

The Evolution of Intellectual Property Products in the System of National Accounts: A Case Study of R&D Product

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Abstract

The 21st century is an era of innovation. How to reflect the value of innovation in GDP has become the focus for all countries. Intellectual property in China has developed rapidly, adding its related products into GDP assets accounting scope can encourage and promote local and national economic development, as well as raising the innovation consciousness and awareness. China used to take the international standard SNA 1993 as national economic accounting system reference, based on the overall revision of China's national economic accounting system (2002), China is going to form the national economic accounting system (2016) which will take SNA-2008 as the standard. This article mainly take R&D products as example, analyzing the content and evolution of the national accounting system of intellectual property products at home and abroad, in order to provide a reference for better implementation for China's GDP accounting system.

Keywords: intellectual property products, accounting system, domestic and foreign evolution, R&D products

1. Introduction

National Economic Accounting or National Accounting, it refers through a series of scientific accounting principles and methods to combine the basic indicators of national economy which are collected by the domestic departments and industries, for describing and reflecting the operation of the national economy entirely and detailedly. The National Economic Accounting System, also known as the System of National Accounts (SNA), is a set of internationally accepted standard proposal according to the strict accounting rules for national economic accounting. The manifestation of this proposal encompasses a complete set of concepts, definitions, classification, and accounting rules, including internationally recognized standards which measure indicators such as gross domestic product (GDP). For more than half a century, the national economic accounting system has made great contributions to the scientification of macroeconomic management in the world. The data and information provided by this system offer an important support for the policy formulation, theoretical research and international cooperation. At present, most countries in the world adopt the System of National Accounts 1993 (SNA -1993) to carry out national economic accounting, which was issued jointly by the United Nations Statistical Division and other international organizations. However, with the continuous development and evolution of global economic development practice and theory, not only the existing mainstream national economic accounting system SNA-1993 cannot accurately reflect the growth of national wealth, the difference of economic development quality and the improvement of social welfare, but also cannot reflect the real situation of the resource consumption, environmental losses, intellectual property, human capital investment and other intangible assets.

The 40th session of the United Nations statistical commission established the new international statistical standard SNA-2008, the highlight of the new GDP accounting method is the inclusion of intellectual property in the statistical category^[1], which shows the value of intellectual property and reveals the nature of GDP in the 21st century. Intellectual property products^[2] were the achievement of research, development, investigation or innovation, developers can sell these knowledge or use it to make profit in the production, because the use of these knowledge is limited under legal or other means of protection. The integration of intellectual property products into the GDP accounting system is an inevitable requirement to conform to the trend of world economic development. Some products which belong to intellectual property products originally exist in the national economic accounting system, such as entertainment, literature, artistic originals and mineral exploration, and so on. SNA-2008 integrates the literature and entertainment properties with the products which are similar to them, then named these products the intellectual property products and add it into fixed assets, this is undoubtedly significant changes of national economic accounting system. After the launch of SNA-2008, some developed countries adjusted their country's national economic accounting system based on SNA-2008, such as the United States, Canada, and Australia.

According to the materials and data we got, this paper mainly takes R&D products as an example to analyze the content and evolution of intellectual property products accounting system at home and abroad, so as to provide reference for better improvement of GDP accounting in China.

2. The scope of intellectual property products

2.1 SNA-1993

In the 1993 edition of the System of National Accounts (SNA 1993) ^[3], there is no definite conceptual expression of intellectual property products. SNA-1993 classifies entertainment, literary and artistic originals and copyrights into the capital account, classifies research and development, mineral exploration into the production accounts of selected industries. Meanwhile, SNA-1993 regards research and development as intermediate consumption while mineral exploration has been incorporated into the fixed assets.

2.2 SNA-2008

The SNA-2008 ^[4] does not treat the research and development activity as ancillary activity. It clearly gives the definition and scope of intellectual property products, including research and development, mineral exploration and evaluation, computer software and databases, entertainment, literary and artistic originals, and other intellectual property products. The intellectual property products are treated as fixed assets.

2.3 The United States

The United States has already incorporated computer software into GDP accounting as fixed assets in 1999. In July 2013, the range of intellectual property products was revised and divided into the following parts: computer software, research and development, entertainment, literary and artistic originals.

2.4 Canada

Canada defined intellectual property products in national economic accounting earlier than the United States, and it did some adjustments of intellectual property products in line with its own national conditions. According to the information published on the official website-Canadian Intellectual Property Office (CIPO), the intellectual property products include computer software, databases, research and development, mineral exploration and evaluation.

