

Research performance and bureaucracy within public research labs

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The purpose of this paper is to analyse the relationship between bureaucracy and research performance within Public Research Bodies. The research methodology is applied on a sample of 100 interviewed belonging to 11 institutes of National Research Council of Italy. The main finding is that within Italian Public Research Council there is academic bureaucratization that reduces performance and efficiency of institutes. In fact, institutes have two organizational behaviours: high bureaucracy – low performance and low bureaucracy – high performance. These bureaucratic tendencies are also present in other countries and particularly: the public research labs have an academic bureaucratization because of administrative burden necessary to the governance of the structures, whereas the universities have mainly an administrative bureaucratization generated by the increase of administrative staff in comparison with researchers and faculty.

Introduction

Red-tape issues have come to prominence in recent years and have become a stated policy priority [KEYWORTH, 2006]. Better Regulation Task Force in United Kingdom (UK) asserts that red-tape reforms could potentially deliver an increase in Gross Domestic Product of about £ 16 billion, that is, a greater than 1 per cent increase [BRTF, 2005]. It is interesting to analyze the bureaucratization in Public Research Bodies, since these organizations have more and more a fundamental role in modern economic growth of countries [LARÉDO & MUSTAR, 2004]. In fact, the core of the debate in modern economies concerns a system of innovation made up of efficient research labs [HERBST, 2004], capable of producing scientific research and innovation. In almost every country, the field of public research includes university institutions as well as other agencies and bodies of different kind and size, which are usually defined as Public Research Bodies (PRBs). The efficiency of PRBs depends on their structure and governance, which is much more difficult to organise in comparison to business enterprises [LANE, 1990]. In fact, these PRBs are complex and dynamic institutions that produce a public good called scientific research [ARROW, 1962] and differently from

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business enterprises, they do not maximize profit but rather their scientific reputation and international prestige. Organizational studies of these public research institutes are important to improve their efficiency and to increase the production of knowledge which is nowadays necessary to the competitive advantage of firms and nations [PORTER, 1990]. OECD [2003] review of red-tape emphasises that, despite the high profile often given to red tape issues, governments rarely had a detailed understanding of the extent of administrative burdens. Moreover, studies concerning bureaucracy and PRBs are poorly developed area, despite the fact that the efficiency of these institutions plays a fundamental role in today's knowledge era in order to generate technology transfer and increase economic growth [AGHION & HOWITT, 1998]. Furthermore, in the absence of economic analysis of relevant causes of bureaucracy in PRBs, the determination of efficiency increase targets will inevitably be a relatively arbitrary matter [BANARJEE, 1997]. The studies addressing the bureaucratic issues can underpin better reforms that improve governance and organization of PRBs and overall national system of innovation.¹ In particular, in order to understand the relationship between bureaucratization and scientific performance, public management and policy maker must have satisfactory answers to the following questions: Which is the nature and causes of bureaucratization in public research bodies? Does bureaucratization affect scientific performance of public research units?

The purpose of the present research is to answer the previous questions analyzing the relationship between bureaucracy and scientific performance in public research bodies by a focus on Italian case study. The results of this analysis are compared with studies carried out in the US and in Northern Europe in order to detect any similarities and differences. Before dealing with the topic, some concepts and studies referring to bureaucracy in scientific bodies are briefly outlined and research method is introduced.

Theoretical framework

The term "bureaucracy" comes from the French *bureau* = *office* and from the Greek *krâtos* = *power*; the origins of bureaucratic organisations date back to the Roman Empire, when a powerful administrative system, divided into offices and based on unified procedures, was systematically introduced. The "Devoto-Oli" Italian Dictionary defines bureaucracy as the whole body of public officials, a system in which public administration has too much power. In German bureaucracy is *Bürokratie*, directly derived from the French term, while in Spanish it is called *burocracia* as well as

¹ The national system of innovation (NSI) refers to the complex network of agents, policies, and institutions supporting the process of technical advance in an economy [LUNDVALL, 1992]. The narrow definition of NSI would include the subsystem research sector represented by universities, research laboratories, while the broad NSI includes many subsystems such as finance, firms, government, and so on. The efficiency of this broad NSI boosts economic growth.

figuratively *pedantería* (pedantry), a word that refers to a person who displays unintelligent fastidiousness in his/her profession. In English, besides *bureaucracy* (needlessly time-consuming procedure), the concept is also defined as *red tape*, an expression deriving from the fact that in public offices documents used to be sealed with a red tape. WEBER [1921, 1964] claims that bureaucracy is the most modern, rational, and efficient form of administration and it can be applied to any kind of public and private organisation. CROZIER [1964] and post-Weber scholars [MERTON, 1970] were the first to use the word in its negative meaning, which has become prevalent today and indicates a form of organisation characterised by slowness and inefficiency. Studies on bureaucracy within Public Research Bodies (PRBs) have been carried out above all in North America [CROW & BOZEMAN, 1989; BOZEMAN & AL., 1992; BOZEMAN & STUART, 1994; GUMPORT & PUSSEY, 1995; CROW & BOZEMAN, 1998; BOZEMAN & RAINEY, 1998; MEIER & AL., 2000] and in Northern Europe [GORNITZKA & AL., 1998].

