Fighting Corruption, Striving for Efficiency and Effectiveness: Reputation-Based Governance of Public Works.

di Lucio Picci[1]

To be presented at the Sixth Mediterranean Social and Political Research Meeting (Fiesole, Italy – 16/20 March 2005) – This version: January 2005 - Abstract

Good governance is conducive to low corruption, and to effective public policies. Three valuable ingredients to obtain a good governance model are "voice" – the possibility for the people to express opinions on the policies that affect them – "benchmarking" – the ready availability of information on various characteristics of the policies, their costs, and their effects, to inform voice activities; and "accountability", where track of relevant behaviors is kept, and incentives are in place to induce virtuous behaviors.

I propose a novel "reputation-based governance model" that provides a coherent framework to improve governance, through a recipe based on the three ingredients mentioned above. While such a system could in principle be applied to several types of public policies, I here present it for the governance of public investments in infrastructure.

Such governance model is supported by an Internet-based "reputation system", where public works are recorded in a standardized format, together with their costs. The public can view such information and, in a structured fashion, can express opinions on the quality of the completed works. Administrators can also express opinions on the firms with which they interact and, in turn, firms express their opinions on the administrators. The procurement rules put a premium on firms with a good reputation, and other forms of incentives are in place for administrators and firms to build a good reputation, and for the general public to honestly assess public works.

Last, I consider in some detail how such a system could be implemented in Italy, where there exists ample evidence on the shortcomings of the governance of public works, and on the relevance of corruption phenomena.

[1] Dipartimento di Scienze Economiche, Università di Bologna. E-mail: lucio.picci@unibo.it; Web: http://www.spbo.unibo.it/picci. I'd like to thank Miriam Golden for useful comments on a first draft of the paper.

J.E.L.: H430, H830, C800, H540

1. Introduction

Over the past 25 years, the scholarly perception of the corruption phenomenon has significantly changed. Formerly treated as an occurrence that could have some benefits in “greasing” otherwise inefficient economic and political systems, corruption has come to be associated with limited economic growth, distorted resource allocation and, ultimately, lack of mutual trust and institutions’ legitimacy.

I highlight three major steps of this transition. First, theory advanced, using more intensively the tools of economic analysis. Rose-Ackerman’s, 1978, represented an early and seminal contribution in that direction. Second, a spate of mostly cross-country empirical analyses, of which Mauro, 1995, provides a significant case, improved our understanding of corruption, its causes, and its consequences. In particular, evidence built up showing that high levels of corruption tend to be associated with poor economic performances. These works, in turn, were made possible by a third development: the construction of perception-based measures of corruption, such as the Transparency International Corruption Perception Index (CPI) (Lambsdorff, 2003).

At the same time, a non-governmental organizations such as Transparency International, and also a series of initiatives by the World Bank, contributed to two worthy objectives: on the one hand, raising public attention on the costs of corruption, and encouraging civil society’s initiatives to pressure the political leaders for change; on the other, providing a bridge between the public debate and academia, bringing into the former more nuanced reflections, and ultimately countering the risk that the fight against corruption would turn into a sterile moral cry.

Today, we have understood that the phenomenon of corruption can hardly be considered in isolation, both from an analytical viewpoint, and for the purpose of policy recommendation. To the contrary, corruption is best seen as part of a more general governance problem, not to be separated from the issues of efficiencies and of effectiveness of a given policy, as the following exemplifications indicate.

Consider a public official who receives an illegal sum of money in order to place someone ahead in a line. The value of such a favor depends on the length of the line, by itself an indicator of the efficiency of the bureaucracy. Corruption may cause inefficiency: a corrupt official is interested in keeping the line long enough, so that from it he can extract a valuable rent: Corruption, then, leads to resistance to bureaucratic reform. It is also true, however, that inefficiency may cause corruption, which at least in part is a crime of opportunity: an opportunity is there for an official to exploit, when there is a long line, and not otherwise.

Another example of a mutual relation between corruption and efficiency is provided by the management of public works in Italy before the "Mani Pulite" ("clean hands") operation of 1992-1993, that uncovered a vast amount of corruption (Della Porta and Vannucci, 1992). A way to induce corruption in public works was through *variazioni in corso d'opera*, or price changes (with respect to the agreed-upon price) that were determined during the realization of a given project, following "unexpected" events and delays. The possibility of such *variazioni* followed delays in construction, that were needed in order to justify a change from the established price. The relation between such delays – an expression of inefficiency – and corruption, was mutual.

In the two examples above, the linkage is between corruption and efficiency, defined as the ability of an administration to carry out a given project, whatever that is. There is also an important relation between corruption and effectiveness: the ability of an administration to choose its projects so that they respond well to public needs. A corrupt official, or politician, may choose a project because it more easily allows to extract unlawful rents. For example, cross-country analyses indicate that more corrupt countries spend relatively more in public works, and Italy consumes twice as much cement per capita than the US, and three times as much as Germany and Britain (cited in Rose-Ackerman, 2004). The extreme case is provided by so-called "white elephant" projects, that are chosen because they are so ineffective, that only the ruling elite is understood to be credibly committed to them, and as such constitute a reliable form of patronage.