2.5 Australia

Australia is the first country to fully implement SNA-2008 and release data, its classification of intellectual property products is most similar with SNA-2008. Based on the information in the website of Australian Bureau of Statistics, its intellectual property products including artistic originals, research and development, computer software, mineral and petroleum exploration.

Table 1, The division of intellectual product in international accounting standards and some countries ^[5]

Country/System	The type and scope of Intellectual Property Products
SNA-2008	1、 Research and development 2、 Mineral exploration and evaluation 3、 Computer software and databases 4、 Entertainment, literary and artistic originals 5、 Other intellectual property products
The United States	1、 Computer software 2、 Research and development 3、 Entertainment, literary and artistic originals
Canada	1、 Computer software 2、 Databases 3、 Research and development 4、 Mineral exploration and evaluation
Australia	1、 Artistic originals 2、 Research and development 3、 Computer software 4、 Mineral and petroleum exploration

3. Evolution and Overview of Intellectual Property Products Accounting of China

3.1 The evolution and overview of GDP accounting system of China

The national economic accounting system of China has gone through three stages: the first stage is from 1952 to 1984, that is, planned economy period, Chinese government adopts material product balance system (MPS), also known as the Oriental system. The second stage is between 1985 and 1992, when the planned economy is overstretched to market economy, at that time, the MPS and SNA accounting system existed simultaneously. The third stage is from 1993 to now, which is also in the period of market economy, during this period, the MPS

system was abolished. On the basis of SNA-1993 and national conditions of China, Chinese government compiled the System of National Accounts 2002(CSNA-2002), the system adopted basic accounting principles, contents and methods of the System of National Accounts 1993 (SNA-1993).

Up to now, there is a latest progress about the System of National Accounts of China. It is reported that in order to reflect the operation of China's national economy more accurately, to meet the needs of the public, as well as to improve China's national economic accounting methods and connect with international standards, the National Bureau of Statistics of China will release a new version of System of National Accounts (2016). This new accounting system was proved in principle by the State Council of China in July 2017, based on the SNA-2008, the CSNA-2016 updates the CSNA-2002 in the following aspects, including basic framework, basic concepts and accounting scope, basic classification, basic accounting indicators and basic accounting methods^[6]. China will take this as a blueprint for national economic accounting work in the future.

3.2 Overview of Intellectual Property Products in China's GDP Accounting

Although the new concept of intellectual property products was first proposed in SNA-2008, China does not involve this concept in the domestic GDP accounting before 2016, and there is no method to account intellectual property product accurately.

However, the concept of intellectual property products was introduced in the CSNA-2016. In the new system, the treatment of Research and Development (R&D) expenditure was adjusted, and the R&D expenditure which would bring economic benefits to the owners is no longer used as intermediate inputs, but as fixed capital formed into GDP.

4. Overview of intellectual property products in the national accounting system in foreign countries

4.1 The United States

Prior to the 14th comprehensive adjustment of National Income and Production Account (NIPA), the U.S. official statistics department had carried out other accounting capitalization projects (such as capitalization of housing transaction costs), accumulated relevant accounting experience in the meantime.

According to the information published in the website of Bureau of Economic Analysis (BEA), the U.S. set a satellite account that arrays information about R&D in 1994, for reflecting the impact of R&D expenditures on the national economy. In 2006, the revised R&D satellite account was released in the U.S. and has been amended respectively in 2007 and 2010 (see Table 2). In response to the capitalization of R&D expenditures in SNA-2008, the standard methodology given by the BEA also use the total cost of R&D activity as the measurement of R&D asset value, but the data source and the specific operational process are slightly different from those in Australia.

The data are mainly derived from the survey data of R&D expenditure given by National Science Foundation (NSF) of the U.S. Based on this, the U.S. did some adjustments about the coverage and other aspects of the obtained data to ensure that it is in consistent with the accounting data caliber. As shown in the NSF report, R&D activities are classified by its investors rather than the actual performers to avoid the confusion and division of its ownership. In addition, the R&D purchased or funded by the federal government is considered the investment of federal department due to lack of ownership information for R&D assets. In terms of government R&D, the BEA has considered four types of federal R&D, i.e. defense, health, space, and energy.

Table 2, The progress of R&D Calculation in the United States^[7]

Time	Event
1985	Working with IBM to measure the computer price which was adjusted by the quality and become more accurate
1994	Preparing R&D satellite account
1996	The chain method of measuring the real GDP was introduced to reflect the price of high technology and the semiconductor more accurately
1999	To capitalize the software, and introduced a service industry measurement which reflects the new technology
2001	Introducing the LANs prices which was adjusted by the quality
2003	Taking advantage of the price which was adjusted by the quality to reflect the change in the share of GDP
2006	Releasing the original R&D account
2007	Releasing the updated R&D data
2009	Releasing the accounting framework of Intellectual Property and Innovation
2010	Releasing the extended and updated R&D account

4.2 Canada

The Canadian System of National Accounts 2012, which was published by the Statistics Canada (StatCan)^[8], was revised according to the SNA-2008, which explicitly proposed to capitalize the R&D activities (including the R&D activities of government and corporate). The Canadian R&D expenditures data were mainly from the various surveys conducted by the government. The data obtained from the survey were processed and published in the official database of the Statistics Canada.

