

■ Research Paper

Improving Performance and Fostering Accountability in the Public Sector through System Dynamics Modelling: From an 'External' to an 'Internal' Perspective

Carmine Bianchi^{*,†}

Department of Management, University of Palermo, Italy

This paper aims to outline the benefits justifying a tailored approach to System Dynamics (SD) modelling in the public sector, to improve performance and foster decision makers' accountability. The need of combining an 'internal' with an 'external' perspective (in respect to decision makers) in developing SD models is claimed. Different levels of intervention (i.e. macro, micro and *meso*) are discussed. Two case studies are analysed. The first one demonstrates how a dynamic resource-based view (DRBV) can support an analysis of the impact of back and front office units on a public sector organization's performance drivers. The second case shows how SD modelling based on a DRBV can also be applied to improve performance on a political level. Copyright © 2010 John Wiley & Sons, Ltd.

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INTRODUCTION

One of the unresolved problems in public sector research and practice stands into the evaluation and improvement of results produced by invested resources. Related to this, there is also the issue of motivating and orientating public sector decision makers towards a consistent set of goals and objectives. This, in turn, reminds two

other significant themes, i.e.: (a) ensuring a proper coordination of decision makers, often operating inside different institutions; and (b) making them accountable to their stakeholders, citizens and the society.

While decision making, performance and accountability provide a wide area on which both research and practice have been working with specific reference to the private sector since a long time ago, it seems that many experiences matured over the years from success and failure on this regard cannot be easily transposed to the public sector (Talbot, 2005). In fact, it is claimed

*Correspondence to: Carmine Bianchi, CED4 System Dynamics Group, Via Mazzini, 59 - 90100 Palermo, Italy.
E-mail: bianchi@unipa.it
[†]Full Professor.

(Rainey and Han Chun, 2005) that such sector has its own peculiar complexity, which requires proper 'lenses' to frame the problems and to figure out alternative ways to manage them.

PURPOSE AND STRUCTURE OF THIS PAPER

The purpose of this paper is to analyse the benefits justifying a tailored approach to System Dynamics (SD) modelling in the public sector, to improve its performance and foster decision makers' accountability.

It will be remarked that:

- (1) Improving performance and fostering accountability in the public sector requires understanding the impact of back office units on delivered services. This is not an easy task, since a bureaucratic perspective¹ tends to be adopted when the contribution of such units to public service is considered (Osborne and Gaebler, 1992, Chapter 6). Provided that back office units take a major role in delivering such service (Millard *et al.*, 2004), this perspective significantly tackles efforts in making public sector decision makers accountable². Overcoming this problem requires the identification of 'administrative products' (Knoepfel *et al.*, 2007, p. 206 and 236), i.e. the measurable results generated by the tasks fulfilled by both back and front-office units. This implies the identification of internal and external 'clients'³ and corresponding performance targets⁴.

Such approach allows one to shift the view of Public Administration (PA) from a bureaucratic to a citizen and community-oriented perspective (Barzelay, 1992, Chapter 8). In fact, performance targets can drive the

activity of public sector units and the evaluation of achieved results.

A first case-study will be analysed to demonstrate how a dynamic resource-based view (DRBV) (Morecroft, 2007, pp. 59–85) can support both back and front-office unit managers in a public sector institution, to frame administrative processes, constraints, strategic resources, and policy levers on which to act, in order to affect results.

- (2) Modelling public sector performance should take into account not only an industry⁵ but also the decision makers' perspective, i.e. the viewpoint of each player (e.g. in terms of available resources, policy levers, constraints, objectives) affecting the system's behaviour.

This opens the discussion towards the need to combine what we may call an 'external' with an 'internal' view of SD modelling in the public sector. Such perspective provides the basis to apply the DRBV as an approach to foster performance improvement and accountability at different levels (i.e. macro, micro and *meso*) of intervention.

An analysis of the potential application areas of SD modelling according to such levels will be done. The discussion of a second case will finally illustrate the usefulness of the proposed modelling approach, applied to a political context.

Based on the above set of purposes, this paper is outlined along two main parts.

The *first part* aims to frame the theme of assessing and improving performance in the public sector, and fostering decision makers' accountability. The central role that SD can play in this process is emphasized.

To this end, the public sector's peculiar complexity is discussed, and a systemic framework is proposed ('On the Public Sector's Peculiar Complexity and the Crucial Role of Value Generation' section) to demonstrate the need of adopting an outcome-oriented view in assessing results achieved by public sector institutions. It is emphasized that such view has to consider the *value* generated by the public sector to the benefit

¹The bureaucratic perspective takes only the point of view of the formal respect of norms and rules associated to the fulfilment of administrative tasks.

²According to the Italian *Ragioneria Generale dello Stato* (State General Accounting Department), in the year 2004, the personnel employed in Italian Ministries in back-office positions was about 56% of the total (Lucibello, 2006).

³'Clients' are here meant as the subjects in the interest of whom each public sector unit delivers its services.

⁴The identification of administrative products is one of the building blocks of the so called 'New Steering Model', i.e. a reform package introduced in Germany in the 1990s (Pollit – Bouckaert, 2000, p. 239).

⁵For example health care, tourism, agriculture.

of the private sector. This can enable the private sector to increase its generated value, which makes, in turn, tax raising sustainable.

Related to the issue of understanding the role of a public sector organization in its relevant system and assessing its performance, based on the value generated by its services, the theme of designing and implementing Planning & Control (P&C) systems in the public sector is discussed in 'The Use of Planning and Control Systems in the Public Sector to Improve Performance: The Need of a Learning-oriented Perspective Fostered by System Dynamics' section: the need of a learning-oriented approach is emphasized.

'Implementing P&C Systems in the Public Sector According to a *Learning-oriented* Approach: A Dynamic Resource-based View' section proposes a DRBV as a framework to implement P&C systems in the public sector to foster accountability and performance improvement, according to a learning-oriented approach. The use of SD as a method to operationalize such view is emphasized. On this regard, a case-study is analysed.

In the *second part* the need of a tailored approach to SD modelling to support performance improvement and decision makers' accountability is recommended.

In particular, 'Applying SD to the Public Sector: From an 'External' to an 'Internal' Perspective' section frames the concepts of 'external' and 'internal' perspective in SD modelling. 'Main Application Areas of SD Modelling in the Public Sector and Corresponding 'Levels' of Analysis' section provides an analysis of different levels of application of SD to the public sector. 'Applying SD Modelling on a Political and Inter-institutional Context: Industrial District Policies' section proposes a second case to illustrate how the DRBV can provide useful insights also when the themes of performance improvement and accountability are focussed from a political viewpoint.

ON THE PUBLIC SECTOR'S PECULIAR COMPLEXITY AND THE CRUCIAL ROLE OF VALUE GENERATION

The public sector is a complex and dynamic system. It is complex since several institutions,

whose roles and competences cover different inter-related domains, affect performance. Complexity also stands into the constraints imposed to the public sector decision makers by the existing legal framework. Their decisions must always comply with such framework, although diverging from them could imply the achievement of better performance levels—e.g. in terms of efficiency and effectiveness (Rosenbloom *et al.*, 2009).

The public sector is also a dynamic system, since the effects produced on performance by decisions made by the several (public and private) actors having a stake on the system itself, can be often observed after long delays. Such delays are due to the time it generally takes to public sector decisions to generate their own outcomes on the community. They also depend on the huge net of feedback relationships between different subsystems ⁶.