Corruption may cause ineffectiveness, but it is also true that the incapacity of a public administration to choose well its projects may cause corruption. For example, if a project is unsound, and it is widely understood that it is wasting money no matter how well it is executed, then any moral restrain may loosen up, and the people who are in a position to embezzle funds, may do so it without staining a clean conscience.

Corruption, efficiency, and effectiveness, then, are strictly linked phenomena. Such an understanding dictates that, from a policy recommendation viewpoint, it does not make much sense to propose narrowly-designed "anti corruption policies". To the contrary, both analysis *and* policy recommendations ought to be forged at a higher level, that is, in terms of general governance[2].

In this paper, I propose a novel "reputation-based governance model" that provides a coherent framework to improve governance, through a recipe based on three ingredients – voice, benchmarking, and accountability. While such a system could in principle be applied to several types of public policies, I here present it for the governance of public investments in infrastructure.

Such governance model is supported by an Internet-based "reputation system", where public works are recorded in a standardized format, together with their costs. The public can view such information and, in a structured fashion, can express opinions on the quality of the completed works. Administrators can also express an evaluation on the firms with which they interact and, in turn, firms express their opinions on the administrators. The procurement rules put a premium on firms with a good reputation, and other forms of incentives are in place for administrators to build a good reputation, and for the general public to honestly assess public works.

I consider in some detail how such a system could be implemented in Italy, where there exists ample evidence on the shortcomings of the governance of public works, and on the relevance of corruption phenomena. In the concluding sector, I add some final considerations, and consider some interesting implications of the approach here proposed, in particular, in terms of the data collection and of the analysis of governance systems.

2. A reputation-based governance model

In order to define our governance model, it is necessary to define a series of concepts. Together, they'll refine, and extend, some of the considerations that were presented in the introductory section.

[2] Such an emerging consensus has found an echo also in the production of quantitative information, that from an early emphasis on measuring (perceptions of) corruption, is gradually evolving towards the development of broader "quality of governance measures". See Kaufmann et al, 1999, documenting World Bank's activities. Also, see the considerations in Golden and Picci, 2005.

2.1 The relevant actors

The relevant actors are a government, who chooses and, with the help of firms, executes policies; citizens, who are affected by such policies; firms, who help the government in executing policies. Public administrations are staffed by administrators, and firms are ruled by entrepreneurs. Administrators can't be entrepreneurs, while both are also citizens.

2.2 The governance system

A governance system is here the general framework under which public policies are selected, designed, and carried out. Governance, then, describes a production process: from policy selection, to its execution.

2.2.1 Efficiency, effectiveness, and corruption

Once a policy has been selected, its accomplishment can be more or less efficient: an efficient policy is one whose production uses relatively little resources. A governance system is efficient if, no matter what policies are chosen, they are carried out efficiently.

The selection and the design of a policy can be more or less effective. An effective policy is one that, if well accomplished, serves the public well. We distinguish between *ex-ante* and *ex-post* effectiveness: an *ex-ante* effective policy is one that is effective, without considerations for the efficiency, and possible presence of corruption, of its implementation. An *ex-post* effective policy is one that is effective judging from its outcome, after it has been completed by a given branch of government.

A sound government, capable and willing of choosing effective policies, could rationally opt for apparently less effective ones, compared to other available alternatives. This could happen if an effective policy would have to be carried out by a very inefficient or corrupt branch of the administration, so much so, that it makes sense to opt for less effective options, if they are within the jurisdiction of better parts of the administration[3]. In this case, we would define such a policy *ex-ante* ineffective, but *ex-post* effective (relative to an *ex-ante* effective, but *ex-post* ineffective, alternative).

[3] This amounts, to some extent, to choosing not policies for their effectiveness, but sectors of the administrations for their efficiency and lack of corruption. Similar considerations are informing a debate on the allocation of international aid, where some propose to "starve" those governments that are known for their high level of corruption and cronyism.

We define the prevailing governance to be *ex-ante* effective if it chooses *ex-ante* effective policies. It is *ex-post* effective if it chooses *ex-post* effective policies[4].

Corruption is the diversion of public resources to private pockets. While such resources may ultimately be spent for valuable and welfare improving purposes – for example, charity – corruption is a drain on public funds and, perhaps most importantly, it often induces the selection of ineffective policies, their inefficient provision, it damages social capital, and it undermines the legitimacy of institutions.

Corruption can occur both at the design and at the implementation stage of the policy production process. In the first case, it may result in the choice of policies that are different from the ones that would have been selected otherwise. In the latter case, it produces a waste of public resources, and is observationally equivalent to inefficiency[5].

Efficiency and lack of corruption of a governance system are sufficient conditions for it to be both *ex-ante* and *ex-post* effective: in that case, quite simply, lack of efficiency and corruption would not be an issue[6].