The surveys mainly include:

- (1) Energy R&D Expenditures by Area of Technology survey;
- (2) Federal Science Expenditures and Personnel, Activities in the Social Sciences and Natural Sciences
- (3) Gross domestic expenditures on R&D;
- (4) Higher Education R&D Estimates;
- (5) Canadian corporate R&D survey;
- (6) R&D of Canadian Private Non-Profit Organizations;
- (7) R&D personnel;
- (8) Scientific Activities of Provincial Research Organizations, Activities in Natural Sciences and Engineering.

The design of the questionnaire is mainly guided by the *Frascati Manual: Proposed Standard Practice for Surveys of Research and Development*, which was published by the Organization for Economic Co-operation and Development (OECD)^[9]. The categories of department are: government departments, business sector, higher education sector and private non-profit organizations (foreign sector only as a source of funds).

Canadian government departments are mainly divided into the federal government, provincial government, and provincial research organizations. The R&D expenditure within the federal government is counted by the annual federal science expenditure and personnel surveys. The provincial R&D expenditure from the provincial government is based on a survey of scientific activities (the Quebec government conducts its own investigation of its internal R&D activities and shares the data with the Statistics Canada to construct the "total R&D expenditure" matrix).

Corporate R&D expenditures data come from the annual Canadian corporate R&D survey. The target department of the survey includes all enterprises, organizations and institutions, government-owned enterprises are also included.

The R&D expenditure of the higher education sector is estimated using the estimation model. The national R&D expenditure data for the private non-profit sector is provided by the annual R&D survey of private non-profit organizations.

Canada conducted a survey of patents and trademarks under the Canadian corporate R&D survey, which required companies with R&D activities and revenues to fill the questionnaire. The investigation of patents and trademarks is divided into two parts, one part is the transactions conducted among the company and the parent company, subordinate and affiliated company (i.e., internal transactions), and the other part is the transactions with other organizations or individuals (i.e., external transactions).

4.3 Australia

The R&D survey was conducted in accordance with the Frascati Manual in 2004 in Australia. The basic practice of using R&D survey as capital is:

- (1) Transforming the R&D survey data into SNA accounting caliber data through bridging tables;
- (2) Determining the scope of the capitalization of R&D expenditures. The R&D expenditures of the pure basic research, applied research, strategic basic research, and experimental development activities of companies are counted as assets, however, the R&D expenditure of private non-profit organizations, general government and imported pure basic research activities are not included. Moreover, the exported R&D expenditures are not regarded as assets (see Table 3).
- (3) Estimating the valuation of R&D assets by cost. Since more than 90% of R&D activities are self-sufficient production, and the market price data of R&D assets do not exist, therefore, R&D assets are estimate by the cumulative cost.

Table 3, The scope of the capitalization of R&D activities' expenditures in Australia

Type	Company	Private non-profit organizations	General government	Export	Import
pure basic research	√	—	—	—	—
applied research	√	√	√	—	√
strategic basic research	√	√	√	—	√
experimental development	√	√	√	—	√

4.4 Other countries and regions

4.4.1 European Union (EU)

The R&D capital formation is measured directly from R&D expenditure data. Its R&D expenditure data are translated into the Frascati Manual's survey data in order to be consistent with SNA-2008 and the European System of Accounts (ESA 2010). The R&D expenditure data of EU are collected by the member countries in their respective domestic surveys, and then report to the Eurostat. Although R&D expenditure data of different countries are collected in accordance with Frascati Manual and regional guidelines, data between countries are not entirely comparable.

The differences between different countries include explanation of definitions, different methods of investigation, and the specificity of national R&D systems. In the United Kingdom, for example, it divides the survey targets of R&D expenditure into four categories according to the Frascati Manual, including the corporate sector, government departments (involving research associations), higher education departments, and private non-profit organizations. The R&D expenditures data of these four sectors are collected through their own separate surveys. After the completion of the survey, the Office of National Statistics of UK also needs to submit all the completed questionnaire to the Eurostat besides the relevant R&D expenditure data in order to finish its GDP accounting work.

