The Online Reporting System of National Bureau of Statistics of China: Construction and Application

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Abstract: The Online Reporting System (ORS) is one of the most important projects of China's statistical information system and the interrelated Four Major Programs. This paper presents the efforts of NBS in accomplishing this system and keeping it under smooth operation over the last five years, including: (a) system design and development; (b) management of operation and maintenance; (c) security construction; and (d) technical support, etc.

Keywords: Online Reporting System (ORS), Four Major Programs, Challenges, Information System

1. Backgrounds

As social concern and attention to the statistical work of China arises, higher requirements have been proposed on the accuracy, timeliness, objectivity and completeness of statistics by the government, enterprises, social organizations and the public, traditional approaches of progressive statements reporting could no longer fully meet the need of statistical development.

In order to improve the statistical capacity, statistical data quality and government statistics credibility, comprehensively promote the statistical work's uniform regulation, reform and innovation, openness and transparency, give full play to the basic role of statistics in the national macro-control and economic and social management, the National Bureau of Statistics of China(NBS) started the construction of an interrelated Four Major Programs, namely Business Register, Integrated Questionnaire for Enterprises, Data Collection and Processing Software and Online Reporting System.

The Four Major Programs is an organic whole, the basis of which is Business Register, the core is Integrated Questionnaire for Enterprises, the platform is Data Collection

and Processing Software, and the means is Online Reporting System.

This new system has achieved the work pattern that respondents and enumerators can submit raw data directly to National Data Management Center via the Internet and statistical agencies at all levels can share the data online. Therefore, the working focus of primary statistical agencies will be dramatically switched, from arduous data collection and reporting in the past, to the verification of raw data and supervision of enterprise-based statistics now, so as to effectively eliminate the possible intervention during intermediate phases and improve the efficiency of data collection and the transparency and controllability of production process.

ORS is one of the most important elements of the statistical information system construction. On February 18, 2012, the National Online Reporting System started its formal operation after about five years of construction, piloting and perfection. More than 700,000 scale-above enterprises submit their raw data directly to NBS via this system, both annually and termly.

2. Challenges

The accomplishment of all these noteworthy achievements has encountered enormous doubt, challenges and difficulties during the entire construction process:

➢ **Challenges in designing stage**: ORS is a complex and gigantic system that involves plenty of aspects, including network, security, database, hardware and software, applications and management. Design defects in any aspect can cause short-board effect, thereby reducing the availability and efficiency of the system.

➢ **Challenges in advocacy and training stage**: Since the traditional way of reporting has been changed, statisticians' concerns on data security and their slow adaptation to this new way of reporting may affect the quality of data collecting. What's more, due to the personnel movement of corporate statisticians, particularly in relatively small-scale enterprises, it becomes rather difficult for the training of all those huge numbers of staff.

➢ **Challenges in application stage**: It is only in the trial could the handiness of those functions within this system be tested. How to ensure our users a better experience and give them a timely access to useful information are challenges facing the system.

3. Construction

After constant trial and perfection over the past year, this system operates smoothly and data reporting stay normal. Lots of arduous work has been done by the NBS for the accomplishment of this goal:

3.1 Hierarchical Structure

The Online Report System (ORS) comprises numbers of components, including the Reporting website, security authentication system, network exchanging system and data collection system. To improve the performance and efficiency of the ORS, certain complementary supporting devices have been introduced, including F5 overload balancing device, gateway of security authentication and network bandwidth enhancer, etc.

As for system deployment, the hierarchical structure of ORS contains one national root node and 13 province leaf nodes. For provinces with more than twenty thousand survey enterprises, data streams would be sent to the corresponding province node first; other provinces' data streams would be directly reported to the national root node. The data collection and exchange between national node and province nodes are real-time and synchronized.

3.2 Maintenance

Since the ORS has been officially deployed, the NBS forms dedicated expert team to supervise the monthly data reporting and to monitor peaking data streams. Therefore, the stability of the system in terms of networking, security authentication and application software is ensured. The NBS has successfully resolved more than multiple potential system dysfunctions, and database, middleware dysfunctions. Through testing and trials, the performance and stability of ORS have been largely improved.

3.3 Software Updating and Function Improvement

We have been holding seminars and workshops regularly, to give chances for experts, technicians and users of the ORS to make suggestions and discuss possible improvements. These suggestions were organized as requirements for software updating, and our system development department has been implementing those requirements. For the last year, there were four successful major updates and multiple local optimizations on over 156 functionalities of the ORS. Meanwhile, we also achieved over one thousand examination (auditing relations), processing and modifying over two thousand and six hundred large scale data sets (summary table).

3.4 System Security Enforcement

For the stability and robustness of ORS, according to our information security guidance, the NBS implemented a series of security enhancement, on aspects from the networking boundaries, main frame protection to application security. Interception of DoS and Malware, secure identification authentication and other effective security measures are utilized.

The real time data streams are monitored and dynamically analyzed for strategy optimization, our data protection deployed through management level down to

technical level. The amount of successful anti-attack interception achieved over ten thousand per month; over seven hundred thousand enterprises and organizations received CA certification, identity authentication and data transmission encryption services, the industrial data security is ensured.

3.5 Technical Support

We organized massive amount of technical training courses over the past year, for commercial companies and statistical technicians on the front line of ORS.

The construction of the ORS Supporting Calling Center started from the beginning of 2012, aiming for ensuring smooth and successful data-reporting process. It was brought into service on third of July 2012, after development strategy evaluation, collection of development requirements, and system deployment and staff training. The center has been receiving more than six hundred query calls from companies and internal statistical branches, and delivering calling services no less than three hundred times monthly. It has been successfully providing high standard services for local companies and organizations, and also for the staff of national statistical system.

3.6 Contingence Strategy

Since ORS has been running online, the data streams from 18 provinces are directly transmitted to the national main frame. The situation that the information distribution is highly centralized in national main frame requires high level of robustness and stability of the ORS data security. To tackle these challenges, we implemented a secondary data storage system for ORS and put it officially running online.

3.7 Training

We introduced a series of conferences, on topic of "Cloud Computing Based Massive Data Processing", dedicatedly to resolve the large scale data processing challenges in ORS. The conferences are also for education of next generation of technicians and experts.

3.8 Publicity

The launch of ORS has drawn massive attention from various societies. It is our responsibilities to support the publicity work, to cooperate with television networks, papers and Internet media, to gain support and cooperation from the public as we always do.