CROW & BOZEMAN [1989] analyse the National Comparative R&D Study Project, using a sample of over 900 US research and development labs belonging to the Industry, Academia and Government. The study measures bureaucracy in terms of amount of time typically required (in weeks) for each of a variety of policy and management actions; the analysis shows that *Government labs tend to be more bureaucratic on every factor. Total levels of red tape in industrial and university labs were about one-third that government labs.* At first glance, low efficiency of public research institutes is due to their nature of public organisation [HECKMAN & AL., 1997], which causes them to be pervaded by too much bureaucratisation [GORE, 1993, 1995], making them less adaptable to turbulent environmental changes.

GUMPORT & PUSSEY [1995] analyse Californian universities over a period of 25 years and show that an increase in the number of universities leads to the growth of administrative structures. During the period under investigation (1967–1992), the expenditure on administration functions grew disproportionately in comparison to the expenditure on instruction: *the ratio of Instructional Expenditure to Administration Expenditure went from 6 in 1966–1967 to 3 in the 1991–1992 period.* Along with growing expenditure, there was also an increase in administrative staff, which rose by 151% in comparison to a 61% increase in academic staff during the 1967–1992 period.

GORNITZKA & AL. [1998] take into consideration four Norwegian universities during the 1987–1995 period, showing that there was an increase in administrative personnel in comparison to academic personnel. *In this study, the growth of personnel and administrative bodies is seen as an indicator of increasing bureaucratization in Norwegian universities.*

BOZEMAN & RAINEY [1998] analyze the bureaucratic personality within National Administrative Studies Project with questionnaires administered to managers of public and private organizations. The results of their analysis show that both personal characteristics such as alienation, and organizational characteristics such as the number of records kept, show relations to preferences for more rules. *Contrary to expectations and to much of the literature, managers in private organizations (mostly business firms) were more likely to prefer more rules than managers in public agencies.*

These studies show that the concept of bureaucratisation usually takes on different meanings. The everyday use of the term has strong derogatory connotations and bureaucratisation is thought of as ‘red tape taking over’. In some organizational studies the term of bureaucratisation as temporal process denotes the growth of the part of the organisation that does not directly carry out the work but which regulates, supervises and supports those who do. In particular, administrative bureaucratization [GORNITZKA & AL., 1998] is when administrative positions and activities increase more than productive activities and the number of staff involved directly in productive activities. In general, the administrative positions are engaged in activities (filling in or entering the necessary information on a document, carrying out calculation, etc.) that PRBs have to perform in order to be able to deliver the defined set of ‘output’: publications, patents, research projects, scientific consultancies and other scientific research outcomes. KOGAN [1996] points out that, in higher education institutions, bureaucratisation is also used in two other ways: the move from individual and academic power to the system or institution, and the growth of power of administrators.

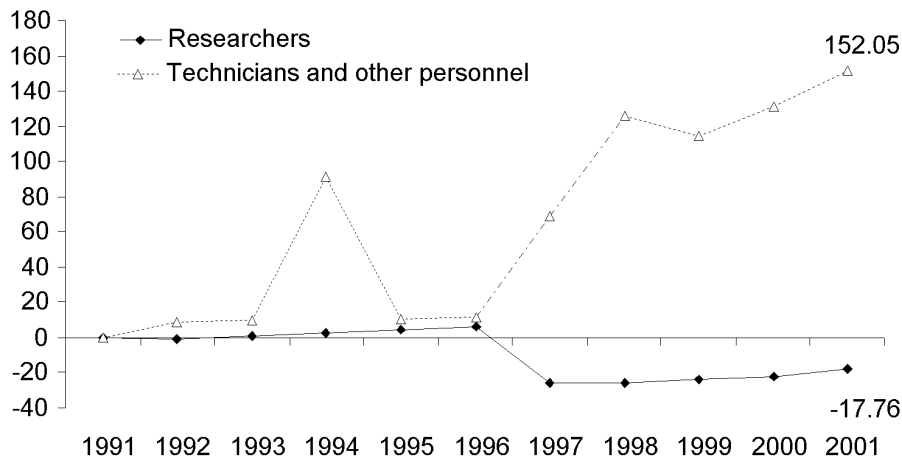


Figure 1. Percent growth of personnel in Italian Universities in 1991–2001 period (the number of technicians and other staff in 1997 is an estimate, since it is not available).
[Source: ISTAT, 1991–2004]