2.3 Institutions

I introduce a set of institutions. These are: an information system, a monitoring and benchmarking system, an incentive system, the judiciary, and a "voice" system.

2.3.1 The information system

An information system is a technological infrastructure that, after having defined an appropriate characterization of the information that are considered relevant within a given domain of policy, it allows for their recording and storing in digital format, their retrieval, and

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4 We could also see the two different types of effectiveness as linked to different levels in sophistication of policy makers. Choosing *ex-ante* effective policies requires a detailed knowledge about policies and their effects. Choosing *ex-post* effective policies, after having indicated a set of *ex-ante* efficient ones, in addition requires a detailed and farsighted knowledge on the working of the different sectors of the administration.

5 On the other hand, note that corruption in the design stage is not observationally equivalent to ineffectiveness. Corruption at the policy design stage need not lead to less effective outcomes, when a government does not possess the capability of opting for the most effective alternatives: distorting an ineffective design process could serendipitously lead to the choice of more effective policies.

6 Efficiency and lack of corruption are not, however, a necessary condition for the coincidence between *ex-ante* and *ex-post* effectiveness: such a coincidence could also occur, for example, when the effects of inefficiency of an uncorrupt branch of government happen to cancel out with the corruption of an efficient branch, so that the two branches are equally effective in carrying out policies.

for any further electronic elaboration of those information that may be needed. We may think of it as a data base, together with a the set of procedures, supported by appropriate software, processing the recorded information.

2.3.2 The monitoring and benchmarking system

A monitoring system generates data from the observed behaviors of the relevant actors, as recorded in the information system. A monitoring and benchmarking system may be an official oversight body, a watchdog, or even an informal word of mouth network: anything that spreads relevant information about the choice and the implementation of policies by the government, and on the performances of the firms involved. Such monitoring system does not include the investigation capability of the judiciary, and it is logically distinct from it.

I distinguish between “detached” and “integrated” (with respect to the information system) monitoring systems. A detached monitoring system is one whose output is not intimately linked with the working of the information system. For example, it could be an oversight body that periodically carries out a monitoring activity on a given set of policies, collecting information from various sources, by means of auditing, personal interviews, and the like. Most monitoring activities are today of this type.

On the other hand, an integrated monitoring system is strictly linked with the information system, and it regularly produces its output in an automatic fashion, without the need of explicit external actions in order to activate the monitoring activity. For example, consider an information system that enables an administration to digitally carry out all its financial transactions. Within such a set up, it is relatively straightforward to automatically produce a vast set of summary statistics regarding various aspects of the financial life of that organization. Such a monitoring system would be “integrated”.

The difference just described is one of degree, more than of kind. The crucial aspect here is that, if a suitable information system is in place, then the monitoring activity can be made automatic, which implies reliability, completeness, and relative independence from a possibly whimsical political will to activate a monitoring initiative. When it is integrated, monitoring is institutionalized within the information system.

An integrated monitoring system easily allows for the comparisons of policies and of their outcomes. To this end, the available information must include the cost of the project, and in general a set of quantitative summary indicators as ample as possible.

It is important to note that such monitoring and benchmarking systems would be flexible enough to provide a host of information that could be used for a variety of different purposes. For example, Golden and Picci (2005) propose a novel method to measure corruption that is based not on perceptions, as with the Transparency International CPI index, but on the comparison of objective data – in that case, the cumulated expenditure on infrastructure in the Italian regions, and a physical measure of their consistence. The results indicate vast regional differences, with Southern and Insular Italy performing well below the national average. That particular research was carried out within what I defined a "detached" monitoring and benchmarking system, that is, on an *ad hoc* basis. However, the availability of a suitable information system would allow for the integration of the monitoring system, to make it produce interesting performance measures. Such a result would be particularly useful within public administrations, whose activities so far have hardly been amenable to quantification. I will further elaborate on this issue in the concluding section of the paper.

2.3.3 The incentive system

The incentive system is a set of implicit or explicit rules linking actors' behaviors with incentives and disincentives of various types. Such incentives can be monetary, for example, a pay increase for good administrators, less chances of securing a public contract for misbehaving firms, or the payoff of corruption. They can also be non monetary, such as would be, for a public official, the stigma of a bad reputation within his peer group. This incentive system does not include the strong disincentive of a jail sentence after conviction on count of corruption. Judicial punishment will be taken into account next.

2.3.4 The judiciary

The judiciary can punish by sending to jail administrators and entrepreneurs who are found guilty of corruption episodes. It uses the investigation capability of the police, that is, has its own monitoring system, separated from the one described above. The judiciary can intervene against corruption cases, but not against inefficiency or ineffectiveness. It is effectively described by two parameters: the probability of finding out about a corruption episode, and the length of the jail sentence that follows. We assume that the judiciary can't make "type two errors", i.e., sending to jail innocent people.

