2005]. The Register is the main database on organizations established in Russia. The Register has a unified identification according to the national classifiers and contains a set of characteristics that allows different aggregates of observation objects to be generated and individual and consolidated data about various aspects of business to be obtained. The Register contains information on the enterprise registration address and the de facto place of business. Information on all business entity categories is distributed into databases (within the Register) “Legal entities” and “Individual entrepreneurs”. Statistical data on legal entities and their TOSPs are contained in the database “The population of the statistical observation objects”.

Registration addresses are specified by using administrative data, mainly the database of the Federal Tax Service of Russia. Since January 1, 2003, data on the state registration of legal entities and individual entrepreneurs have been provided obligatorily by tax authorities, which carry out state registration. An enterprise can record the address of the actual place of business in the questionnaire along with a phone number, email address and a contact person, which simplifies the delivery of statistical tools to the respondents and increases the efficiency of territorial statistical bodies.

If a Russian enterprise has TOSPs, the parent company receives a questionnaire and fills it in according to the summed volume, results and economic activities related to the enterprise itself and the TOSPs. Some Rosstat forms have special questionnaires where volumes and economic activities related directly to each TOSP can allocated.

In contrast to the UN standards, Rosstat does not identify *establishment*, therefore, does not operate with this statistical unit. In addition, in questionnaires, activities are not broken down into primary, secondary and auxiliary; respondents should indicate all types of economic activities carried out, regardless of their volume.

The size of classes of the statistical units in accordance with the International recommendations

[UN, 2007, 2008a] are determined by the physical units (for example, the number of employees) or monetary units (such as turnover or net assets). The classification of unit size based on the average number of employees should include the following: 1-9, 10-19, 20-49, 50-249, 250 or more.

Rosstat divides enterprises into 4 groups: large, medium-sized, small and micro using three criteria (authorized capital, revenue and employment) which are based on Federal Law № 209-FZ "On the development of small and medium enterprises in the Russian Federation". A comparison of the Rosstat and UN criteria is presented in Table 3.

Individual entrepreneurs engaged in economic activities are surveyed by Rosstat separately, using short questionnaires. According to the results of a full-scale Federal statistical observation on activities of small and medium entrepreneurship in 2010, individual entrepreneurs were first grouped by firm size into medium, small and micro.

Table 3. Comparison of the criteria for identifying the enterprises types in accordance with the recommendations of the European Union and the Russian legislation

Enterprises types	European Union		Russia			
	Number of employees	Annual turnover, million Euro	Number of employees	Revenue from sale of goods (works, services)		Authorized capital
				million Rubles in national currency	million Euro (calculated through the exchange rate)*	
Micro	<10	<= 2	<= 15	<=120	<=1,7	The participation share of the Russian Federation, its subjects and etc. should not exceed 25% of the authorized capital; foreign legal entities and etc. – 49%
Small	<50	<= 10	<= 100	<=800	<=11,5	
Medium	<250	<= 50	<= 250	<=2000	<=29,0	
Large	>=250	> 50	251 and more	More than 2000	More than 29,0	

Note: the Central Bank of Russian Federation exchange rate (I quarter 2016 on average) – 77 Euro per 1 Ruble.

Rosstat collects data on the activities of large and medium-sized enterprises annually, and on small and micro enterprises every five years according to the reporting forms of the full-scale statistical observation.

Information sources, compilation methods, and data collection strategies

The International recommendations for industrial statistics [UN, 2008a] emphasize that the main source of industry information are the records of transactions by businesses; therefore, the questionnaires should take into account the relevant terminology in commercial accounting. The recommendations include a detailed list of data items for industrial sector. In general, they covers the following items:

- The number and characteristics of statistical units;
- Employment (the number and the average number of employees, hours worked);
- Employee compensation;
- Other expenditures (the purchase of goods and services; quantitative indicators for the most important types of raw materials – electricity, fuel, gas, water, etc.);
- The value of shipments, receipts from services and other revenues (turnover, sales, revenues from e-commerce, the volume and value of the basic products);
- Inventories;
- Taxes and subsidies;
- Gross output and industrial output at basic prices; intermediate consumption; value added;
- Gross fixed capital formation;
- Orders;
- The protection of the environment.