COCCIA & GOBBINO [2006] investigate trends concerning scientific and academic personnel vs. technicians and administrative staff in Italy, using data from the yearbooks of the Italian National Institute of Statistics (ISTAT). The results are summarised in Figures 1 and 2.

The results of Italian case-study are compared with those of GORNITZKA & AL. [1998] in Norway and GUMPORT & PUSSEY [1995] in California. Table 1 shows that the average yearly growth of administrative personnel is higher in Italian universities than in the same Californian and Norwegian institutions (respectively 15.20% in Italy versus 10.70% in California and 6.25% in Norway), whereas the number of researchers in Italy drops by -1.8% , versus an increase of $+4.35\%$ in California and $+4.25\%$ in Norway.

Conversely, the Italian Public Research Bodies (PRBs) have a different situation, since they display an increase in researchers and a decrease in administrative personnel over time (Figure 2).

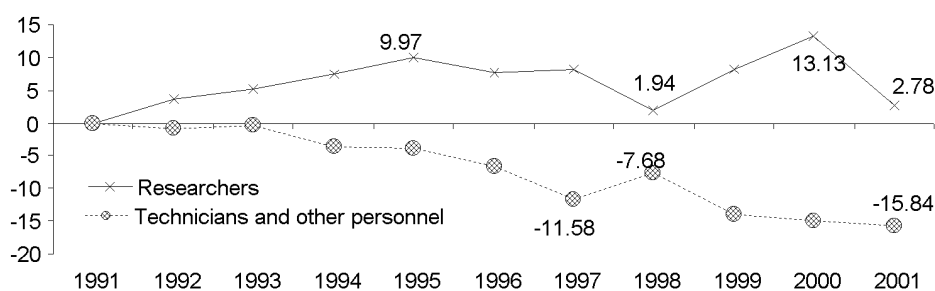


Figure 2. Percent growth of personnel in Italian Public Research Bodies in 1991–2001 period.
[Source: ISTAT, 1991–2004]

Table 1. Average yearly personnel growth in percentage: comparison among states

| | California | Norway | Italy | | |
|--------------------------|------------|--------|------------|------------------------|---------------------------|
| | University | | University | Public Research Bodies | National Research Council |
| Researchers (%) | 4.35 | 4.25 | -1.80 | 0.28 | 3.80 |
| Administrative staff (%) | 10.70 | 6.25 | 15.2 | -1.60 | 0.62 |

Source: ISTAT and CNR data

In particular, the National Research Council (CNR), the largest public research body in Italy, displays low administrative personnel growth and a modest increase of

researchers. These results shows that *in Italian Public Research Bodies, unlike universities, the administrative bureaucratization does not occur, i.e. there is no disproportionate growth of administrative personnel over time in comparison to academic personnel.*

Furthermore, if we consider research productivity per researcher [COCCIA, 2005], the CNR in Italy has a decreasing trend (Figure 3) and has the lowest productivity per researcher (Table 2), in comparison to similar European institutions, such as the Max-Planck Gesellschaft – MPG in Germany², the Centre National de la Recherche Scientifique – CNRS in France, and the Consejo Superior de Investigaciones Científicas – CSIC in Spain. Studies carried out by COCCIA [2004, 2005] on Italian CNR finds out that only 30% of institutes are high performers, whereas the remaining 70% are low performers.

Table 2. Comparison among European research bodies

| | CNR Italy | | CNRS France | | CSIC Spain | | MPG Germany | |
|-----------------------------|-----------|------|-------------|------|------------|------|-------------|------|
| | 2001 | 2002 | 2001 | 2002 | 2001 | 2002 | 2001 | 2002 |
| Publications per researcher | 1.34 | 1.36 | 1.42 | 1.39 | 1.93 | 1.89 | 2.42 | 2.19 |