2.3.5 The voice system.

Voice is the possibility that the parties who are affected by a given policy can express their opinions on the observed outcome, and that these opinions are easily accessible and relatively inexpensive to process. This last characteristic would rule out, for example, a Web-based forum where thousands of people write lengthy ramblings requiring much time and energy to read and to summarize. For a voice system to be effective, it must provide highly structured, hence easy to process, information. A voice system, then, is that institution that allows for structured opinions about policies (administrations, firms) to be easily recorded and disseminated.

2.4 Attributes of governance systems

We are interested in several characteristics that a governance system may have. A governance system is good when it selects effective public policies, it carries them out efficiently, and there is no corruption. In this case, effectiveness is both *ex-ante* and *ex-post*. Given our discussion in the introductory section, we hold for true that governance systems tend either be good, or to be bad in several dimensions, that is, to present simultaneously various degrees of ineffectiveness, inefficiencies, and corruption.

A governance system is *stable* if the observed outcome, in terms of effectiveness of the chosen policies, of efficiency, and of the level of corruption, does not change in time.

It is useful to define a more stringent stability concept that will later on serve as a point of reference for the discussion. A governance system is *autonomously stable* if it is stable, and if the observed outcome is not influenced by the presence of the judiciary. Such a concept is obviously an abstraction, since there doesn't exist a governance system whose outcome would be unchanged if the judiciary were literally to be taken out. A good and autonomously stable system is good and stable regardless of the presence of the judiciary. If a system is characterized by corruption and is autonomously stable, it follows that the judiciary is not working: the expected value of the jail term (equal to the probability of being caught, times the length of the ensuing jail term) for being corrupt is zero[7].

[7] Assuming that people commit an act of corruption at most once in their life, the same irrelevance of the judiciary could prevail if people were not deterred by the risk of a jail sentence. If there are persons who are prone to commit acts of corruption more than once, then a jail sentence would decrease corruption at least through its "impediment effect", i.e., by keeping people away from the possibility of committing crimes.

2.5 A reputation-based governance system

We are ready to provide a first definition of our proposed governance system. A reputation-based governance system is the result of the integration of an information system, a monitoring and benchmarking system, a voice system, the judiciary, and an incentive system. The behaviors that have to be induced for a governance system to be good are effectiveness in the selection of policies, efficiency in their execution, and lack of corruption. Let us consider how the integration of the above institutions would contribute to this end.

Lack of efficiency would result from inadequacies either of the administration in charge of the policy, or of the firm hired to carry it out. However, the public would observe the outcome, and compare it with other outcomes. The incentive system would punish inefficient behaviors, and put pressure both on administrators and on firms to build and keep a good reputation. Similar considerations would apply for the effectiveness issue. Citizens, by expressing their opinion on finished project, give a summary measure also of their usefulness. Administrators who choose ineffective projects, maybe serving narrow constituencies, would damage their reputation.

Corruption, insofar as it leads to a diversion of resources, inflates prices. Administrators and firms would have convergent interests in keeping prices low, in order to build, and then to keep, a good reputation. Such incentives would run counter the pecuniary incentives of corruption.

Such a reputation-based governance system, in fact, establishes a series of positive incentives that supplement the incentive system built into the judiciary. With respect to this issue, one way to look at the proposed system is the following. The judiciary is typically slow, error-prone, and expensive, and it only addresses the corruption issue, not the efficiency and effectiveness one. The proposed reputation-based governance system supplements the (partial and week) incentives of the judiciary. Insofar as it reaches this result, it lowers corruption, it diminishes demand for the services of the judiciary, and in such a way it makes it better (less slow, and probably more accurate). The two effects would reinforce each other: less corruption would free the judiciary and make it more accurate and its threat credible, and a more credible judiciary would lower corruption.

Such a governance method, then, if the incentives are strong enough, is good, that is, characterized by effectiveness, efficiency, and lack of corruption. In fact, all the incentives cooperate to this end: administrators are pressured to be effective and efficient, the same holds for firms, and the judiciary incentives are more effective than otherwise.

As a reference point, it is useful to consider the case when the incentives are so strong that the judiciary is not needed in order for the governance system to be (autonomously) good. The idea here is that the incentive system could in principle be so effective, to induce virtuous behaviors without the help of the threat of a jail term to convicted criminals.

Such an abstract reference point resounds in works of economic historians studying situations where the state was absent, or too weak. For example, Greif et al., 1994, consider how medieval (trade) guilds could provide the right incentives for long distance trade to flourish, in a context where formal mechanisms to define and enforce contracts were absent. In this sense, the equilibrium there described is of the "autonomous" type[8].

3. Internet-based Reputation Systems

In the reputation systems described by economic historians, word-of-mouth has served to build and destroy reputations and, as such, has provided a strong incentive for virtuous behavior, even in contexts were formal contracts were absent or hard to enforce. Dellarocas (2003) aptly notes that through the Internet it is possible to have a digitalization of word of mouth, through what we define "Internet-based reputation-systems".

An Internet-based reputation system, or "online feedback mechanism", is a type of information system that has recently attracted considerable attention, and that provides a useful reference point for the suggested governance system. It is defined by a set of characteristics[9], that I now describe, while reporting how they map into what probably is best known example, the E-Bay (http://www.ebay.com) auction electronic market[10].