4.4.2 Japan

Japan plans to implement SNA-2008 in 2016, and the current standard for GDP accounting is SNA-1993. Japan began using SNA-1993 in 2000, and the relevant data were collected and sorted out by the Economic and Social Research Institute (ESRI).

Japan has a special survey of research and development on R&D activities, which investigates different departments in accordance with the departmental classification in the Frascati Manual. The survey respondents are divided into commercial enterprises, non-profit institutions and public institutions, universities and colleges, each department has a separate questionnaire and the survey content is different. There are two kinds of questionnaires for commercial enterprises, one for enterprises with more than 100 million Japanese yen of capital, and the other for enterprises with capital less than 100 million Japanese yen.

4.4.3 South Korea

In 1999, South Korea began using a series of new definitions and standards in SNA-1993, and fully implemented SNA-1993 in 2004. The data are collected and summarized by the Economic Statistics Department under the Bank of Korea.

In the Korean System of National Accounts, which was issued by the Bank of Korea, two points are mentioned about the patent:

- (1) The fee of using a patent or trademark is not regarded as the leased property, but treated as the intermediate consumption of the enterprise, or the final consumption expenditure of the household and the government;
- (2) Royalties and license fees include the expenditure and income which come from the resident and non-resident units consuming for intangible, non-productive, non-financial assets and exclusive rights (such as patents, copyrights, trademarks, industrial processes, franchise rights, etc.), as well as the use of production of originals or prototypes (such as manuscripts and movies). The latter is under the Miscellaneous Services for Import and Export Services in the Account.

There is a survey for R&D and ownership of intellectual property in the Survey of Business Activities in South Korea. For instance, the survey about whether the company has R&D activities or not, the survey of R&D expenditures and the sales of enterprises, as well as the survey for investigating the number of patents and trademarks of enterprises.

5. Conclusion

Intangible wealth such as intellectual property is becoming more and more important to a country's economic development. The amount and composition of the intangible wealth of a country is not only the foundation of the productive forces, but also impact the sustainability of future output in a country.

Some countries, led by the United States, have incorporated Intellectual Property Products into the scope of fixed assets of national economic accounting system under the guidance of SNA-2008, but they are still in the exploratory stage. There are many researches on R&D in these countries, but for other intellectual property products stipulated in SNA-2008 are rarely discussed, so the systematic researches of intellectual property accounting system still need a lot of further investigations.

China has begun to develop the implementation of the System of National Accounts (2016). Taking the intellectual property products into GDP accounting, not only can improve China's GDP and optimize its structure, but also can energize the economy for the whole country, what's more, it can provide an opportunity for China to connect national economic accounting system with the international standards and accelerate the progress for the innovative country construction.

Considering that this is the first time for China to involve intellectual property products into the GDP accounting, based upon the national condition of China and the related material we obtained, we propose some suggestions for China to better carry out the system of national accounts 2016 in the future.

First, the Chinese government should conduct much deeper comparisons of intellectual property products with those in international organizations and foreign countries, particular attention should be given to accounting systems and methods. As previously mentioned, the major developed countries represented by the United States have carried out practical work on the accounting of intellectual property products, incorporating R&D expenditures into their own GDP accounting systems to measure the capital value of R&D. Generally speaking, R&D expenditure accounting has been one of the important difficulties faced by national accounting work. In response to this, some developed countries try to use output data of R&D to better deal with the classification and depreciation problems related to R&D expenditures in practice, for example, the data of patent, which was regarded as one of the main outputs data of R&D. Therefore, China government should do further research on this, and carry out the corresponding international comparative work.

It is also important to recognize that R&D is not just patent, it also includes industrial design, copyright, etc. It is necessary to systematically engage in creative work in order to increase knowledge reserves (including knowledge about human, cultural and social) and use these knowledge reserves to develop new applications. Hence, it is a trend that the China's national accounting system needs to expand the scope of data collection of intellectual property products to be more close to the international accounting standard.

Second, the Chinese government should develop an effective intellectual property product accounting program in the light of its national situation. There is no uniform requirement for international implementation of intellectual property product accounting standards in different countries, so countries need to design their own intellectual property products on the basis of their own condition, accordingly, China also needs to be realistic and rationally formulate the implementation plan and design for the accounting of intellectual property products^[10].

For example, China has some basic information such as R&D expenditure survey data, for the revision of production assets, China should fully study the existing data caliber, calculation methods and so on, then analyze the feasibility for using these data to calculate the capital formation. For the process of accounting in China, it is proposed to carry out the pilot project of intellectual property products accounting and analyze the impact of the adjustment of GDP accounting methods for the national economy development, especially the impact on the asset management and taxation in intellectual property-intensive industry. Moreover, China could explore the tax standards and tax policies which can encourage the development of intellectual property-intensive industries.

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