The public sector performance has a major impact on the quality of life of people and may constitute either an acceleration factor or a constraint for the growth of the socio-economic sectors profiling a given territory. A higher accountability of the public sector, and capability to deliver better services and rules to the private sector, may generate economic and social value, in the system (Moore, 1995). Such value corresponds to an increase in tangible and intangible strategic resources ⁷ that are available to the private sector. An improvement in such resources may result into a multiplier of the private sector performance, i.e. can determine suitable conditions to deliver products and services that can generate new value. Part of this value may, in turn, feed back to the public sector again, not only in terms of taxes and other financial contributions but also in terms of consensus, image, etc.

⁶For instance, infrastructures may affect commerce or tourism, and—in turn—commerce or tourism can affect banking and (through this last subsystem) infrastructure funding, in a given Urban Metropolitan area.

⁷For example infrastructures, funding, image of a territory, permits, skilled manpower.

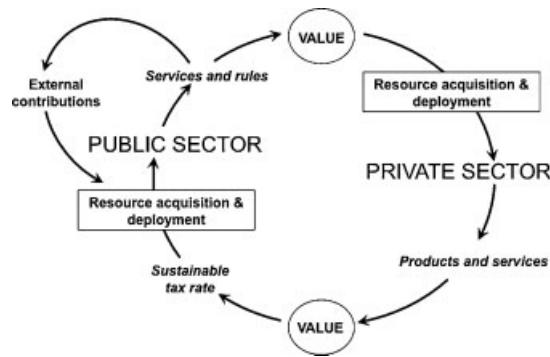


Figure 1 A systemic framework embodying both the public and private sector: value generation as a focus for assessing performance and a prerequisite for sustaining growth

Figure 1⁸ shows how both the public and private sectors are part of a same system, and how the rules underlying the survival and development of both sectors lie behind their own capability to generate *value*, to make growth sustainable⁹.

Figure 1 also shows how public sector performance does not only feed back under the form of taxes and financial contributions from the community to the benefit of which a given set of services and rules is delivered but also in terms of external contributions¹⁰.

So, the private sector feeds back to the public sector: public opinion is primarily affecting the political level, and income primarily affects the funds that the PA will be able to raise through taxes and other sources to provide the admin-

istrative level with resources to afford public expenditures.

How to design and implement policies aimed to foster sustainable growth in such system? How to prevent idiosyncratic behaviour by its players, leading to a destruction of resources? How to make public sector decision makers accountable on the system's key-performance variables?

To find an answer to the above questions, in the last 20 years legislative frameworks have introduced formal P&C systems in the public sector in many countries of the world. This move can be associated to a growing interest of the society towards the improvement of public service quality, effectiveness and operational efficiency. This phenomenon is commonly referred as *new public management* (NPM).

THE USE OF PLANNING AND CONTROL SYSTEMS IN THE PUBLIC SECTOR TO IMPROVE PERFORMANCE: THE NEED OF A LEARNING-ORIENTED PERSPECTIVE FOSTERED BY SYSTEM DYNAMICS

A mechanistic approach to P&C systems design and implementation has often generated an *illusion of control* and a risk of manipulation in goal setting and performance evaluation (Bouckaert and Peters, 2002; Van de Walle and Roberts, 2008)¹¹.

To avoid that a misleading effort is produced towards the use of formal P&C systems in the public sector, decision makers should be enabled to learn and practice an aptitude to communicate each other and to be aware of the causes

⁸Though Figure 1 may look like a causal loop diagram, i.e. a feedback representation involving possible stock-and-flow simulation, this is not properly the case here. In fact, Figure 1 tries to capture both the public and private sector into a single and abstract framework. Such framework remarks the role of the public sector into the wider system where it operates, and therefore underlies the main conditions for assessing its performance.

⁹Sustainable growth depends on the capability of public and private sector organizations to generate results (e.g. in terms of products, services or rules) which tend to produce an outcome whose value corresponds to an increasing endowment of available resources.

¹⁰Such additional resources correspond to those that a single public sector institution (or a group of them) ruling a given territory is able to procure from third actors (e.g. the Union funding for infrastructure building to the benefit of European Regions). It is worth remarking that the above analysis is relevant not only for those public services generating a financial value (e.g. in the case of infrastructures, education, enterprise funding, territorial marketing) but also for those generating a qualitative value (e.g. in the case of health care, police or environmental care services, whose indirect outcomes have, however, an economic value too).

¹¹More specifically, a number of unintended effects generated by the introduction of formal P&C systems have been remarked, such as (1) an increase of bureaucratization; (2) a poor definition and alignment of goals, activities, and performance indicators, and a low level of coherence between them; (3) a missing connection between the political and managerial level; (4) a lack of coordination between policies undertaken by several institutions playing different roles in the delivery of a given pool of services to citizens and the wider community (Boyle, 1999; Pollit, 2003; Johnson, 2005); (5) overlapping objectives and competences between different Ministries in a same administration in a given territorial area; (6) a static and bounded view of the relevant system for public policies and management decisions, leading to schizophrenic and atomistic behaviour and (7) an un-focussed communication to the community of the outcomes associated to undertaken policies.

underlying the phenomena on which they are expected to intervene.

The roles of both politicians and managers are dramatically changing. On the one hand, political decision making cannot be focused on an incremental view, which pursues a gradual and tactical change. Today, political action requires a higher aptitude than in the past to frame the dynamic complexity characterizing the systems where decisions will be made (Haynes, 2003; Klijn, 2008). It also requires a crucial capability to foster synergies, communication and synchronization of strategies between different, public and private, actors involved in the systems where politicians act.

On the other hand, managers are expected to outline a set of objectives, consistent with political goals and to better acquire and allocate resources to pursue them. It is required to focus the real impact of services on citizens and the wider community, rather than considering actions only in a traditional *weberian* perspective, i.e. through the lenses of the 'bureaucrat'. According to such lenses, managers' performance can be positively assessed if decisions have been made in compliance to laws, rules and procedures. However, today, resource scarcity and the proliferation of citizens' expectations towards the public sector also require a high promptness and selectiveness in decision making, and an ability to undertake networking and joined-up government (Christensen *et al.*, 2008).

In such a new context, the P&C process cannot be bounded to the consideration of 'input' factors only. It should be, rather, broadened and more focused on the search for continuous improvement, leading to the measurement of outputs and outcomes (Ammons, 2001, Chapter 1), which could better respond to the various instances converging towards the public sector.

This needs the adoption of new approaches and tools that may foster a *common shared view* among different involved actors about the causes underlying experienced phenomena. It also needs a new approach to planning: more systemic and learning-oriented perspectives should replace incremental, formal and structured ones.

SD has proven an effective method to make explicit mental models as a way to identify discrepancies and to induce a fruitful dialogue between parties, such as the actors in the public sector, and between them and those in the private sphere. Such a dialogue is a prerequisite for building mutual understanding, confidence and trust between these parties and to establish a foundation for organizational learning, a key component in organizational development.

Making the public sector more transparent and understandable is a prerequisite to enhance decision makers' accountability, since it allows one to frame the impact of policies on performance.

IMPLEMENTING P&C SYSTEMS IN THE PUBLIC SECTOR ACCORDING TO A LEARNING-ORIENTED APPROACH: A DYNAMIC RESOURCE-BASED VIEW

If one adopts a 'learning-oriented' approach to P&C, to support the contribution of each responsibility area to performance improvement, new profiles of PA appear particularly relevant, i.e.: (1) an 'objective' view; (2) an 'instrumental' view and (3) a 'subjective' view.

The '*objective*' view implies that 'products' (i.e. public services) generated by administrative tasks are made explicit (Figure 2a). By 'products' we do not mean the output of a production function, which is transferred to external clients as the object and goal of commercial transactions. We, rather, refer to the output of administrative tasks, aimed to deliver a *value* to either external¹² or internal 'clients'¹³, with respect to the player that is taken into account. For instance, in a public utility water company, not only the water provided but also the billing service can be considered as a 'product' according to which external clients may have a number of expectations. They may expect that billing is done according to proper accuracy, transparency and reliability standards. Therefore, billing errors and irregular updates of con-

¹²That is private sector actors or outside public sector institutions.