First, an Internet-based reputation system provides an information infrastructure that allows for a set of transactions. In E-Bay, sellers can post information on their products. Prospective buyers can see them and place their bids on the products that they desire. The system records the bids and manages the needed interactions between sellers and buyers. A noteworthy characteristic of E-Bay is that the transactions that it allows are not backed up by formal contractual guarantees, so that in principle there is ample space for cheating, in the

8 See also Greif, 1993.

9 See Dellarocas, 2003, for a review.

10 E-Bay is also the most widely studied example of a reputation system. Reisnick et at. (2002) cite 14 empirical studies on E-Bay.

form of not paying for a delivered good, paying late, delivering merchandise that does not correspond to the published specifications, etc.

Second, it allows the interested parties to record their opinion on the transactions, in a highly structured manner. On E-Bay, both sellers and buyers, after a transaction, can voluntarily rate each other. The rating can be “positive”, “negative”, or “neutral”. Other reputation systems allow for greater granularity of ratings.

Third, some function(s) of the opinions expressed are made public. On E-Bay, it is the sum of negative, positive and neutral ratings received by each buyer/seller during the past six months. Such a filtering of information is also called the “feedback mediator”. The resulting publicly available data is descriptive of the reputation of each interested party.

Last, an incentive system is in place that prizes a good reputation, and that punishes a bad one. On E-Bay, buyers will tend to be wary of conducting business with sellers that performed badly in the past, and sellers will do the same with respect to buyers.

The desired outcome of such a system is one where people have an incentive to behave well, in order to build and to maintain a good reputation. When such an outcome is obtained, we should in principle observe that most people behave well: the most effective punishments are the ones that people are afraid of, but that, precisely because they are effective, are rarely needed and, hence, observed[11].

The availability of the Internet offers the potential to drastically renovate the time-honored institution of word of mouth. First, it brings it to a huge scale: reported opinions spread vastly and instantaneously. Secondly, it democratizes it, because the recorded opinions are in principle accessible to everyone, and not just to the people who are well placed within informal social networks. Thirdly, Internet-based reputation systems are not simply the result of social interaction as they manifest themselves, but they can be carefully engineered, to make their working coherent with a desired outcome. Ongoing research is trying to better understand how various reputation-systems’ characteristics – their general rules, the way feedback mediators are designed and, eventually, the required costs to participate or to change one’s identity, etc. – influence the equilibrium outcome.

Reputation systems also have shortcomings. The information that they collect is decontextualized. Unlike in a traditional setting, it is not possible to extrapolate information from the non-verbal aspects of communication: for example, if a prospective business partner

[11] This is the observed outcome on E-Bay, where less than 1% of the reported comments are negative. See Dellarocas, 2003.

is maligned by someone who's dressed like Napoleon, such an opinion may as well be discounted. On the other hand, all non-verbal information is lost on the Internet.

The availability and truthfulness of reported opinions also represents a thorny issue. Ratings are a public good and, as such, we'd expect their underprovision. Also, there could be misrepresentation of personal opinions, following strategic behaviors and, possibly, collusive practices, where actors exchange good ratings, either in-kind or for money. How to assure a truthful revelation of opinions is an area of current research.

Notwithstanding these limitations, several successful applications of reputation systems are in place, and reputation systems are today the object of much research interest, in an attempt to better understand their properties, and to better design them to solve actual problems.

4. An application to public works

I now illustrate a reputation-based governance system within a specific context: the provision of public infrastructure. The relevance of the case is obvious, given that there is unrefutable evidence on the fact that this sector of public intervention is prone to corruption, and that the efficiency and effectiveness of different public administrations in building infrastructure varies sensibly. I now describe the characteristics of such an application, with reference to its constituent institutions.

4.1 The information system

All public projects are included on a Web-based database, that can be accessed by administrators, firms, and by the public. The administration includes each project into the database upon selection[12]. Preliminary information about a project contain a general description according to codified taxonomies (type of good, location, expected cost, etc.)[13],

[12] Inserting candidate projects at the beginning of the selection phase would create the possibility for a participatory selection process, as I'll discuss in the conclusions.

[13] While the purpose of this paper is not to provide guidelines on the technical aspects of the required implementations, I note that the needed codification could be carried out through the use of XML (http://www.w3c.org/XML). Such an approach would have several advantages. Among them, it would favor the integration with other XML based standardization efforts, such as the Geography Markup Language (http://opengis.net/gml), permitting the use of the infrastructure database within GIS (Geographic Information Systems), to answer a multitude of analysis and planning needs.

technical drawings, and a set of data pertaining to any documentation that may accompany the early stage of the project (environmental impact and cost-benefit analyses, etc.). As the project evolves, more information is provided, to eventually include the costs, and data about the final outcome (pictures, etc.).

Each project is linked to information about the administration that selected it and that is responsible for its execution, and about the firms involved, with details about their responsibilities. For each firm and administration, the information system records all the projects that they are and have been involved into.