UNIDO recommends that statistical services develop a single questionnaire with the main focus on obtaining comparable data for at least a minimum set of indicators: the number of enterprises, the number of employees (in all and by gender), wages and salaries (in all and by gender), gross output, gross expenditure, material and component expenditure, electricity and fuel expenditure, costs for services, gross value added, and gross fixed capital formation [Upadyaya 2014]. The data on the industrial sector can be obtained through various economic censuses and surveys or from administrative sources. The data must be reliable, imputation procedures for missing items should be carried out. To compile a list of objects for observation it is necessary to create and

maintain a business register – a list of all economic units in the general population, where a unique code is assigned to each object. The register can be generated on the basis of economic censuses, administrative data, and other sources. It must contain detailed information about each object. Small companies due to their mobility may be included in the register, if they meet the size criteria – UNIDO requests to include data on companies with a staff of 15 people or more in its questionnaire [UNIDO, 2010].

The Statistical Register of Rosstat [Rosstat, 2005] includes administrative and statistical information. Administrative information includes data on the state registration of legal entities and individual entrepreneurs, provided by bodies responsible for state registration (Federal Tax Service of Russia). Statistical information is generated based on administrative information, statistical databases and other government information resources and systems. To identify objects in the Statistical registers, the following all-Russian classifiers of technical, economic and social information are used [Prozorina, 2014]:

- By place of registration;
- By place of business;
- By main kind of economic activity;
- By organizational and legal form;
- By form of ownership;
- By type of enterprise (“small”, “medium-sized”, “is not a subject of small and medium-sized businesses”) and others.

To obtain data on industrial statistics, Rosstat conducts censuses and surveys – large-scale and sampled – at varying intervals and with varying sample sizes. There is no a single questionnaire to provide complete information, however, Rosstat developed a considerable number of annual, quarterly, monthly and weekly reporting forms to obtain industrial statistics. Indicators of physical quantity (volume and value) by types of products and monetary (and labour) indicators are scattered across various forms.

Large and medium-sized enterprises are surveyed annually, quarterly and monthly. These companies fill in more than 15 detailed forms. Small and micro enterprises are surveyed annually and quarterly on a sampling basis and every five years through a large-scale survey; they fill in only 3 questionnaires on the industry. Basic questionnaires (for sampling) – “Information on key indicators of small enterprise” (monthly) and “Information on key indicators of micro

enterprises" (annual) – contain a limited number of indicators and are filled only by 20% of the small and micro enterprise general population. The information applies to all small and micro enterprises in Russia using mathematical methods. The full-scale survey of small businesses is conducted every five years: the questionnaire contains an expanded set of data: on revenue, expenditures, employment, wages, and changes in fixed capital. This information is used for the correction of information between censuses and as a basis (among other data) for compiling input-output tables.

Along with legal entities, Rosstat surveys annually the activity of individual entrepreneurs; the sample size is 10% of the general population. The reporting form for this category of respondents ("Information on individual entrepreneur activities") includes a limited set of indicators as individual entrepreneurs are still wary of state reporting and extremely reluctant to provide information about themselves. In addition, there are brief specialized reporting forms for entrepreneurs engaged in specific economic activities ("Information on individual entrepreneur activities in the retail trade", etc.). Individual entrepreneurs are also surveyed within the large-scale observation conducted every five years to fill gaps in the annual data.

All forms of Rosstat for large and medium-sized enterprises contain information about the name, address, and other characteristics of statistical units, and the economic activities of enterprises. In addition, they include a standard (for a particular survey) set of indicators, such as employment, wages, expenditure and income structure, changes in stock and fixed asset flows, the number and volume of fuel produced, purchased and sold, electricity and water, expenditure on R&D. The main forms are the following: "Basic information on organizational activities", "Information on the presence and movement of fixed assets and other financial assets", "Information on the number of employees and wages" (annual), "Information on the number of employees and wages" (monthly).

The annual reporting form "Information on the production and shipment of goods" provides data on physical quantities (by products):

- Manufactured products, including those produced for own use;
- Shipped product (all and excluding production from raw materials supplied by customer);
- Stocks of finished products at the year-end.

Shipments of each kind of good (without production from raw materials supplied by customer)

are provided both in physical and value terms. In addition, the value of shipped goods (works, services) is broken down by economic activity, and the annual production (for each product) is distributed by months.