¹³That is responsibility units operating inside the same institution.

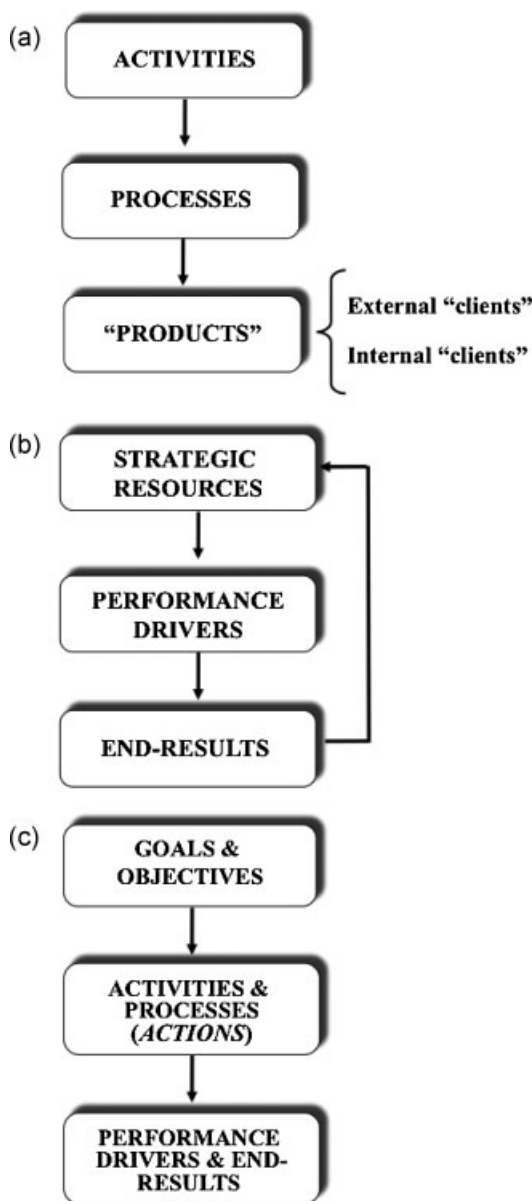


Figure 2 (a) The 'objective' view, (b) the 'instrumental' view and (c) the 'subjective' view

sumptions will result in a poor service, though the quality, availability or cost of supplied water is satisfactory. Likewise, the billing 'product' will be considered as poor, if uncollected invoices—due to unreliable billing—will drop the public utility cash flows.

Related to billing (as a final 'product'), relevant 'intermediate products' for such

organization, could be referred to: metres inspection, billing issuing, checking billing errors and compulsory credit collection. Although most of such 'products' are delivered by back-office units, they have a direct impact on the delivered final product (i.e. billing), resulting in a higher or lower customer satisfaction and utility solvency. Most of the above 'intermediate products' are delivered to 'internal clients'. For instance, the performance of a 'customer complaints office', receiving requests from clients, due to bad invoicing and/or metres checking, are affected by the speediness and accuracy of activities carried out by various back-office units, such as those fulfilling operations related to the inspection of the correct recording and billing of consumed water.

This analysis remarks the need to track *management processes* and underlying activities, in order to explain how to improve results associated to the 'products' delivered to both internal and external 'clients' related to a given public sector organization.

A management process can be defined as a group of homogeneous and inter-related activities, generating a well-identified intermediate result, oriented to the attainment of a final 'product'. All activities pertaining to the periodical *check of metres/bills issuing*, aimed to assess consumptions, can be grouped into a process, whose result (i.e. metres inspection) affects the accuracy and predictability of billing. In our case-study, the water utility company's 'services charter' prescribed that the average time between two inspections should have been 6 months. Since in this case, due to an excess of workload on the staff in charge of checking metres, this time was increasing, in spite of the automatic resort to overtime, this caused a bad service. In fact, for those customers whose metres were not regularly checked, billing was done based on past water consumptions. Therefore, actual consumptions were randomly updated and many clients found significant unexpected and unpleasant extra-charges in bills, which were instead punctually issued every 2 months. This phenomenon

increased the percentage of uncollected bills and their collection time.

Likewise, also those activities regarding the *assessment of billing errors* influenced the bills collection time. Such errors were increasing because of a rising resort to overtime for checking metres: in fact, increasing overtime implied a higher occurrence of errors by the company staff in checking actual consumptions. In order to reduce the disputed bills collection time, a process similar to the one previously commented about checking metres was carried out. Precisely, a group of senior inspectors was requested to verify possible errors in checking metres, and—when necessary—to start the procedure for re-issuing the wrong bills.

Related to the above said 'objective' view, the '*instrumental*' view implies that alternative means to improve performance, in relation to a specific 'product', are made explicit. On this regard, it is necessary to identify performance measures related to both end-results and respective drivers (Figure 2b).

In order to affect such drivers, each responsibility area is expected to build up, preserve and deploy a proper endowment of strategic resources, systemically linked each other. Managing strategic resources to affect performance drivers and end-results related to a given responsibility area is a dynamic and complex task. In fact, intangible resources are difficult to identify and measure. Furthermore, accumulation and draining processes affecting the dynamics of strategic resources are *inertial*, since delays underlying them are difficult to perceive by decision makers, and effects generated by actions taken (or not taken) in a recent or remote past are intertwined each other, and single causes cannot be easily matched to related effects (Warren, 2008). In order to provide decision makers with proper *lenses* to 'read' such phenomena, to understand the feedback loop structure underlying performance, and to identify alternative strategies to undertake, SD modelling can play a major role. On this regard, the 'Dynamic Balanced Scorecard' (based on a DRBV) has been successfully

applied in different contexts—not only in the private but also in the public sector (Linard, 1996; Ritchie-Dunham, 2002; Bianchi and Montemaggiore, 2008).

Figure 2(b) also illustrates how the end-results provide an endogenous source in an organization to the accumulation and depletion processes affecting strategic resources. In fact, they can be modelled as *in* or *out*-flows, which change over a given time span the corresponding stocks of strategic resources, as a result of actions implemented by decision makers. For instance, liquidity (strategic resource) may change as an effect of cash flows (end-result); image and credibility of an organization towards citizens (strategic resource) may change as an effect of their satisfaction (end-result). There are also interdependencies between different strategic resources: image may affect the capability of an organization to get funds from different stakeholders. Furthermore, both image and financial resources may affect its capability to recruit skilled human resources and keep them.

Finally, the '*subjective*' view provides a synthesis of the previous two views, since it makes explicit, as a function of the pursued results, the activities to undertake, the related objectives (and performance targets) to include in the plans and budgets for each decision area.

This view requires that performance measures associated to the delivery of organization 'products' are made explicit, and then linked to the goals and objectives of decision makers operating in different responsibility areas.

Performance measures can be firstly expressed in terms of outcomes and related *drivers*. While outcome performance indicators are a synthetic measure of final results¹⁴, performance drivers are a measure of intermediate results which affect the corresponding outcome indicators in a longer time horizon (Kaplan and Norton, 1996) (Figure 2c).

Results¹⁵ are originated by decision makers' activities carried out in the fulfilled processes. Expected results provide a benchmark to which

¹⁴For example referred to people (customer or employees satisfaction) or finance (cash flows, profits).

¹⁵That is both outcome indicators and performance drivers.