Source: CNR Report, 2003

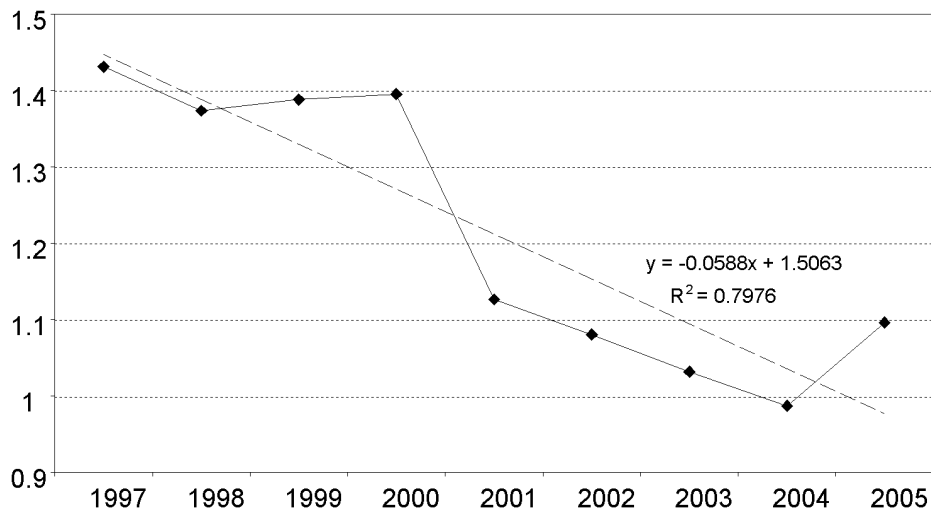


Figure 3. Temporal dynamics of productivity of CNR

² Max Planck is an association of elite research organizations that work under exceptionally rich funding conditions.

In brief, CNR institutes display low efficiency, which is not ascribable to administrative bureaucratization [GORNITZKA & AL., 1998]. Then, which is the cause of CNR institutes' low efficiency? The following section describes the methodology to answer such an important question, which is crucial for the correct management of public research organisations and increase of their efficiency.

Research methodology

The first step of the research concerns the analysis of Reports issued by some research units, in order to identify the most important activities related to their operation. Main thematic areas and questions were included in a questionnaire. This questionnaire undergoes a pilot investigation, in order to rectify interpretation mistakes, unnecessary or missing questions, redundant or confusing questions, etc. The final questionnaire displays a semi-structured form. The questionnaire is administered by means of "face-to-face" interviews, because when compared with other data collection methods it has several advantages in relation to the quality of the data collected, even though time and costs are higher. Semi-structured interviews using this questionnaire are carried out in a number of institutes belonging to the Italian national research council (CNR), the biggest public research institutions in Italy. The sample includes 100 people (researcher, technicians and administrative staff since they represent the main subjects operating in research units) from 6 institutes and 5 sections of Piedmont and Lombardy, two large regions in Italy based on manufacturing and commercial sectors and high investments in research in comparison to other Italian regions.

Low efficiency (and research productivity) of CNR institutes is not generated by the growth of administrative staff but may be due to other causes. Bureaucracy can be also identified with the time needed to carry out administrative and scientific activities in research organisations as suggested by CROW AND BOZEMAN [1989]. Moreover according to GORNITZKA & AL., [1998], academic bureaucratization includes the time needed to prepare meetings and to participate in them as well as all the administrative paperwork that is done inside universities. This theoretical framework is the basis to analyze the relationship between bureaucracy and research performance of Italian research institutes, given by:

$$Y = f(T_1, T_2, T_3, T_4, T_5, T_6, T_7, N)$$

where

Y = average yearly scientific production (number of domestic and international publication per researcher into institute);

T_i = time spent on the i-th administrative activity;

N = number of documents filled in.

Bureaucratization is a latent variable³ measured by the following manifest variables:

T₁ = *Contracts-staff recruitment*: average time needed to recruit term contract personnel (topic 1 in the questionnaire);

T₂ = *Organisation of events*: time needed to organise events such as meetings, seminars, and projects (topic 2 in the questionnaire);

T₃ = *Scientific Activities in one month*: time needed to participate in meetings and to draw up projects (topic 3 in the questionnaire);

T₄ = *Drawing up final balances and budgets*: time needed to compile budgets and to draw up final balances (topic 4);

T₅ = *Approval by the headquarters*: time elapsing from the presentation of a project application or joint agreement/collaboration to the moment when the project starts (topic 5);

T₆ = *Financial activities*: time needed to approve budgets and to make changes to the expenditure capacity of the Expenditure Centre, i.e. institute or research unit (topic 6);

T₇ = *Purchases*: time needed to purchase scientific materials, books, journals, etc. (topic 7);

N = *Documentation (number)*: number of documents required (topic 11 in the questionnaire).