Russian structural business statistics are presented by the annual reporting form “Basic information on the organization activities”, which shows the following structural characteristics of the enterprise:

- Organizational structure and its change;
- The distribution of authorized capital to the shareholders/founders (including foreign) by partner countries;
- A break down into four indicators (the average number of employees, wages and salaries, investment in fixed assets, and turnover) by economic activity;
- A break down into three indicators (the average number of employees, wages and salaries, and turnover) by TOSPs and then by industrial activity.

This reporting allows the estimation of a range of value indicators for the activity of the organization as a whole. However, it does not include the number and structure of employees , hours worked, labour payment structure, fixed asset presence and movement, resources consumed in physical terms, waste treatment, emissions, and others. The essential indicators are those for calculating the gross output, the intermediate consumption, and the cost of production:

- The shipment of goods and services produced;
- Stocks of finished goods;
- Work in progress;
- The sale of goods purchased for resale;
- The cost of goods purchased for resale;
- The remains of goods purchased for resale;
- Expenditure on production and purchasing products (by items);
- Stocks of raw materials, purchased semi-finished products and components for the needs of production;

– Subsidies on production and others.

Some reporting forms include extra modules provided supplementary information, for example, R&D expenses. In addition, there are monthly questionnaires for large and medium-sized enterprises ("Information on production and shipment of goods and services", "Information on the organization's financial condition") to clarify and supplement the annual survey data on revenues, expenditures, capital, accounts payable and receivable, profit/loss and so forth.

To provide essential information for the government on the quantity of gas, oil, electricity, ethanol and some other kinds of products, Rosstat developed a number of special reporting forms. Information on gas production is collected annually, on oil – quarterly, on ethanol – monthly, and on petrol and diesel fuel – weekly. The main Rosstat reporting forms to obtain information on the economic and production activity of industrial enterprises in Russia are shown in the Annex.

To supplement structural surveys, Rosstat developed a large number of specialized reporting forms on industrial statistics for obtaining more detailed information on the large and medium-sized enterprises:

– Annual reporting forms: "Information on the production of heat and electricity by power plants"; "Information on balances, the purchase and consumption of fuel and energy resources, the collection and use of waste petroleum products"; "Information on fuel, heat and electricity used for producing individual kinds of products, works and services"; "Information on oil well operation"; "Information on oil and gas well construction"; "Information on the gas well operation"; "Information on the production of the chemicals that are subject to declaration and monitoring under the Convention No 153 from 28.07.2009 as amended from 1.4.2014 No 224"; "Information on the processing of livestock and poultry and meat output"; and others;

– –Monthly reporting forms: "Information on the production and shipment of ethyl alcohol, alcohol-containing and alcohol production and bottling of alcoholic beverages" and others;

– Weekly reporting forms: "Information on the production of petroleum products" and others.

Despite the vast array of detailed indicators in the Rosstat databases, which can serve as sources of industrial statistics, there is still an information gap compared to the UN recommendations

and the UNIDO Large Questionnaire recommended to Industrial Survey [UN, 2008a], [UNIDO, 2010]. Specifically, there is no full information on women's and men's employment, foreign workers, wages and salaries, hours worked. There are no data items to make up the incomes and expenditures of small and micro enterprises, or data on the changes in the stock fixed asset movement of these enterprises. There is also no information on some other indicators; a detailed analysis is given in the next section.

Data items of the UNIDO Large Questionnaire for industrial surveys and Rosstat reporting forms: a comparative analysis

The large questionnaire developed by UNIDO for industrial surveys is presented in the UNIDO International recommendation "Industrial Statistics. Guidelines and Methodology" [UNIDO, 2010]. A comparative analysis of this questionnaire and the Rosstat reporting forms revealed comparable data items and missing information.

Comparable data items in the UNIDO large questionnaire and the Rosstat reporting forms:

- *Data on industrial enterprise income (UNIDO questionnaire)* can be obtained from the Rosstat reporting form "Basic information on organizational activities" (turnover, shipping), "Information on production and shipment of goods and services" (revenue). Enterprises identification (UNIDO questionnaire) also is carried out by the reporting form "Basic information on the organization activities" which includes the most detailed specifications;

- *Data on wages and employment (UNIDO questionnaire)* can be obtained from the following Rosstat reporting forms: "Basic information on organizational activities"; "Information on the employees number and wages"; "Information on the working conditions and the compensation for work in harmful and (or) dangerous working conditions"; "Information on the underemployment and the movement of workers"; and "Information on the number of employees and wages".

