

Organizational support for Statistical Production in the National Statistical Institutes (NSIs)

Concetta Ferruzzi ¹

Abstract. The National Statistical Institutes (NSIs) are facing a number of major challenges at national and EU level: they have to improve quality and economic of statistical production system, define standard processes for clusters of statistics based on a common (technical, methodological and organizational) infrastructure but with even more decreased budget. The contemporaneous achievement of all these goals is not easy because of a trade off between them. To solve this collision it appears necessary to start off adopting organizational models and tools. The purpose of this paper is to analyse the main troubles and to provide a conceptual basis for solving them trying to develop a new organizational productive structure of statistics production in the NSIs. The challenge is to switch the focus from statistical process to management process through the use of theoretical models of organizational design. The use of organizational structures and Supervisory and Control Systems (SCS) coherent with the mission and strategies can improve the overall quality and economic of NSIs and would bring a significant contribution to the improvement of effectiveness of statistical processes as they benefit from the knowledge embedded in organizational processes.

Key words: Business Process Model, Supervisory and Control System.

1 Introduction

In all developed countries there is an Office for National Statistics to monitor the changings in economic, social, environmental and cultural aspects of society so that effective government is possible. These Institutes are facing number of major

¹Concetta Ferruzzi, Italian Institute of Statistics – ISTAT- email: ferruzzi@istat.it .
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challenges at national and EU level: improvement in quality and economic ² of statistical production system, developing standardised processes for clusters of statistics based on a common (technical and organizational) infrastructure but with a smaller budget than in the past. The achievement of all these goals isn't easy because there is a competition between them. In order to keep control of these competitive challenges there is only one way: to start off with the modernisation of Statistical Production through standardisation of processes, systems and methods and redesign organisational structure by application of organizational models and tools. In this way, the traditional functional model will be gradually abandoned in favour of a flexible process and service oriented approach.

This paper is organized in two steps. First, we will have a look at the specific issue of the description of the business process model and at the relationship between the processes through the value chain theory; secondly, we will see how organisation's structure and Supervisory and Control System (SCS) contribute on added value of statistical production.

2 Towards a coherent and integrated statistical production system

Statistics is the science of extraction of meaning of data to transform data into information [Hand, 2009]. The statistical process, shortly, can be well define as the process for manipulating or classifying statistical data into various categories with the aim of producing statistics [OECD, 2010]. This process, usually, is organized in the following phases: specify need, survey, develop and design, data collection, data processing, analysis and dissemination. Frequently, the statistical productions in NSIs are based on functional model (*stovepipe* model). In such a model, every single product corresponds to a specific domain of statistics, together with the corresponding production system. Inside each domain, the whole production process, from survey design over data collection and processing to dissemination, takes place independently of the other domains, and has its own data suppliers and user's groups. The *stovepipe model* tends to achieve a functional subsystem optimization at the expense of the overall system. Furthermore, compensation systems at the organizational level have assured functional optimization and in this way, a functional focus was reinforced. However, in an environment characterized by continuous improvements, the integrated processes seem to be of more relevance rather than the very limited functional models. The *stovepipe model* has a number of advantages [Commission of the European Communities' Communication, 2009]:

1. *the production process is better adaptable to the corresponding products;*
2. *it is flexible so that it can quickly adapt to relatively small changes in the underlying phenomena described by the data;*

² Economic definition refers to the organizational arrangements and processes through which an organization makes its outcomes. In creating and modifying its economic system, each organization chooses among alternative objectives and alternative decision modes. This objective is covered with the management concept of efficiency and effectiveness.

3. *it is checked by a domain manager and with a low-risk business architecture, as by as a problem in one production process should normally not affect the rest of the production.*

However, it also has a number of disadvantages:

1. *it imposes an unnecessarily heavy burden on respondents. Given that the collection of data in different domains is done in an independent and uncoordinated manner, the respondents are regularly asked for the same information more than once;*
2. *it is not really adaptable to collect data on phenomena that cover multiple dimensions, such as globalisation or climate change;*
3. *it is highly inefficient and expensive, as it does not make use of standardisation between areas and collaboration between statistical processes. Redundancies and duplication of work in development production or dissemination processes are therefore unavoidable;*
4. *it produces some problems of coherence among analogous phenomena related to the same (under) population and analogous dominoes of estimates founded on different processes of statistic production.*