To guarantee that the monitoring system is sustainable from an organizational point of view, it should be tightly integrated with some pre-existent administration's needs, so that inputting the information does not represent a duplication of efforts. This criterion can be met by integrating the database with some of the requirements that the administration already faces, such as, the generation of reports and financial information of various kinds. I will be more explicit on the issue later on.

In sum, the information system is the result of a) a careful definitions of types of goods and of their characteristics; b) an information system proper, allowing for the coding of public works c) a set of procedures, suitably engineered, for the recording of information.

4.2 The monitoring and benchmarking system

The monitoring system is a set of procedures that, applied to the information system, automatically generate a series of summary statistics of the available information. It is, then, an *integrated* monitoring system. These statistics, whose purpose is to allow comparisons (i.e., benchmarking) between different projects, would include: unit costs for projects of the same type (for example, of a km of road of a given category), various rankings of projects; their time to completion. All the data would be available both for the whole population of projects documented in the database, and also for various subsets and disaggregations: by geographic unit, by type of administrations, and by executing firm. For each project, administration and firm, rankings would be provided.

The system could comprise information from projects that are not included in the database, following *ad hoc* analyses carried out by independent observers. For example, the availability of a study on road costs in a set of foreign countries, would allow for a more comprehensive comparison of the projects.

4.3 The voice system

A voice system allows all relevant actors to express their opinion on given characteristics of the realized works. Administrators would express their opinion on the firms that carried out the infrastructure. Firms, on their side, would voice their points of view on the public administration with which they interacted. The public would state judgments on pieces of infrastructure. Such opinions would be highly structured, and would refer to a small set of well defined characteristics. For example, the public could judge "aesthetic qualities", "usefulness", "accessibility", etc., of the manufactured goods.

An important component of the voice system is the feedback mediator. The design of the feedback mediator is a critical aspect of a reputation system, and should be carefully crafted, possibly allowing for a trial and error approach. The two most relevant issues here are the incentives for the relevant actors to maintain a good reputation (see Dellarocas, 2003), and the incentives to correctly report one's opinions. With respect to the latter, it could be devised a weighting of reported opinions according to one's record: people who are detected to be systematically biased, would see their opinions discounted. The voice system would then provide a ranking of the votes received by projects, and by the administrations and firms who carried them out, variously disaggregated.

A relevant issue about the functioning of the voice system has to do with the identity of who is allowed to post an assessment of a given project. Within a firm, we would expect that its administrator, or a person authorized by the administrator, would be in charge of such a task. Within the public administration, we may think that it is the person that is in charge of a given project who eventually assesses the performance of the firms involved. It would be possible to keep track both of the administration, and of the administrators' identity, so that each administrator would develop a personal track both of his assessments to others, and his ratings by others.

Voice activities present some further problematic issues when they are carried out by the public. In principle, private citizens and organized private entities could be entitled to carry out voice activities. Private citizens could register on the Web site, and then express their opinions on all projects carried out in their region. For major network infrastructures, each person could also express an opinion on realizations elsewhere.

Citizens' organizations could also be allowed to participate, since they could more easily afford the time consuming and possibly expensive analyses needed to assess public works. However, dealing with organizations' participation presents difficulties. First, it is not immediately clear how to weight their assessment. The weighting could be done according to their membership, but this would establish an incentive to artificially inflate it.

Also, compared to individuals, organizations would more easily be prone to collusion with the other interested parties. Collusion and the presence of political scheming, in fact, is a general concern for the working of the voice system. Political parties or factions could encourage people to express positive opinions on projects that they carry out, and to smear projects within the jurisdiction of adversaries. They could encourage the formation of *ad hoc* organizations that do the same, enjoying the added weight that fake memberships by party activists would guarantee. Enterprises could also encourage the formation of fake organizations to support their projects, and to discredit their competitors' creations.

Several answers to these objections are possible. First, the capability of creating some form of consensus on a given realization would somehow proxy its worth. In a context where barriers for entering the voice system would be very low, whoever is able to organize consensus on a given project, no matter how that is done, is implicitly showing that, at least to some extent, that consensus is warranted.

More importantly, a set of cautionary measures could be taken to guarantee that as little scheming and collusion as possible takes place. For example, private organizations could be required to post their budget sheets, and to declare any contributions that they receive. Their members could be required to register, and to declare any link that they may have with firms or administrations. Moreover, each person's or organization's expressed opinion could be tracked, and possibly weighted according to a set of suitable parameters.

While several steps could be taken in order to limit collusion, a different stance to confront the issue could simply be, to give low or no weight to organized opinions, that is, to put a premium on individual participation to voice activities. As a rationale for this option, consider that the proposed information system is a tool to reduce transaction costs of various kinds. To the extent that organizations are instruments to counter transaction costs, in this new setting, they would be less needed than before[14].

[14] However, it is also true that the proposed system would also lower the costs to carry out watchdog activities, and this would instead put an incentive to the formation of organized watchdogs. Again, the fine tuning of the system would require flexibility and experimentation.