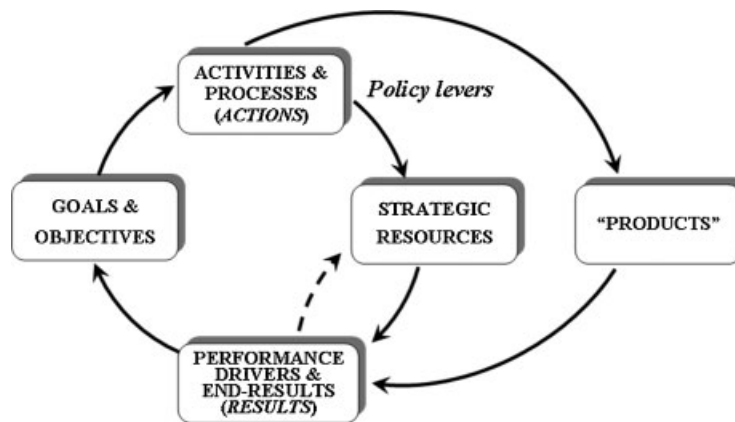


Figure 3 A synthetic picture of the 'objective', 'instrumental' and 'subjective' view

to refer for setting goals and objectives for each responsibility area in a P&C context.

Figure 3 sketches a synthetic picture of the three above perspectives. It shows how, in a planning context, once defined the 'products' originated by the fulfilment of administrative tasks, it is needed to move *backwards*, i.e. to outline the underlying processes and activities, and then to define goals and objectives for each responsibility area. Such objectives must correspond to the results (and indicators) that will be achieved through actions aimed to manage a given strategic resource system. Both performance drivers and end-results should describe whether an organization is able to meet the various expectations (e.g. in terms of volumes, defects, time, cost) coming from internal and external 'clients', concerning delivered 'products'.

If we refer to the above water supply public utility case, customer satisfaction (outcome measure) represents a flow increasing or decreasing over time a corresponding stock, named 'Company Image' (strategic asset). Likewise, cash flows provide a rate changing over time a corresponding strategic asset named 'Liquidity'.

It is also possible to detect horizontal relationships between strategic assets. In our example, 'Company Image' may affect 'Liquidity', since

it influences the organization's credibility towards different funders (e.g. the Municipality, banks). Such credibility is a performance driver affecting cash flows (outcomes) and—through them—liquidity. The stock of available liquidity may, in turn, affect a third important strategic asset, i.e. 'Human Resources'. In fact, the more financial resources are available, the higher the capability to hire people will be. If a water supply company can rely on a larger staff of people who can be devoted to the fulfilment of processes impacting on critical performance drivers, also organizational outcomes will improve. In our case, relevant billing performance drivers are: metres inspection time, billing errors%, time to check billing errors, billing collection time, company credibility towards funders.

The case illustrated above proves the powerful role that SD modelling can play to implement a *learning-oriented* approach to P&C in the public sector, according to the NPM perspective.

In the utility, different areas had a joint responsibility for the fulfilment of the previously described processes, i.e.: the periodical *check of metres/bills issuing*, and the *assessment of billing errors*. Activities underlying the above two processes were managed by three units, i.e.: Commercial, Legal and Technical. The Commercial unit also consisted of five offices: Customer

complaints, Contracting, Invoicing, Metres installation and Electronic Data Processing (EDP).

The invoicing process was started by periodical metres inspections by the Invoicing office. The same office was also responsible of sending senior inspectors to check metres in case of customer complaints about suspected billing errors. It was also responsible of asking the 'Metres installation' office to replace damaged metres with new ones. Once water consumption was periodically ascertained, bills were automatically issued by the EDP.

For those bills which had not been collected after 2 months from their issue, an overdue debt was reported after 2 months in a new bill, together with the new accumulated debt in the last period. If, after two more months, the accounts receivable had not been collected yet, the 'Invoicing office' would have communicated the total overdue to the 'Credit collection office' of the Legal unit. This last office was used to send a letter to the client, to intimate payment of the overdue, including accumulated interest. After receiving such letter, most clients were used to complain about wrong billing at the 'Contracting' and 'Customers' offices. Some of them were also used to ask the company to test the correct functioning of their metre. This implied that the 'Invoicing office' had to check metres again, in order to verify possible billing errors; in some cases the 'Technical office' was also asked by the 'Metres installation' office to replace old metres with new ones (Figure 4).

These above messy problems led the company to three main consequences: (1) a liquidity crisis, due to the long delays in collecting overdue bills; (2) strong conflicts between different units and offices, all of which felt themselves not liable for the recorded inconveniences; (3) a low customer satisfaction, due to a lack of confidence towards

the utility about the precision and reliability of recorded consumed water.

Although possible 'solutions' might seem obvious, if we analyse the problem from outside the public utility and after events have taken place, the organization was not able to perceive reality¹⁶.

Figure 5 shows that the company policy was to respond—after a delay—to a rise into bills collection time by increasing staff overtime devoted to both checking metres and uncollected billing errors. In the short term, for both processes, increasing overtime allowed the utility to improve (i.e. to reduce) two important performance drivers: metres inspection time and time to check billing errors. This, in turn, allowed the utility to increase its output (in terms of checked metres and bills, respectively) and to decrease the bills collection time (main performance driver). However, over a longer time span, the 'uncollected bills' problem emerged again. In fact, overtime productivity was gradually decreasing, due to burnout. This was a major cause of more billing errors and a lower number of metres checked in an hour, which contributed to rise the metres inspection time again. Therefore, both phenomena caused a new increase in the billing collection time. So, managers were forced to periodically resort to overtime, but this did not allow them to solve the problem.

Figure 6 depicts main performance drivers' dynamics produced by the above policy, as simulated through a SD model developed with the collaboration of a manager of the utility, operating in the budgeting unit¹⁷. The periodic oscillations portrayed by the graphs demonstrate the structural inability of the above policy to insure company performance stability in the long run.

¹⁶This phenomenon is due to a lack of coordination and communication between the different (back and front-office) units, and to a poor perception of delays. SD modelling can play an important role in dealing with these problems, and fostering a *process*—rather than *function*—oriented view of performance. A process-oriented view implies that each organization unit is made accountable on a set of indicators pertaining to the 'products' resulting from each process to which it contributes. It also implies that, for each process, the impact of other units on results, and the effects generated by material and information delays are taken into account.

¹⁷The model was a follow-up of a previous Dynamic Balanced Scorecard (DBSC) project embodying real detailed company data (Bianchi and Montemaggiore, 2008). The aim of modelling was to analyse more in depth a number of processes and inter-relationships that—in order to follow a same level of analysis for the different subsystems—were not included in the DBSC model. However, this was an insight model, including—as company real data—the number of bills, the real behaviour of billing collection time and the associated performance drivers, as well as main delays characterising the investigated company processes. The model was used to stimulate a dialogue between the involved units and a better understanding of their role in affecting performance. Copy of model Equations is available on request from the author.