Moreover, these inefficiencies and costs of production of national data are further amplified when become necessary to collect and integrate regional data, which are indispensable for design, monitoring and evaluation of EU policies. Furthermore, the new regulation on statistics consolidates the European Statistical System – ESS – [European Parliament, 2009] allowing improvements of efficiency through a systematic collaboration between the partners of the system. In this direction, the Commission of the European Communities [2009] outlines that at EU level, statistics for specific domains are to be no longer produced independently from each other. Instead they are to be produced as integrated parts of comprehensive production systems for clusters of statistics. These systems would be based on a common (organizational, technical and methodological) infrastructure, they would apply as far as possible standardised software, processes and methodologies (integration of data, integration of statistical sources, treatment of non responds, estimates, etc), and they would make use of all available data sources which are appropriate in quality. Statistical modernisation would place the current statistical system into an enduring, shared and integrated management system through the reengineering of statistical processes. The main focus have to be put at the level of statistical system as a whole rather than at the level of individual statistical domain. A conversion from *stovepipe model* to an integrated system demands, moreover, switching the focus from statistical process to process management. Indeed, the process management is the ensemble of activities of planning and monitoring the performance of a process. It is the application of knowledge, skills, tools, techniques and systems to define, visualize, measure, control, report and improve processes with the goal to cut the costs and improve the quality of outputs and the economic of outcomes. In order to start a programme that regards this is necessary to develop methods and tools: to describe and define the set of business processes needed to produce official statistics; to integrate and standardize the statistical processes; to design organization structure according to coordination and control mechanisms; to build an integrated SCS.

2.1 *Business process models*

To describe and define the set of business processes needed to produce official statistics it could be made use of a specific model called Generic Statistical Business Process Model – GSBPM – [METIS, 2009]. The GSBPM includes four levels: zero, (the statistical business process); first (the nine phases of the statistical business process); second (the sub-processes within each phase); third (the description of those sub-processes). According to the process model theory, each sub-process should have a number of clearly identified attributes, including: input, output, added value, owner, guides, enablers, feedback loops. However, these attributes are likely different for statistical business processes and management processes. The GSBPM also recognizes several over-arching processes that are operating throughout the nine phases, and across the statistical business processes. They can be grouped into two categories: with or without statistical component. Over-arching processes have an indirect impact on several parts of the model and include: processes most closely related to the model; quality management and metadata management; processes supporting the economic and the effectiveness of the model: human resources management, financial management, project management, legal framework management, organizational framework management, strategic planning and control.

2.2 *Value chain*

Organizational researchers developed theories and tools to model the generic production process: the Value Chain theory [Porter, 1980] and the methodology to define the logical rules to reengineer the process: Business Process Reengineering (BPR) [Hammer, Champy, 1994]³. To adopt these tools means to define a network of processes with many cross relations between them and sub-processes. Every sub-process adds value to the data that are processed. The chain for the statistical process consists of two elements: activities and information products^{4, 5}.

Several NSIs are seeking to modernize their system in similar way: adopting a uniform technical environment, using standard tools and processes across statistical system, redesign organization structure and improve a SCS⁶.

³ In the years 2000, a significant experience has been made in ISTAT, in order to fulfill the requirements of the Regulation on the organization of the European Union Labour Force Survey (LFS), adopted in 1998. [Bergamasco, Budano, Toma, 2001].

⁴ Davenport [1993] argues that information products represent the object and the activities are the processes that can be distinguished within the statistical process.

⁵ The demand of representation and simplification do not only concern the statistical process but also the organizational procedures of support [Lo Moro, 1993].

⁶ Significant experiences in this perspective has been had in Italian Institute of Statistics [Baldassarini A., Battellini F., Di Veroli N., 2010], ONS of United Kingdoms [Pennek, 2009]; Statistic Netherlands [Braaksma, 2009]; Statistics Norway [Gloersen, Viggo Saebo, 2009].

3 Organization design to support statistical production

Another phase of the project toward an integrated production system for Official Statistic consists in design organizational structure according to coordination and control mechanisms.

Organization design is a formal, guided process for integrating people, information and technology of an organization to achieve the strategic goals. Organization design begins with the creation of a strategy — a set of decision guidelines by which members would choose appropriate actions [Simon, 1997].

The key concepts in organization design are: span of control, the range of employees who have to report to a managerial position; authority, the formally-granted influence of a position to make decisions, pursue the goals and get resources to pursue the goals; responsibility, the duty to carry out an assignment or conduct a certain activity; delegation, process of assigning a task to a subordinate along with the commensurate responsibility and authority to carry out the task; chain of command, the lines of authority in an organization, who reports to whom; accountability, responsibility for the outcome of the process; line authority and staff departments. Line refers to people that work directly on the main products of the NSI or manage the people who do. Staff refers to people who construct and maintain the organizational infrastructure.

With reference to the variability and features of production, the theoretical model to be adopted is the Contingency Theory that, has attempted to explain the effectiveness of management control systems (MCS) by examining designs that best suit the nature of the environment, technology, size, structure, strategy and national culture.

With reference to this model, the organizational system is framed by: organizational structure [March, Simon, 1958], that defines the formal relationships among people and specifies either their roles and their responsibilities; administrative systems that govern and control the organization through guidelines, procedures and policies, budgets, information management systems, quality management systems, performance review systems, etc.; information and technology that define the processes through which members achieve outcomes.

3.1 *Organizational structure*

The main theoretical elements of organizational structure are: coordination mechanisms and parts of organizational structure⁷.

The coordination mechanisms underline the role of the organisation as a main instrument of coordination and control further more than did the work part in the traditional theories. They can take different configuration within a range whose extremes are represented by: hierarchy (vertical decentralization based on formal power) and horizontal decentralization (based on informal power, out of vertical line of

⁷ According to Mintzberg [1978], the parts of organization structure are: operating core, strategic apex, middle management, analysts, other administrative units.

the hierarchy and describing the collection and processing of information to support decision making processes).