4.4 The incentive system

A number of incentives and disincentives would be available. Through the feedback mediator, the general public could browse a series of rankings on projects, on administrations who carried them out, on the administrators involved, and on the firms who executed them. By itself, this would put a premium on virtuous behaviors: the politicians within the administrations would be under pressure to get good ratings, in order to improve their chances of reelection. The bureaucrats would also be pressured not to be looked down by their peers. To the extent that administrators can choose the firms that they work with, firms would also be obviously interested in having good ratings. Moreover, if a firm works both in the public and in the private sector, a good reputation in the former would be expendable in the latter.

All this could be secured simply by publishing and publicizing the data produced by the monitoring system, according to the rules of the feedback mediator. Such effects could then be made more cogent by deliberate publicity activities, such as publishing in newspapers the "ten best projects" of the year, "the ten worst projects", and the like.

A further set of incentives could be added by allowing administrations to choose firms to carry out projects while taking into considerations their ranking. This is possible when administrations are allowed to buy projects "on the shelf"; on the other hand, including such considerations in a context where competitive bidding prevails, would present both practical and legal obstacles. While such obstacles could in principle be overcome, note that the proposed governance system would make more attractive an allocation mechanism based on off-the-shelf purchases, instead than on competitive biddings, a possible evolution of procurement systems already hinted at in Rose-Ackerman, 2004[15].

Last, the published rankings could be used by an oversight body to determine which administration gets an audit. A probabilistic rule could be used, attributing a higher probability to be audited to the administration with a low ranking, while not making it completely impossible for high rankings administrations (or administrators) to be checked. Such a publicly known rule, by itself, would act as a further incentive for virtuous behavior.

[15] More generally, economists have pointed out how private negotiations may be superior to auctions, when the good being exchanged is complex, and as a consequence it is hard, and sometimes impossible to write a "complete" contract – i.e., a contract that describes all contingencies. See, among others, Bajari et al., 2003.

5. An application to Italy

Public works in Italy have been plagued by the triad of ineffectiveness, inefficiency, and corruption. In 1992-'93 a vast network of malpractices was uncovered, and a sweeping judicial operation, to be known as "mani pulite" (clean hands), provided ample proof of the existence of an alarming level of corruption. While after the crackdown on corruption of the early '90s the phenomenon lost at least some of its more extreme edges, judicial data, and newspapers articles, testimony that the problem is still acute. Corruption has been accompanied by ineffectiveness and by inefficiencies: the Italian press is full of stories about public works that take decades to move from the designing to the execution phase[16].

Italy, also, is characterized by a high level of corruption compared to similar western industrialized countries. It ranks n. 35 in the 2003 Transparency International Corruption Perception Index, performing only better, within the European Union, of a handful of countries, all of them, with the exception of Greece, from the former Soviet block. Last, Italy is a good user of Internet technologies. While not being as popular as in Northern Europe, or in the United States, the Internet is widely used by people, firms, and public administrations alike.

In what follows, I first briefly indicate a few key elements of the governance of public works in Italy, and then I provide a possible scenario for the creation of a reputation-based governance system. Such a scenario is not meant to indicate implementation details, but it is merely intended to offer a reference point for more detailed reform plans, by indicating a series of roles and of tasks that could be instrumental in achieving the proposed governance model.

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[16] To make the point, consider a few examples about unfinished works that are widely considered as high priorities. The "variante di valico" – a partial doubling of a highly congested freeway across the Appennin mountain range between Bologna and Florence – was first proposed in 1971, and is now under construction. The construction of the "passante di Mestre", a new freeway circling around Mestre (Venice) to alleviate a heavy congestion problem, has been on the political agenda for decades, and has not yet been started. The completion of the first part of the high-speed railroad network, linking Turin to Naples, is under construction, several years behind schedule, and with major costs overrun. In the meantime, other less useful projects drained scarce resources. An example of ineffectiveness (that was linked both to political patronage and to corruption) is provided by the so called "Italia '90" public investments, in preparation for the 1990 Football World Cup.

5.1 The reform of the early '90s

In the 90's, following the "mani pulite" scandal, the Italian public procurement system underwent a reform, embodied by the three "Merloni Laws[17]", as they became known. Together, they prescribed a series of important changes in the management of public works. Of interest for us here are some of the provisions contained in the first "Merloni law" of 1994 (Article n.3), that instituted an independent Authority with an oversight responsibility on the sector[18].

Among such responsibilities, the Authority must determine a set of "standardized costs" of public works. The Authority should inform the Government and the Parliament about the observed deviations from such costs, by means of a dedicated publication. Over the last few years, the Authority has started developing such standardized costs, through an ad-hoc research, and not (yet) routinely computing them using a suitable information system. To use our definition of monitoring systems, what the Authority is developing is one of the detached variety.

Over the last few years, further changes in legislation have to some extent altered the general framework provided by the three Merloni Laws. In particular, the role of the Authority, besides what it is prescribed by the law, is not very clear at the present time, and there is a widespread sensation that the current parliamentary majority, who inherited it, does not believe very much in its usefulness. Apart from sensations, what is certain is that the Authority is currently not very influential, and that it lacks visibility.