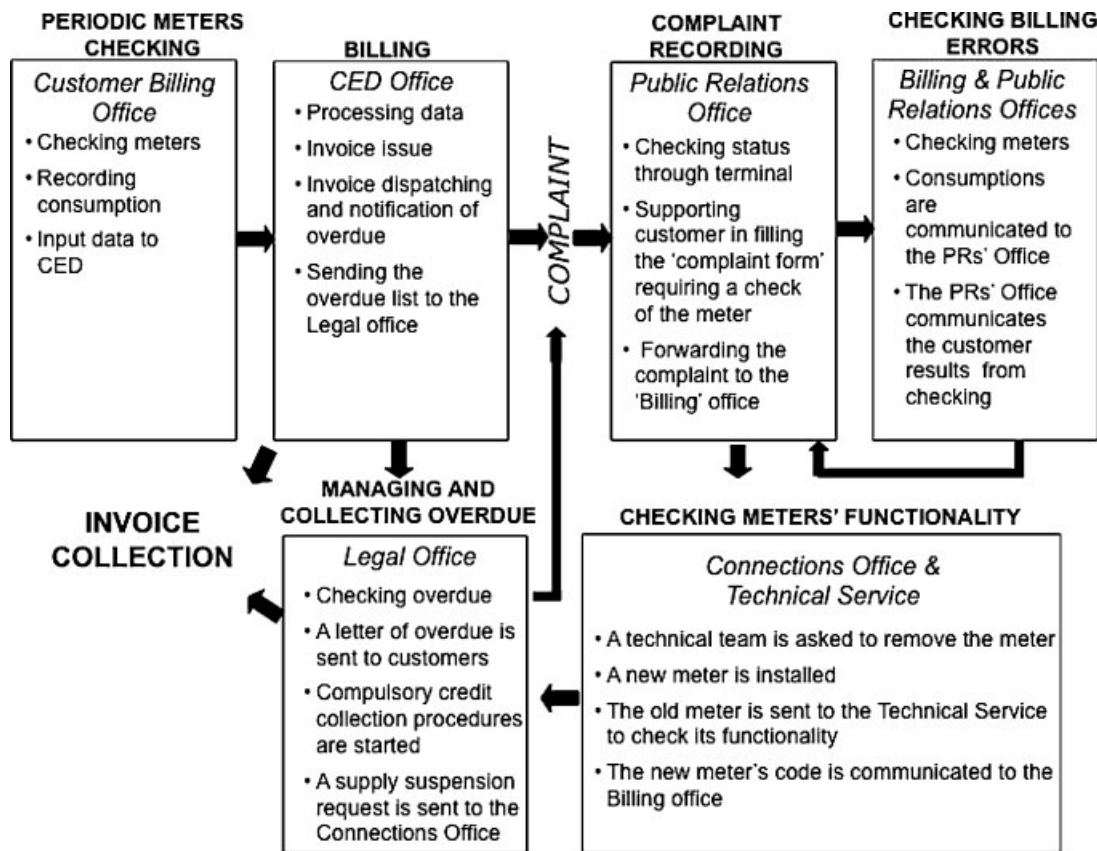


Figure 4 Main processes and organization units responsible for the 'billing' product in a water public utility

Simulation helped the utility managers to detect major policy weaknesses and to envisage possible solutions to the experienced problems¹⁸. Figure 7 shows main feedback loops related to a sustainable policy. The balancing loops B1 and B2 identify the number of needed workers (strategic resource) to allocate to metres inspection and checking billing errors, in order to meet performance targets. Based on the desired number of workers, the suggested policy aims to fill human resource gaps (balancing loops B3 and B4).

¹⁸For instance, it was remarked that a possible fundamental solution could have been to increase the number of inspectors devoted to check metres. If necessary, also senior inspectors could have been devoted to periodical checking, in order to reduce the backlog of metres to check, so to keep the company on track with the '6 months' average inspection time target. This would have allowed the utility to reach a more reliable level of billing accuracy.

The feedback structure depicted in Figure 7 was embodied in a new version of the simulation model, in place of the feedback structure illustrated in Figure 5. Simulation results demonstrated the sustainability of this new policy. Figure 8 shows how performance drivers were now showing a more stable behaviour, which was proving the sustainability of the policy.

Decision makers in this public utility were not able to perceive the causes of experienced oscillations in performance targets. This was because of the dynamic complexity of the underlying system: more than 20 000 invoices were issued per month and about 40 000 metres had to be checked on average twice a year. Delays between a step of the billing/collection process and the next one, as well as interdependencies between different responsibility areas, and a

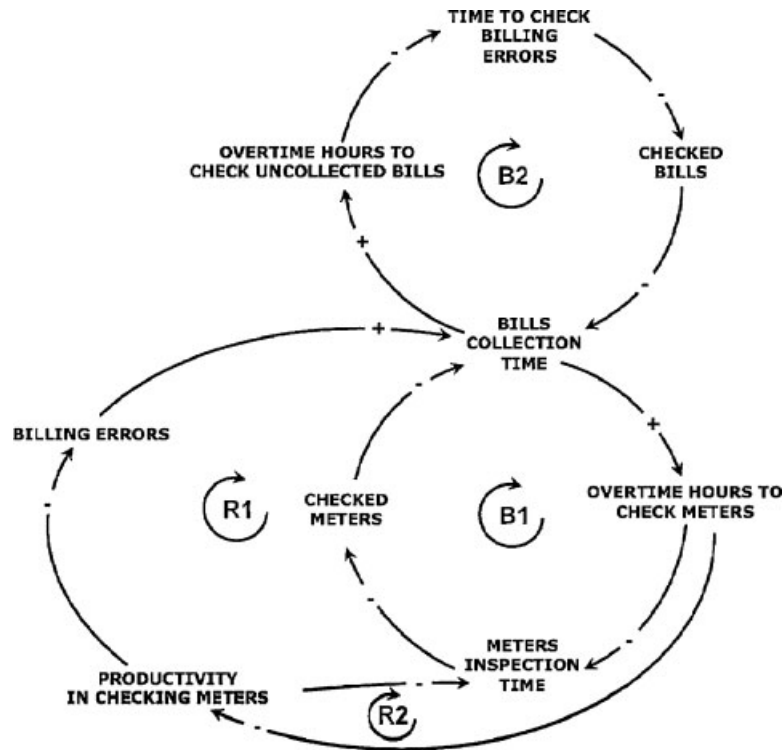


Figure 5 Unintended effects of overtime policies in a public water utility. Key:Figure - Loop B1 and B2: symptomatic solutions to service problems ('metres inspection time' and 'time to check billing errors', respectively);Figure - Loop R1 and R2: unintended effects amplifying service problems over a longer time span (billing errors and metres inspection time, respectively)

missing process-oriented vision, were also significant factors inhibiting decision makers to properly frame such an apparently simple and predictable system. The above problems were also increased by the difficulty of the company management/strategic control to perceive small performance changes.

Figure 9 provides a synopsis of how the main SD model's stock-and-flow structure supported the utility in detecting the causal relationships between 'products', processes, and strategic resources on which to act in order to affect performance drivers and end-results, to foster accountability. Strategic assets are depicted as stocks primarily affecting the system's performance. End-results are modelled as flows changing strategic resource endowments. Performance drivers are auxiliary variables. Processes come from the analysis of factors impacting on the flows affecting stocks to which performance

drivers are related (i.e. those concerning Metres and Bills). Products are an outcome of the carried-out processes ¹⁹.

¹⁹Figure 9 is a synthetic picture of the SD model that was developed with the utility manager's support. The dotted links it embodies represent logical relationships between variables; therefore, some of them are not included in the model in the same way they are presented here. For instance, concerning the 'metres inspection process', in the simulation model the variable 'Productivity' has been represented through an auxiliary variable named 'Number of metres checked in an hour'. This variable (multiplied by the number of worked hours) determines the 'Checked metres' flow. From the ratio between the 'Metres to check' stock and the above said flow, the model calculates the auxiliary variable named 'Metres inspection time'. In the simulation model, this variable, in turn, affects the bills collection time through the stock-and-flow chain regarding uncollected bills (which is longer than the one depicted in Figure 9). In fact, it determines the 'Collected issued bills' flow, which affects the 'New uncollected bills' flow, which accumulates into the 'Total uncollected bills' stock. The model calculates the bills collection time as a weighted average between four major delays affecting bills collection, i.e.: (1) issued bills collection time (ratio between Issued bills and collected issued bills); (2) average time to check uncollected bills; (3) overdue bills collection time and (4) overdue bills forwarded to the legal department collection time. The stocks of bills at each stage of the described processes have been used as weighting factors.