Missing data items in the Rosstat reporting forms:

- *Wages and employment (UNIDO questionnaire):* the average number of proprietors/partners, unpaid family members, apprentices, working directors, casual/seasonal workers, leased workers (males and females); the average number of non-resident workers – there is no separate data on each of these indicators; no data

for salaries and wages, social benefits, insurance and premiums paid to all workers types listed above;

- *Wages and employment (UNIDO questionnaire):* there is no information on the number of employees and remuneration by codes 231-261, 271-279; the average number of part-time and full-time workers and their remuneration: proprietors/partners, unpaid family members, apprentices, working directors, casual/seasonal workers, leased workers (males and females);

- *Hours worked (UNIDO questionnaire):* there is no information on indicators № 201h-204h, 206h-217h and b-e columns; no data on permanent employees by gender, by type;

- *Wages and employment of males and females (UNIDO questionnaire*): there are no such detailed data;

- *Income (UNIDO questionnaire*): there are no data items (codes № 301-329) for the small industrial enterprises;

- *Expenditure (UNIDO questionnaire):* there are no data under codes № 401-444 for small industrial enterprises (large-scale survey of small businesses every five years will provide the data items: payments for raw materials; fuel, electricity, water purchased; payments for rental of premises; purchase of goods for resale);

- *Stocks and inventories (UNIDO questionnaire)*: there are no data under codes №№ 501-509 for small industrial enterprises;

- *Fixed assets (UNIDO questionnaire):* there are no data under codes №701-715 for small industrial enterprises (the large-scale survey of small businesses every five years will provide the data on buildings and facilities, vehicles, machinery and equipment, intangible fixed assets including databases);

- *Fuel purchased and consumed (UNIDO questionnaire:* there are no data under section 8a (from renewable resources) for all types of enterprises;

- *Electricity generated, purchased and used (UNIDO questionnaire):* there are no data under section 9a (generated from renewable resources) for all types of enterprises;

- *Water produced, purchased and used (UNIDO questionnaire*): there are no data under

section 10a (Waste treatment) for small industrial enterprises;

- *Goods and materials consumed (UNIDO questionnaire):* there are no data under codes №1101-1114 for all types of enterprises;
- *Production capacity and its utilization (UNIDO questionnaire):* there are no data for small industrial enterprises;
- *General business environment (UNIDO questionnaire)*: there are no data for all types of enterprises;
- *Research and Development (UNIDO questionnaire):* there are no data items describing employee remuneration; no data for small industrial enterprises;
- *Orders and traded goods (UNIDO questionnaire):* there are no data.

It is obvious that the structure of the Rosstat surveys and reporting forms requires large-scale modernization to achieve greater harmonization with the UN and UNIDO International recommendations. However, the current reporting forms include individual and sufficiently detailed data items to provide users with detailed statistical information and indicators which reflect the trends of economic (including industrial) development. Rosstat has to provide the Government of the Russian Federation with operative information under special requests, so the necessary information is included according to such requests in the reporting forms. Finally, the most important Rosstat mission is to provide data for the system of national accounts – for the gross domestic product calculation.

The data quality, metadata, and industrial statistics dissemination

Rosstat has not yet developed a unified methodology for industrial statistics, for that reason a more detailed assessment of data quality (by relevance, accuracy, timeliness, methodological soundness, coherence and accessibility) in accordance with the international recommendations [UN, 2008a] is difficult. Such criteria are defined by Federal Law № 282-FZ "On Official Statistical Accounting and State statistics system in the Russian Federation" in Article 4, paragraphs 1-8. In accordance therewith, official Russian statistics must comply with the principles of completeness, accuracy, scientific validity, timeliness and availability of data (except for information, access to which is restricted by federal laws); use evidence-based official statistical methodology corresponding to the international standards and principles and the Russian Federation legislation, which is open and available, and so forth.

Rosstat has designed exclusive methodology for each reporting form, which facilitates, to some extent, filling the questionnaire data items by respondents (in terms of the maximum possible harmonization with the concepts and definitions used in taxation and accounting). Currently, however, the total number of reporting forms for industry companies indicates that reducing the burden on respondents – one of the tasks of Russian statistics modernization – has not yet been performed in full.