5.2 A strategy towards the creation of a reputation-based governance system

The 1994 Merloni Law attributes to the Authority a series of roles that are coherent with a leadership in the establishment of the proposed governance system. To put it differently, the proposed strategy would probably not need any legislative measure, at least during its first phases; however, to fulfill such a new role, the Authority should be essentially revamped, in terms of the available resources and of visibility. Such a result could be obtained within the premises of the yearly budget law, and with the indispensable contribution of a suitable political commitment.

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[17] These are the laws n. 109 of 1994 ("Legge Merloni"), n. 216 of 1995 ("Legge Merloni bis") and n. 415 of 1998 ("Legge Merloni ter").

[18] "Autorità per la vigilanza dei lavori pubblici", http://www.autoritalavoripubblici.it/

Moving on from what has already been accomplished for the computation of the "standardized costs", the Authority should coordinate the realization of the necessary classification of public works. Such an effort would more appropriately be carried out at the international level. Organizations such as the World Bank, or Transparency International, could be interested in participating. An interesting possibility would be to deal with the semantic and technological aspects of the problem within the World Wide Web Consortium (W3C, http://www.w3c.org), of which the Italian Prime Minister's Office (Presidenza del Consiglio dei Ministri) is a member.

Parallel to this preliminary activity, a steering committee should be constituted, composed of people embracing a vast array of different skill, and including game theorists, economists with expertise in mechanism design, computer scientists and experts in knowledge representation, lawyers, political scientists, and experts in administration. Such a committee, adopting a pragmatic approach, should manage a step-by-step process leading to the full implementation of the desired governance system.

The construction of the information system should ensure its usefulness already in the short to medium term, and well before the governance system is fully working. To guarantee this result, the information system should serve different administrations' needs. An interesting possibility is that one of its first applications would administer the payments by "Cassa Depositi e Prestiti", the public agency that finances most public works in Italy[19]. Other applications, based on the information system, could also be studied and eventually implemented, with the purpose of convincing all the actors of its usefulness.

The second step would involve the construction of the monitoring system. The availability of an early set of summary statistics would allow for preliminary studies of the data by the steering committee. Only at a second stage, and after careful considerations, the monitoring system would be released to the public.

Third, the voice system would be put in place. Last, and possibly only after a few years after the beginning of the project, and after a careful analysis of the available data, a set of incentives would be introduced, following the previous discussion.

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[19] See http://www.cassaddpp.it. For an account of the Cassa Depositi e Prestiti rich history, see De Cecco and Toniolo (ed.), 1994.

6. Conclusions and discussion

In this paper I have argued that the integration, within an Internet-based information system, of monitoring and voice activities, and of an appropriate incentive system, could contribute to a governance model characterized by effectiveness, efficiency, and lack of corruption. To give more substance to the proposal, I have considered in some detail its possible implementation for the management of public works in Italy, a country that would certainly benefit from such an improved governance system.

The proposal is prone to further developments. For example, if candidate projects are recorded in the information system before they are selected, then room is created for participatory forms of decision making. Within this context, the public could be entitled not just to *ex-post* voice activities, but also to present proposals for new public works, and the planned reputation-based governance model would support far reaching "electronic democracy" practices, where the word "democracy" would be taken both to mean participation, and accountability.

The monitoring system range of action could be increased. Public works shape the territory where they are constructed, and suitably organized information on them would allow for a vast series of activities that require to process information about a given territory, and would be very useful in planning exercises of many forms.

A further consideration is in order. The present proposal, with its emphasis on data collection, and on the organizations of automatic data processing procedures, should be seen within an ongoing process that is gradually changing our appreciation of the quantitative aspects of public administrations and, more generally, of governance. The study of corruption provides a good exemplification of the issue.

As we saw, in the 1990's several organizations made available perception based corruption and governance indexes. Golden and Picci (2005) provide a measure of corruption that is based not on perceptions, but on hard data. Moving from measuring perceptions, to constructing measures that are based on objective data, is a process that deserves encouragement. However, such a process is difficult to realize, because objective data are often hard to find, and very time consuming to organize.

The methodology proposed by Golden and Picci (2005) could certainly be carried out for countries other than Italy[20]. Such an endeavor would be intrinsically expensive, and by necessity it could hardly be sustained on a regular basis, to provide for a timely updating of information. The availability of an information system of the type here proposed, however, would allow for an “integrated” monitoring system, with all its qualities. Such a monitoring system would compute a vast array of useful indexes and measures, and would help address a more general problem that besets current studies on public administration’s related fields: the difficulty to collect suitable quantitative information.

These considerations help casting the proposed governance model under a different light. The stated issue is about improving governance. However, it is also about the creation of a conceptual and technological model for the systematic organization and collection of quantitative information about the working of a governance system. The two issues, in fact, are closely related.

[20] Work in this direction is currently under way by independent researchers for Mexico.

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