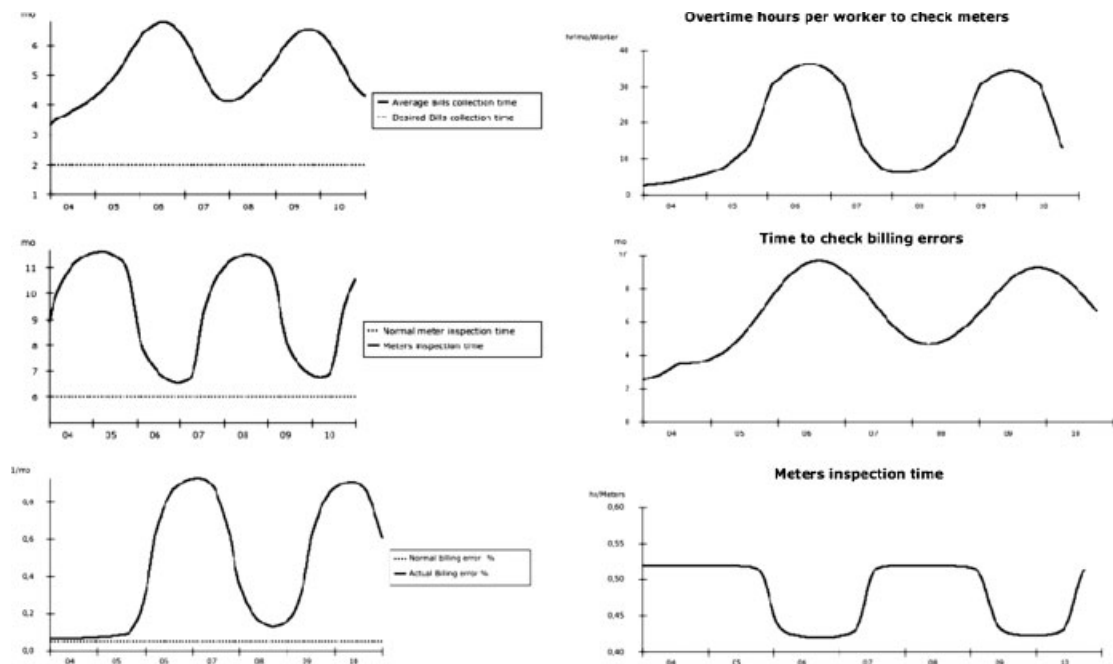


Figure 6 Main performance drivers' dynamics from overtime policies in a public water utility.

The problem context described here demonstrates the usefulness of SD as a mapping method to frame how decision makers can affect outcomes in a public sector organization through synergic policies aimed to manage strategic resources, with a view to influencing corresponding performance drivers.

The relevance of a DRBV can now open a wider discussion on the perspectives that can be used in SD modelling to improve performance and foster accountability in the public sector. *To what extent the currently adopted perspective in SD research and practice can substantially support the public sector to this end?*

APPLYING SD TO THE PUBLIC SECTOR: FROM AN 'EXTERNAL' TO AN 'INTERNAL' PERSPECTIVE

The public sector is not new at all as an area for SD modelling. Though it is not the purpose of this paper to make an exhaustive analysis of different research streams on this wide topic, it is possible here to outline some significant characteristics of

main research streams, approaches and applications in the field.

Traditional applications of SD in this area have been oriented to the study of industries, like energy (Sterman and Richardson, 1985; Davidsen *et al.*, 1990; Ford, 1999; Dyner and Larsen, 2001), health care (Vennix and Gubbels, 1994; Wolstenholme, 1999; Lane and Huseman, 2008), housing (Goodman, 1989, pp. 309–347), tourism (Honggang, 2003), agriculture (Thompson *et al.*, 2007), fishing (Moxnes, 2000, 2005), water supply (Martinez Fernandez and Esteve Selma, 2004), education (Andersen, 1990; Richardson and Lamitie, 1989).

Many of these studies have been focused on sustainability issues (e.g. urban dynamics, tourism, ecology, energy) (Forrester, 1969, 1970; Meadows *et al.*, 1974, 1992, 2001; Saeed, 1996; Sterman, 2002; Fiddaman, 2007; Moxnes and Saysel, 2009); others have been framing the problems associated to the lack of capacity affecting systems performance (e.g. health care). Other applications have been oriented to depict the structure and behaviour of multi-sectoral economic systems, in order to support public policy makers in understanding how wealth is

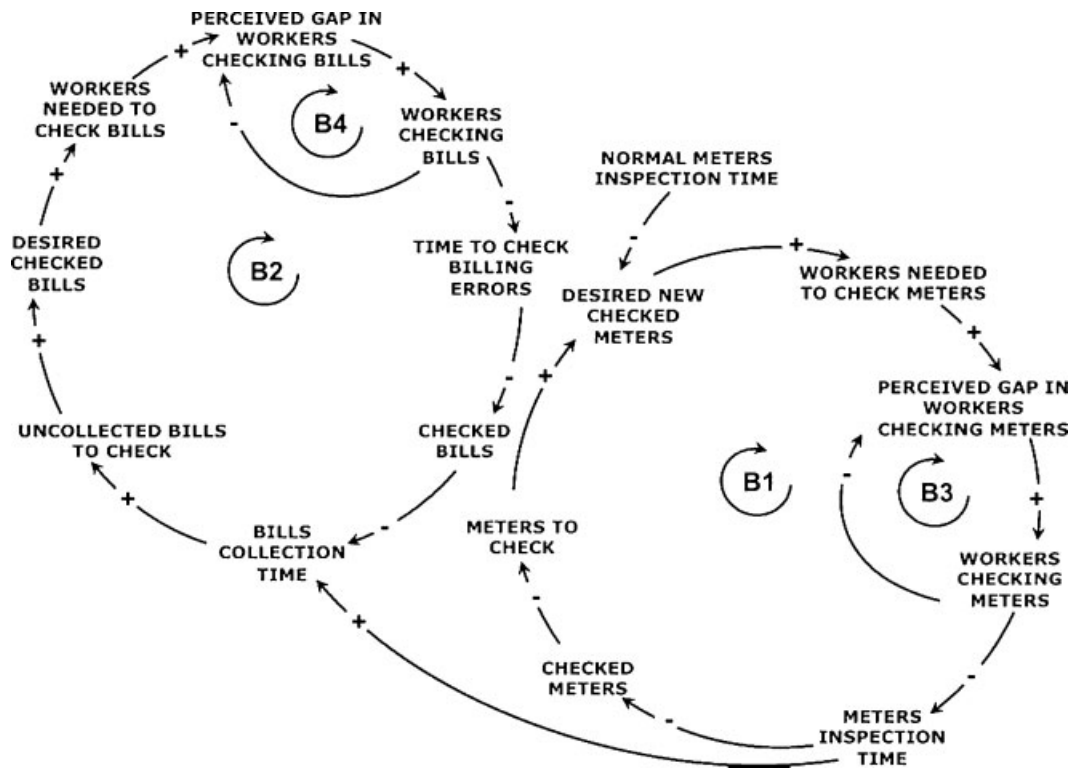


Figure 7 An alternative sustainable policy to fix the billing errors and collection time delays in a public water utility. Key:Figure - Loop B1 and B2: fundamental solutions to service problems ('metres inspection time' and 'time to check billing errors', respectively);Figure - Loop B3 and B4: strategic resource adjustments sustaining fundamental solution to service problems (hiring needed workers gap in checking metres and checking billing errors, respectively)

generated in a State or a Region, and what interdependences exist between different sectors of the economy (Kopainsky *et al.*, 2009). Among such studies, there are those focusing the topic of poverty and wealth creation in developing and underdeveloped countries.

In addition, topics that are longitudinal to different sectors, and significant on a public policy/management point of view, e.g. crime (Homer, 1993; Coyle and Alexander, 1997; Stephens *et al.*, 2005; Jaen and Dyer, 2008) or terrorism modelling (Grynkewich and Reifel, 2006), have been developed.