The research question is: if variables T₁ and N increase (indicators of the academic bureaucratization which is a latent variable), is there a decrease in variable Y?

The data are studied by means of a descriptive analysis, a correlation and cluster analysis using the Statistics software S.P.S.S..

The bivariate Bravais-Pearson's correlation analysis is used to find a correlation between at least two continuous variables. The value for a Pearson's can fall between 0.00 (no correlation) and 1.00 (perfect correlation). Other factors such as group size will determine if the correlation is significant (sig.). Generally, correlations above 0.80 are considered high. Moreover the correlation among the variables that is significant at the 0.01 level (2-tailed) is considered. In addition, the Cluster Analysis method is also applied. This technique detects, within a set of items of whatever nature, a number of subsets, i.e. clusters, which are homogeneous from an internal point of view but sufficiently different from each other. Cluster Analysis techniques should display high internal (intra-cluster) homogeneity and high external (inter-cluster) heterogeneity. Therefore, if the classification is successful, items within the same cluster are close to each other, while items belonging to different clusters are further away from each other. The cluster analysis uses Ward's method and the squared measure of the Euclidean distance; results are summarised in the dendrogram.

³ One of the most relevant and debated topics in the field of statistics is the so-called *latent variable*, i.e. a variable that is not directly observed, lacking both an origin and a unit of measurement. In particular, a latent variable is *a variable that cannot be measured directly and that is believed to exert a causal influence on several variables that are directly observable (manifest variables)*.

Results

The sample is made up of 11 different institutions, of which six institute headquarters and five decentralized units. The institutes are: Institute of Ecosystem Study (ISE); Institute of Plant Virology (IVV); Institute for the hydro geological protection of the River Po basin (IRPI); Institute for economic research on firms and growth (CERIS), Milan and Turin research units; Gustavo Colonnetti Metrology Institute (I.M.G.C.); Institute for applied mathematics and information technologies (I.M.A.T.I.); Institute of biology and agricultural biotechnology (I.B.B.A.); Institute for Electromagnetic Sensing of the Environment (I.R.E.A.); Institute for macromolecular studies (I.S.M.A.C.), Institute of biology and agricultural biotechnology (I.B.B.A.). The questionnaire was administered to Scientific staff (Researchers and Technologists), as well as Technicians (Technical collaborators of Research Bodies and operators) and Administrative Personnel working in CNR institutes since they are the organization staff of Italian institutes. The sample used for the research is made up of 100 interviewees and is divided as follows: 27% administrative staff; 7% technical staff, and 66% scientific staff. Moreover, 51% of interviewees are females and 49% are males; 2% of the sample belongs to the 24–30 age group, 21% belongs to the 31–40 age group, 41% belongs to the 41–50 age group, and 36% belongs to the > 50 age group. Table 3 shows the results:

Table 3. Average time and number of documents needed to carry out activities within the CNR

| Topic | Item | Average value |
|--|--|---------------|
| 1. Contracts – staff recruitment: T ₁ | Recruitment of staff with permanent contract | > 34.1 months |
| | Grant recipients | 7.2 months |
| | Research doctorate students | 6.7 months |
| 2. Organisation of events: T ₂ | International conferences | 9.1 months |
| | International projects | 7.4 months |
| 3. Activities in one month: T ₃ | Drawing up international projects | 7.5 days |
| 4. Drawing up final balances and Budgets: T ₄ | Drawing up budgets | 22.5 hours |
| | Drawing up final balances | 22.8 hours |
| 5. Approval by the headquarters: T ₅ | Approval of long-term projects | 12.4 months |
| | Approval of one-year projects | 9.7 months |
| 6. Financial activities: T ₆ | From the allocation of funds to the approval of the budget | 59.4 days |
| 7. Purchases: T ₇ | Materials > 7,500 € | 48.5 days |
| | International books | 12.8 days |
| 11. Documentation (number) | Recruitment of staff with permanent contract | 12.8 |
| | Organisation of congresses/meetings | 12.3 |
| | Preparation of each project | 12.1 |

Correlation analysis

The analysis of correlations draws a distinction between scientific personnel and administrative personnel. Positive correlations are indicated with the “+” symbol, whereas negative correlations have the “-” symbol. The main results of correlation analysis for *scientific personnel* are:

- “-” correlation between the *scientific production* variable and the *activities* variable with *r* coefficient equal to -0.204 and sig. equal to 0.087.
- “-” correlation between the *scientific production* variable and the *drawing up final balances and budgets* variable (*r* = -0.209 and sig. = 0.083).