Rosstat provides statistics to politicians, the business community and all interested users, broken down in various ways including consolidated information for Russia, Russian regions, municipalities, and economic activities. Individual data per object is not available to any user; Rosstat guarantees the confidentiality of the received primary data. In processing, the data of observations and census are depersonalized in accordance with the requirements of the Federal Law of 27.07.2006 №152-FZ “On personal data”.

Conclusions

In promoting inclusive sustainable industrialization and encouraging innovation, technological progress contributes to the effectiveness of industrial production, leads to increasing competitiveness in external markets, reduces the country’s vulnerability zones, and expands national participation in the global flows of industrial products. These new technologies, the quality and timeliness of their implementation are the main drivers of successful industrialization and achieving sustainable economic growth.

To evaluate the process of country's industrialization objectively, it is important to develop technology-intensive industries and to make the best decisions at all levels of governance. For this the quality of the national statistical information system – the availability, completeness, timeliness and international comparability of statistics – is critical.

UNIDO acts as a global forum for the establishment of acceptable international standards on industrial statistics; UNIDO international recommendations are aimed at the greatest possible harmonization of the national statistical systems. This paper presents the results of a comparison of Russian state statistical practices with the UNIDO recommendations on industrial statistics, including aspects of the scope and structure of the industrial sector; the composition of statistical units; the data collection strategy; and a comparative analysis of data items of the UNIDO Large Questionnaire for industrial surveys and Rosstat reporting forms. The following conclusions can be drawn. Rosstat has not yet developed a unified methodology for industrial statistics; for that reason, data quality assessment (relevance, accuracy, timeliness, methodological soundness,

coherence and accessibility) in accordance with the international recommendations is very difficult and has only advisory character.

The Russian statistical system should be modernized in terms of reducing the burden on the reporting for entities and for the closer convergence of statistical, tax and customs reporting, and for the transparency and comparability of disaggregated information in order to evaluate the quality and effectiveness of industrial policy nationwide and across regions. This does not mean using data per object, but the obligatory detailing of information with the four-digit level of industrial activity classification, which is sufficient to measure development of the national industrial and export potential, and to analyse the quality and efficiency of industrial policy, including a global comparison of the level and trends of re-industrialization.

Structural changes in the new Russian classification system have led to the need for the transcoding of virtually all available statistical information resources and a recalculation of retrospective time series. The long transition period for the OKVED-2 implementation in Russian statistical practice has created difficulties in making comparisons of the re-industrialization process rates and quality which cannot be done within the framework of a single country.

The data to identify industrial activities at the two- and four-digit levels, depending on the technological sophistication (when all industrial activities at the detailed level can be clearly divided into low-, medium- and high-tech on the basis of the share of R&D expenditure in gross output and gross value added) is delayed. This still makes it difficult to assess the technological level of industrial activities, the modernization capacity of manufacturing as recommended by the OECD and UNIDO.

It is an open question how quickly after information recoding, the long time series at constant prices will be available, which is necessary to carry out a comparative analysis for long time intervals. There is no clarity about a detailed elaboration of the recalculated retrospective time series based on of transition keys from OKVED-2007 to OKVED-2.

The choice of minimum statistical unit still remains an unsolved problem. The “enterprise” is a traditional reporting unit for Russian executive authorities, because an enterprise is registered with the tax service as a legal entity. It is very difficult to obtain information on an “establishment” with only one economic activity, as recommended. At the same time, a break down into primary, secondary and ancillary activities is not provided in reporting

forms; respondents indicate all kinds of on-going activities, regardless of their volume. It is assumed that in the reports of enterprises that carries out several activities, information on output and gross value added in various industrial activities may be obscured at the level of collecting information by local (or regional) statistical services. Insufficient transparency of such information is compounded by a lack of uniform methodological recommendations and indicators for industrial statistics.

The significant number of annual, quarterly, monthly and weekly reporting forms, and the vast array of indicators in the Rosstat statistical databases in the absence of a unified questionnaire to obtain comprehensive information from enterprises does not solve the problem of missing information compared with the UN recommendations and the best international statistical practices. In particular, there is no information about male and female employment, foreign workers, wages by gender, and hours worked. There are no data for the income and expenditure of small and micro enterprises; no information about changes in stock, profit, fixed assets flows, purchased and consumed fuel, electricity, water, and raw materials, the orders and value of sold industrial products; in European practice such information on the small business contribution to the national industrial potential is common. There are no data about the general business environment, although such indicators are strongly recommended and included in the UNIDO Large questionnaire for industrial surveys. No summary statistics on so-called “green” industries, particularly for assessing the effectiveness of using various kinds of raw materials and energy at the detailed level of industrial activities.