Also SD applications to individual public institutions (or parts of them) have been done, such as, for instance, in the cases of hospitals, Universities (Barlas and Diker, 2000) and even Courts (Bernstein, 1994).

More generally, most SD applications into the public sector tend to be focused on under-

standing the structure and behaviour of systems that usually embody different players, ranging from public to private ones, from organizations to individuals. The main focus is on the wider system, and policy implications for each player can be taken by the light of the responses that the observed system's behaviour is likely to give, as a consequence of changes in its structure.

If one takes the point of view of each decision maker on behalf of whom a SD model is developed, such a perspective could be defined as 'external', since it does not primarily reflect the observation point from which each involved player perceives the system. In other words, an 'external' perspective primarily implies an analysis of the relevant system *per se*, rather than that of a specific decision maker. Though such analysis does not disregard the elicitation of the decision areas that each player is in charge of, it does not primarily focus possible responsibility overlaps,

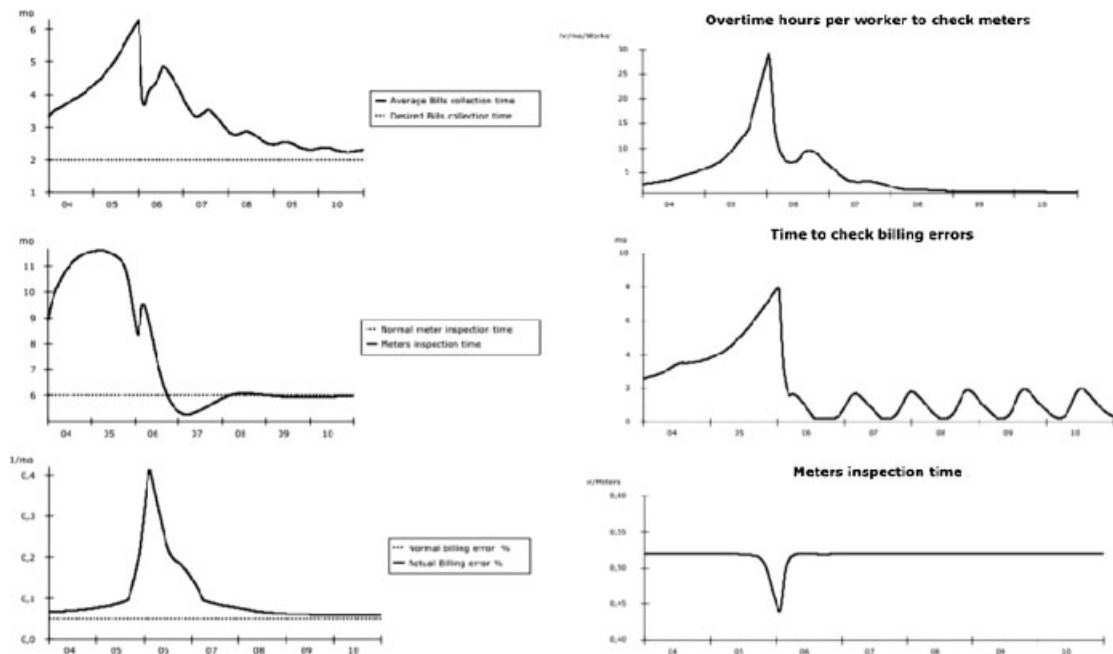


Figure 8 Main performance drivers' dynamics from the adoption of a sustainable policy to fix the billing errors and collection time delays in a public water utility

unattributed roles, inconsistencies, conflicts and ambiguities in PA decision-making processes, and their consequences on the governance, management and performance of the observed system. On the other hand, an 'external' perspective analysis has the merit to provide a neutral basis to frame cause-and-effect relationships underlying the relevant system's behaviour, from a point of view that may go by far beyond—both in time and space—that each of the involved players may take²⁰.

A complementary perspective may be defined as 'internal', since it focuses the wide relevant system by primarily taking the *observation point* of

one of the players who takes a role in affecting the system's behaviour (Zagonel, 2002; Richardson *et al.*, 2004). If such view is adopted, modelling tends to devote a higher level of detail and scope in the analysis of factors which specifically impact on decisions made by the player in the perspective of whom the model is developed. If compared to the 'external' perspective, the 'internal' one does not necessarily imply the adoption of narrower boundaries for the relevant system in relation to a given problem context. It, rather, implies a more unbalanced or asymmetric analysis, since it tends to focus attention on the way the observed player operates and interacts with the other players within the relevant system.

Both the 'external' and 'internal' perspectives are necessary in SD modelling for the public sector. In fact, they complement each other. Although they both support analysis, diagnosis and decision-making processes, the first one seems to be more suitable for analysis, while the second is likely to better foster diagnosis and decision making in specific areas or domains. Therefore, the two perspectives could be seen as

²⁰For instance, if the modelling goal would be understanding the impact on urban life generated by European Union funded works (e.g. on transportation, education, housing, water procurement and distribution infrastructures), and related accomplishment time delays, then an 'external' perspective would primarily focus the aggregate physical, financial and information stocks and flows associated to projects execution. Such perspective would be likely to adopt a same level of detail and scope in the analysis of factors (e.g. roles, constraints, structure of management processes) impacting on each involved player (e.g. State, Regional Municipal administration or other private sector institutions such as enterprises fulfilling the public works).

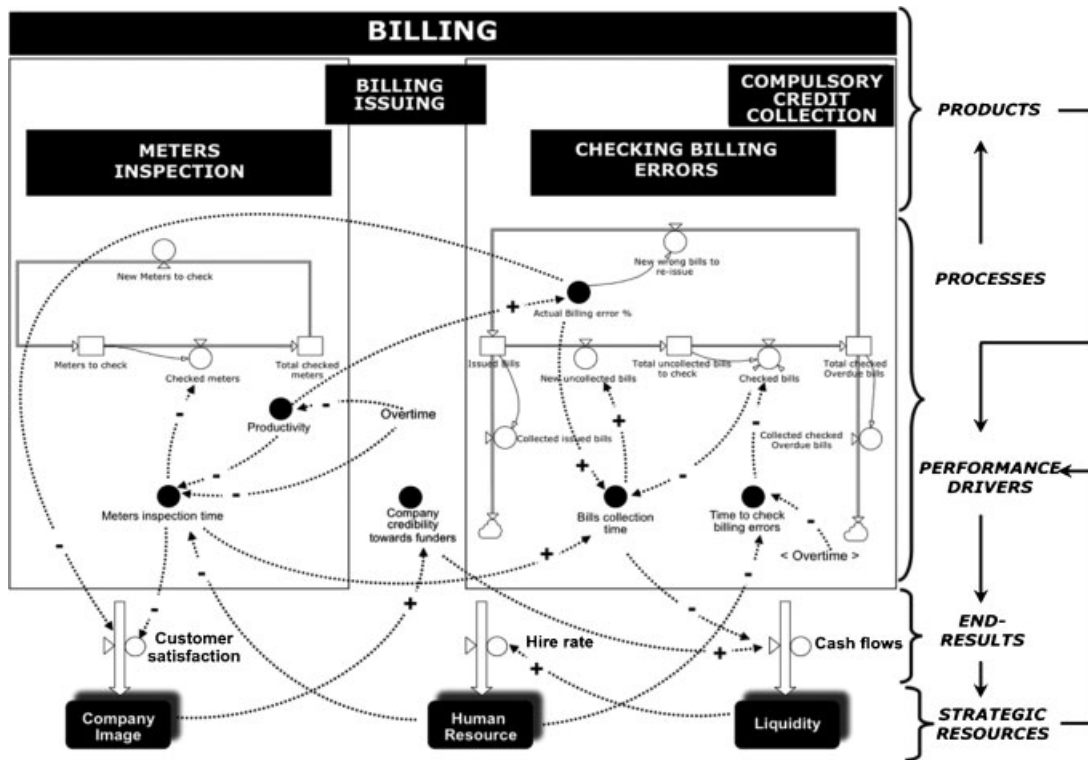


Figure 9 A synthetic picture of the main feedback stock-and-flow structure of a SD model supporting a dynamic resource-based view in a public water utility

sequential steps in SD modelling to support public sector decision making and performance improvement (Figure 10)²¹.