The results concerning the *administrative personnel* are:

- High correlation “+” between *organisation of events* and *documentation-number* (*r* = 0.669 and sig. = 0.003);
- High correlation “+” between *activities* and *documentation-number* (*r* = 0.597 and sig. = 0.007);
- correlation “+” between *approval by the headquarters* and *documentation-number* (*r* = 0.494 and sig. = 0.052);

Cluster analysis and organisational behaviour of CNR research institutes considering performance and bureaucracy

The cluster analysis groups 11 sample institutes belonging to the CNR into two clusters made up respectively of 9 and 2 units (Figure 4). A descriptive statistical analysis of the groups helps to study differences in their organisational and strategic behaviour.

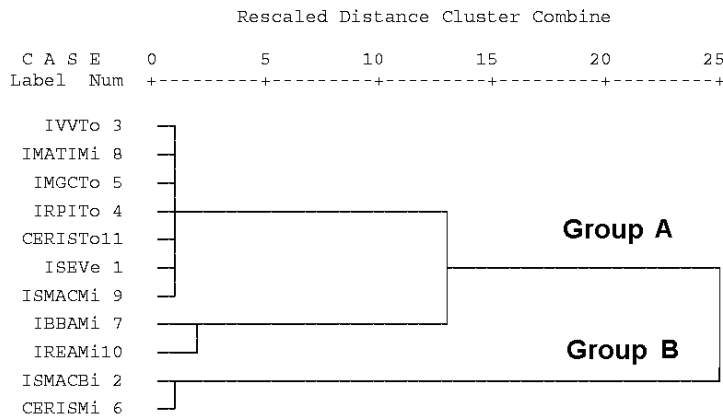


Figure 4. Dendrogram of CNR research institutes, using Ward’s method
 Labels of Provinces: TO = Torino; MI = Milano; VE = Verbania; BI = Biella

Group B (Fig. 4) displays an average production value higher than that of group A. but the most remarkable result is that group B also displays the lowest average values for all the variables that are bureaucracy indicators. Therefore, *in PRBs as the time needed to carry out scientific and administrative activities and preparing/managing projects and/or grants, etc. increase, there is a decrease in scientific production of the research units.*

Table 4. Descriptive statistical analysis of groups A and B following the cluster analysis of CNR institutes

| | Arithmetic mean * Group A | Arithmetic mean * Group B | Standard Deviation Group A | Standard Deviation Group B |
|---|---------------------------------|---------------------------------|----------------------------------|----------------------------------|
| Scientific Production | 3.069 | 3.458 | 1.279 | 1.708 |
| Contracts-staff recruitment: T ₁ | 0.402 | 0.338 | 0.076 | 0.012 |
| Organisation of events: T ₂ | 0.486 | 0.213 | 0.125 | 0.243 |
| Activities in one month: T ₃ | 0.069 | 0.013 | 0.062 | 0.007 |
| Drawing up final balances and budgets: T ₄ | 0.069 | 0.012 | 0.072 | 0.002 |
| Approval by the headquarter: T ₅ | 0.872 | 0.628 | 0.279 | 0.039 |
| Financial activities: T ₆ | 0.143 | 0.133 | 0.032 | 0.003 |
| Purchases: T ₇ | 0.098 | 0.090 | 0.026 | 0.008 |
| Documentation (number): N | 6.264 | 4.577 | 1.837 | 0.322 |
| Age of researchers | 33.555 | 45.500 | 3.720 | 0.000 |
| Number of institutes | 9 | 2 | 9 | 2 |

* Some figures are low since they are standardized in annual value.

Notes:

T₁=*Contracts-staff recruitment*: average time needed to recruit term contract personnel (topic 1 in the questionnaire).

T₂=*Organisation of events*: time needed to organise events such as meetings, seminars, and projects (topic 2 in the questionnaire).

T₃=*Activities in one month*: time needed to participate in meetings and to draw up projects (topic 3 in the questionnaire).

T₄=*Drawing up final balances and budgets*: time needed to compile Budgets and to draw up final balances (topic 4).

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T₇=*Purchases*: time needed to purchase scientific materials, books, journals, etc. (topic 7).

N=*Documentation (number)*: number of documents required (topic 11 in the questionnaire).

Discussion and concluding remarks

The results are particularly interesting because the correlation analysis presents a negative coefficient between the scientific production and two variables regarding governance: the one referring to the time needed to prepare projects (*activities*) and the one referring to the time needed to draw up budgets and final balances (*drawing up final balances and budgets*). In other words when the time needed to carry out these activities increases, the scientific production decreases. Moreover there is a high

correlation between the number of documents that are filled in and the variables regarding the time needed to organise projects/congresses, the drawing up of the latter and the time needed for their approval (*documentation-number* and *organization of event, activities* and *approval by the headquarters*). The analysis shows that the time needed for certain activities is excessively long and this hinders normal and streamlined operations within the institutes.