The theoretical coordination mechanisms' configurations are: *mutual adjustment*, which achieves coordination by the simple process of informal communication; *direct supervision*, is achieved by having one person the power to assign orders or instructions to several others working in interrelation; *standardization of processes*, which achieves coordination by specifying the work processes of people carrying out interrelated tasks; *standardization of outputs*, which achieves coordination by specifying the results of different work; *standardization of skills* (as well as knowledge), in which work is coordinated by virtue of the related training that the workers have received so that they respond almost automatically to the standardizing procedures.

The design of an effective organizational model must necessarily take into account the strategic plan, certain organizational structure and current organizational control mechanisms.

3.2 *Planning, control and supervisory systems*

Another component of an effective governance of NSIs is the planning, control and supervisory system. It is branched into two components: tangible⁸ and intangible⁹.

It can be divided into three different sub-systems:

1. tools for the developments and monitoring of the goals in terms of effectiveness and efficiency:
 - a. *documentation*: map of processes, procedures and interdependences [Pace S., Carbini R., Pellegrini C., Cara M., 2010];
 - b. *measurement*: definition of strategies and strategic plan¹⁰, planning and control system, allocation, performance valuation; timely feedback and feed-forward control mechanisms, standardization of processes, management and statistical methods;
2. tools for evaluating processes, output and outcomes:
 - a. *procedures* put in place to ensure that the management and statistics produced are of high quality: Total Quality Management (TQM)¹¹;
 - b. *process* intended to provide reasonable assurance regarding the achievement, the compliance with rules and procedures; the safeguarding of assets and information, prevention and detection of fraud, the reliability of financial and management information: Internal auditing¹²;

⁸ In turn consists of a static part – a map of responsibility and a management information system – and a dynamic part - the process.

⁹ Interdependent management and style of control (culture, values, leadership and governance style).

¹⁰ The strategy came from clear, concise statements of mission, and vision and, from the organization's basic philosophy. Strategy unifies the intent of the organization and focuses members toward actions designed to accomplish desired outcomes.

¹¹ A TQM model, in general, defines areas of activity and criteria which have to be taken into consideration to obtain high quality of output and processes [Eurostat, 2007].

¹² Internal auditing is an independent, objective assurance and consulting activity designed to add value and improve organization's operations. It helps an organization to accomplish its objectives

3. tools to manage the uncertainty of an event that could have an impact on the achievement of objectives: risk management. This framework implies that, for each step of the process, the potential risk, the impact if it occurs, the likelihood of occurrence, the action for risk prevention and responsibilities for are adequately identified, assessed and managed [COSO, 1992].

The design of an effective organizational control system postulate overcoming the conflict with the coordination mechanisms.

4 Conclusions and development guidelines

NSIs mission is to provide a high quality statistical information service. To achieve this goal is necessary to define an organizational framework. It can be thought of as a tool box to be used according to specific aims, organizational assurance, and coherent with strategies and organizational structure and control system [Lo Moro, 2010].

The key elements for structuring an effective system internal control in the NSIs are due essentially to two major areas: governance and risk management. The implementation of a system of internal control based the above mentioned elements is indispensable for with monitoring at all levels of proceedings administrative and statistical processes and strengthening transparency and credibility of the NSIs against community. Statistical processes and outputs are just covered by the European statistic code of practice and Eurostat Quality Assurance Framework but it is necessary to cover productive processes from the organizational prospective¹³. Achieving this goal requires:

- 1) to have a clear vision, knowledge of environment and organizational structure, assessment of the users and partners satisfaction about data quality and to define a coherent strategic plan;
- 2) to reengineer process of producing data based on: the need to integrate both horizontally, with respect to the units of analysis (households, businesses, etc.) and vertically (integration of sources apart from the output), a set of statistical metadata needed to support processes with a view of the GSBPM model [Commission of the European Communities, 2009];
- 3) to develop an integrate planning and control system coherent with coordination mechanisms and different decision levels (strategic, managerial, operational);
- 4) to extend Internal Auditing and TQM with reference to overall organizational system and not just statistical processes;
- 5) to formalize map of risks and responsibilities and define the tools to manage the organizational and management risk through expanding on internal control to overall processes (statistics and support), focusing on five essential component: control environment, risk assessment, control activities, information and communication, monitoring [COSO, 2004] ;

by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes. Institutes of internal auditing, www.theiia.org .

¹³ European Commission has launched the “Action plan towards an Integrated Internal Control Framework” which aims to ensure that SCS are in place to keep the risk of illegality or irregularity transactions within reasonable limits so to provide the Court of Auditors with reasonable assurance to that effect.

This plan requires significant investments in tools for organizational integration: map of value, code of ethics, knowledge management, ICT and web 2.0 potentials. Moreover, to design and start up an integrate and effective organizational framework is essential, above all, high level sponsorship, to reorient the organizational culture, to replace the culture of bureaucracy with modern control systems, based on competence, integration and standardization of processes, ICT and effective system of measurement and evaluation of performance (individual and organizational).

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