The UNIDO international recommendations on industrial statistics include compiling a set of indicators based on performance, structural change, and competitiveness for industrial policy development. Obtaining such indicators requires a reorganization of the statistical process. However, sharing responsibilities for various thematic areas between departments in the state statistics structure often leads to differences between reporting units and, therefore, a decrease of the aggregated data quality and comparability. To solve this problem, the traditional organization of information flows within the state statistical service should be optimized. Using international statistical methodologies (including UNIDO) in data collection and processing improves both data reliability and the possibility of using them to monitor the development of industrial policies and economic programs.

The statistical approaches described in this paper are essential to understand and improve in order to develop evidence based STI indicators for the purpose of STI policy making.

Frequently STI indicators are being developed but oftentimes these are little connected to the underlying industrial statistical basis. This might eventually lead to misunderstanding and misinterpretation of STI statistics.

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ANNEX

Table 1. Rosstat reporting forms to obtain information on the economic and production activity of the industrial enterprises (legal entities) in Russia

	Large and medium-sized enterprises	Small enterprises	Micro enterprises
Annual surveys	1. "Basic information on the organization activities" (information on the number of TOSP, income, expenditures (costs and changes in inventories), the average number of employees, labor costs, investment; Section 9: Information on the parent organization and TOSP - for each kind of economic activity: the average number of employees, labor costs, turnover) 2. "Information on the presence and movement of fixed assets and other financial assets" 3. "Information on the presence, movement, and composition of contracts, leases, licenses, marketing assets and goodwill" (intangible assets of enterprises) 4. "Information on the employees number and wages" (average number of employees, wages and social payments by economic activities) 5. "Information on the working conditions and compensation for work in harmful and (or) dangerous working conditions" (number of employees including women and compensation for heavy and harmful working conditions) 6. "Information on creating and using advanced production technology" (the estimations of the development and use of technological advances in manufacturing by technology type and others) 7. "Information on the shipment of goods, works and services related to nanotechnology" 8. "Information on the research and development" (the number of employees involved in R&D, the R&D costs, the overall profit and profit from R&D, the average size of fixed assets including R&D, R&D funding sources, internal costs by research areas) 9. "Information on the organization innovative activity" (the amount of innovation by type and source of funds, the number of acquired and transmitted new technologies) 10. "Information on production, shipment of goods and the balance of production capacity" (the amount of produced and shipped production by	-	1. "Information on key indicators of micro-enterprise activity" (income, expenditures (costs and changes in inventories), the average number of employees, labor costs, social benefits, investments, shipping, sales, income, industrial production (by products)

	Large and medium-sized enterprises	Small enterprises	Micro enterprises
	type) 11. “Information on production, transmission, distribution and consumption of electrical energy” 12. “Information on the hydroelectric power plant operating” (the power, the volume of water in the reservoir, the full flush, full water flow for the production of electricity, the amount of produced electricity) 13. “Information on the atmospheric air protection” (the amount of produced pollution, the sources of pollution, the methods of pollution abatement)		
Quarterly surveys	-	1. “Information on key indicators of small enterprise activity” (the average number of employees; wages; social benefits; investment; shipment; sales; the cost of buying and reselling goods; profits, investment and domestic spending on R&D) 2. “Business tendency survey of small enterprises in mining, manufacturing, electricity, gas and water production and supply” (evaluation of the enterprise business activity, including employment, production and prices; the main limiting factors)	-
Monthly surveys	14. “Information on production and shipment of goods and services” 15. “Information on the underemployment and the movement of workers” 16. “Information on the number of employees and wages” 17. “Information on the organization financial condition” (profits, accounts payable and receivable, income, expenditures, income from sale of fixed assets, fixed/non-fixed assets of the enterprise, changes in inventories - all components in accordance with the enterprise accounts) 18. “Business tendency survey of enterprises in mining, manufacturing, electricity, gas and water production and supply” (evaluation of the enterprise business activity, including employment, production and prices; the main limiting factors)	3. “Information on the of small enterprise production”	-

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