In short, the research displays a two-fold bureaucratic behaviour of the main scientific subjects within the national system of innovation: Academia has administrative bureaucratization; instead Public Research Bodies (PRBs) have academic bureaucratization (i.e.: it includes all administrative work at the institutes which has not been included in the supervision and research activity, teaching, and so on; for instance huge amount of time that is spent for preparing grant applications, managing grants, refund expenditures, necessary to obtain external funds; it is due to rules and procedures to follow for having documents and authorizations – ruled by laws – that are necessary for preparing grant applications, grant reports and managing grants, recruiting of term personnel, spending funds, refund expenditures, and so on, [COCCIA, 2007]. Figure 5 summarizes the results of the analysis:

The research shows that the effect of a high administrative burden is a reduction of efficiency and research productivity of scientific organizations.

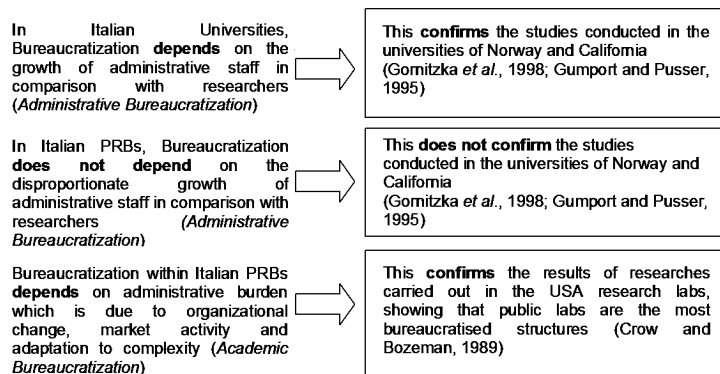


Figure 5. Causes of bureaucratization in Public Research Organizations

The causes of bureaucratization within PRBs that generate the reduction of research productivity and efficiency in Italy are due to restructuring of public research that was carried out in two different phases over five years (1999 and 2003). The objective was to reduce general costs and to increase technology transfer and overall efficiency of Italian research structures. In consideration of the widely shared political objective of

improving scientific research in an industrialised country such as Italy, but above all in view of the necessity for the economic system of profiting from scientific research produced in public institutions, the organisational reforms were poorly planned, creating confusion about the activities carried out by researchers (they have to deal with consultancies to external subjects rather than scientific research activities), as well as uncertainty about the future of the CNR organization. The aim of the consolidation of CNR research units is to create scientific institutes of larger size, similar to the Max Planck in Germany, thinking that large labs=efficient labs. This consolidation has been carried out only from an administrative and not from a scientific point of view. Although nowadays there are about 100 new institutes (in the past there were around 310 research units), these often have several (2–6) decentralised units spread on the territory and far from the headquarters. This new organization creates diseconomies of scale, because of the increased costs of co-ordination of decentralised units and high administrative burden for their management [COCCIA & ROLFO, 2007]. In addition project based organization applied in 2003 and market resource dependence (due to cuts of public funding) have generated a vast portfolio of small -medium projects for external subjects that leads to administrative burden for its maintenance. Moreover to spend funds deriving from Government or market it is necessary to fill in several documents and to have authorizations because of national law for reducing public debt, etc. Therefore, researchers that spend time in these administrative activities have a decrease in publications. In short, the CNR has a bureaucratization process owing to high administrative burden generated by internal new organization (CNR) and environmental complexity. The origin of this situation is the hasty and badly designed restructuring that has been making governance within PRBs more complicated, reducing overall research performance and efficiency. This research proves how hasty reforms of research sector generate ambiguous results. The future challenge for policy maker is a new restructuring of PRBs to reduce this administrative burden (i.e. academic bureaucratization) in order to improve research performance and as consequence positive impact of research units on economic growth of modern economies.

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References

- AGHION, P., HOWITT, P. (1998), *Endogenous Growth Theory*. The MIT Press, Cambridge.
- ARROW, K. (1962), Economic welfare and the allocation of resources for invention, In: R. R. NELSON (Ed.), *The rate and direction of inventive activity: economic and social factors*, Princeton University Press, Princeton.
- BANARJEE, A. V. (1997), A theory of misgovernance, *Quarterly Journal of Economics*, 112 (4) : 1289–1332.
- BOZEMAN, B., RAINEY, H. G. (1998), Organizational rules and the bureaucratic personality. *American Journal of Political Science*, 42 (1) : 163–189.
- BOZEMAN, B., STUART, B. (1994), The publicness puzzle' in organization theory: A test of alternative explanations of differences between public and private organizations. *Journal of Public Administration Research and Theory*, 12 (4) : 197–223.
- BOZEMAN, B., REED, P., SCOTT, P. (1992), The presence and predictability of red tape in public and private organizations. *Administration and Society*, 34 (24) : 290–322.
- BRTF (2005), Less is more: reducing burdens, improving outcome, *Better Regulation Task Force*, London.
- CNR REPORT (2003), *Risultati di Ricerca*. D'Anselmi Editore/Hoepli, Roma.
- COCCIA, M. (2007), Does Bureaucracy affect performance of public research organizations? In: *Proceeding of ISSI 2007*, D. TORRES-SALINAS, H. F. MOED (Eds), CINDOC-CSIC, Graesal, Madrid, Spain.
- COCCIA, M., ROLFO, S. (2007), How research policy changes can affect organization and productivity of public research institutes? Analysis within the Italian national system of innovation, *Journal of Comparative and Policy Analysis*, 9 (3) 215–233.
- COCCIA, M., GOBBINO, A. (2006), Analisi della burocrazia negli enti pubblici di ricerca. *Working paper Ceris-Cnr*, n. 5, Moncalieri (To).
- COCCIA, M. (2004), Models for measuring the research performance and identifying the productivity of public research institutes. *R&D Management*, 34 (3) : 267–280.
- COCCIA, M. (2005), Scientometric model for the assessment of the scientific research performance within the public institutes. *Scientometrics*, 65 (30) : 297–311.
- CROW, M., BOZEMAN, B. (1989), Bureaucratization in the laboratory. *Research Technology and Management*, 32 (5) : 30–32.
- CROW, M., BOZEMAN, B. (1998), *Limited by Design. R&D Laboratories in the U.S. National Innovation System*. Columbia University Press, New York.
- CROZIER, M. (1964), *Bureaucratic Phenomenon*. University of Chicago Press, Chicago.
- GORE, A. (1993), *From Red Tape to Results: Crating A Government That Works Better and Costs Less*. Government Printing Office, Washington.
- GORE, A. (1995), *Common Sense Government*. Random House, New York.
- GORNITZKA, A., SVEIN, K., LARSEN, I. M. (1998), The Bureaucratization of universities. *Minerva*, XXXVI (1) : 25–47.
- GUMPORT, P., PUSSER, B. (1995), A case of bureaucratic accretion. *Journal of Higher Education*, 66 (5) : 493–520.
- HECKMAN, J., HEINRICH, C., SMITH, J. (1997), Assessing the performance of performance standards in public bureaucracies. *American Economic Review. Paper and Proceeding*, 87 (2) : 389–395.
- HERBST, M. (2004), Governance and management of research universities: funding and budgeting as instruments of change. *Center for Science and Technology Studies*, vol. 4, Bern, CH.
- ISTAT (1991–2004), *Annuari Statistici*. Roma.
- KEYWORTH, T. (2006), Measuring and managing the costs of red tape: a review of recent policy development, *Oxford Review of Economic Policy*, 22 (2) : 260–273.
- KOGAN, M. (1996), *Academics and Administrators in Higher Education*, paper for the CHER Conference, Turku, June.
- LANE, J. E. (1990), *Institutional Reform a Public Policy Perspective*. Dartmouth Publishing Co, Aldershot.
- LAREDO, P. M., MUSTAR, P. (2004), Public sector research: A growing role in innovation systems, *Minerva*, 42 (1) : 11–27.
- LUNDEVALL, B. (1992), *National Systems of Innovation*, Pinter Publishers, London.

- MEIER, K. J., POLINARD, J. L., WRINKLE, R. D. (2000), Bureaucracy and organizational performance: causality arguments about public schools. *American Journal of Political Science*, 44 (3) : 590–602.
- MERTON, R. K. (1970), *Teoria e Struttura Sociale*. Il Mulino, Bologna.
- OECD (2003), *From Red Tape to Smart Tape: Administrative Simplification in OECD Countries*, OECD Publishing, Paris.
- PORTER, M. E. (1990), *The Competitive Advantage of Nations*, Billing & Sons, Ltd, Worcester.
- WEBER, M. (1921), *Economy and Society*. Bedminster Press, Totowa, New Jersey.
- WEBER, M. (1964), *The Theory of Social and Economic Organization*. Collier Macmillan, New York.