Today, a wide range of SD applications to the public sector seems to be fostered by the NPM trend, particularly concerning the issues of value

generation, citizens' satisfaction, performance improvement and accountability. This shifts the primary focus of modelling to the *goals, objectives* and *decisions* that a politician or manager should set in order to affect the observed system. As said, quite seldom the area of influence and authority of a given 'actor' operating in a public institution is likely to cover the domain of the overall relevant system. The outline of policies and undertaking of management decisions in the public sector is often fragmented through different institutions. There-

²¹It is worth remarking that the distinction between the above two perspectives relates to the wider methodological discussion in the SD field about the inductive vs. deductive nature of modelling. On this regard, it is possible to observe that—though both the external and internal perspective underlie a mix of inductive and deductive approach—the second approach is more ingrained into the external perspective, while the first approach tends to prevail if one moves towards the internal perspective. So, the two perspectives can be seen over a *continuum* where each of them contributes under a different viewpoint, towards the pursuit of a deeper learning process and better support of decision making of the actors involved with different roles in public sector dynamic complex systems. A similar kind of reasoning also applies if one considers the other important debate in the SD and sociological literature regarding the 'structure vs. agency' relationship. On this regard, the 'social structure' view appears more ingrained into the external perspective, while the 'human agency' view better reflects the internal perspective viewpoint. (Lane, 2001; Größler, 2004, 2008; Schwaninger and Groesser, 2008). I am indebted to Andreas Größler for suggesting me possible patterns for relating the above external and internal perspectives to the wider methodological/philosophical discussion in SD modelling.

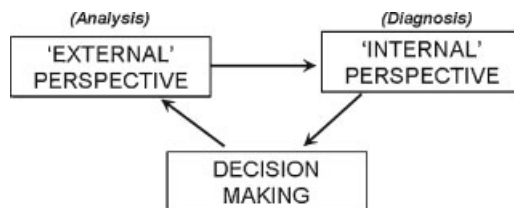


Figure 10 The 'external' and 'internal' perspective as two sequentially-related steps to support public sector decision making and performance improvement through SD modelling

fore, to affect the behaviour of specific decision makers, it is necessary to find a proper balance between the need to model the relevant system in relation to the main problem(s) in the observed sector, and the need to calibrate the analysis on what decision makers are enabled to affect, i.e. by focusing the impact that the specific player could make on the system, in his or her own perspective.

Such a different modelling perspective implies that—for each organization unit—SD models foster a better understanding of the relationships between performance and responsibility. This implies the identification of a self-consistent system of goals and objectives for each unit. Such goals should be embodied in a proper budget, together with the identification of the activities that each unit will undertake, in order to build a strategic resource system providing a suitable basis to affect performance drivers and outcomes in the time horizon taken into consideration. Focusing SD models on the above perspective fosters a clearer statement and a better understanding of goals and objectives embodied in the planning documents, and supports managers to frame processes, as demonstrated in the previous section of this paper.

Such a deeper level of knowledge and awareness that this modelling perspective fosters also prevents a number of dysfunctional behaviour consequences that may happen when formal P&C and performance evaluation systems are adopted. Among them: setting easy-to-reach objectives²², focusing attention on only a restricted number of objectives to the detriment of others (related to the same goal) and confusing means with ends²³. Such behaviour is more evident in many public sector contexts, due to both cultural reasons and lack of proper methods

and tools to foster learning and a proper framing of the *specific complexity* characterizing such environments²⁴.

MAIN APPLICATION AREAS OF SD MODELLING IN THE PUBLIC SECTOR AND CORRESPONDING 'LEVELS' OF ANALYSIS

The previous discussion remarks how using the 'internal' perspective as a complement to the 'external' one can provide a suitable basis to apply a DRBV as an approach to foster performance improvement and accountability in the public sector.

With the aim to move towards a tentative framework of possible application areas for SD modelling in this domain, we may distinguish three main 'levels' of analysis, i.e. (1) a political (or *macro* level); (2) a managerial (or *micro* level) and (3) a political vs. managerial conversation (or *meso* level).

Macro 'level' applications of SD focus the perspective of political actors. They could be referred to: (a) an 'inter-institutional' or (b) an 'institutional' context.

The *inter-institutional context* implies that the political decision maker takes an active role in the wider system where his institution (e.g. a State or a Region) operates, in order to undertake a strategic conversation with other players operating in other institutions (e.g. a Municipality) in the system, to establish joined-up government

²⁴Improper objectives do not underlie any expected result. For instance, stating as a plan objective 'building a web page', or 'writing and approving of a law', or 're-designing organization's procedures' is a wrong practice, since such statements are just descriptions of activities aimed to build strategic resources (i.e. web pages, laws, procedures). Such resources—if properly used and coordinated in a coherent system—may allow the organization to have an impact on its performance drivers, e.g. the waiting time of visitors to get information from a 'customer relationships desk. A proper goal, in this example, could be identified the waiting time, rather than the web page. This—and many other similar—frequent errors are often caused by defensive routines affecting decision makers' behaviour. In fact, often public managers are not prone to accept the risk of underperforming, if their perceived degree of influence on the desired outcomes is not remarkable, or full. Unfortunately, very seldom a full degree of influence over outcomes is possible. This is due, at least, to two main reasons: (1) uncertainty and risk are significant factors not only for an enterprise but also in the public sector; (2) the high fragmentation of competencies—and, hence, the significant interdependencies between different units in the public sector.

²²This often implies the constitution of slack resources.

²³On this regard, Flamholtz (1996) remarks the following: 'Blau and Scott (1962) reported a study of a public agency whose major goal was to serve workers seeking employment and employers seeking workers. The tasks to be performed included interviewing applicants, helping them to complete application forms, counseling them, and referring them to jobs. To control the interviewers, the agency monitored the number of interviews conducted. The effect of this control system was to motivate the interviewers. They paid attention to the instrumental goals (numbers of interviews), while neglecting the overall (but unmeasured) goal of placing people in jobs'.

initiatives. SD models supporting such application areas can be developed by (or on behalf of) a Governor's or Mayor's Cabinet—respectively in a State, Region or Municipality.

This is the case—in Italy—of territorial government, i.e. the formulation and implementation of policies affecting a geographic area, where the political player (e.g. the regional government) runs the role of ruler and coordinator in a system affected by the behaviour of many other actors, both public (e.g. Municipalities) and private ones (e.g. enterprises). 'Industrial district' policies provide a good example on this regard ²⁵.

Other examples can be referred to the government of cities and metropolitan areas in a perspective of sustainability, to environmental policies aiming to face pollution, and to regional health care systems.

Also the start of a Unified Desk for building permits by a Municipal administration could provide a suitable basis for the development of SD models through an inter-institutional perspective. Modelling how a unified desk could simplify processes and foster synergies between different administrations (e.g. health care, fire department, environmental agency and municipality) can allow decision makers to better assess benefits on delivered services.

Labour and employment policies can also require the development of SD models involving an inter-institutional context, e.g. to support the design of strategies aiming to reduce the waiting time for University graduates to find a job. More particularly, concerning education strategies that could be outlined to reduce the unemployment time, a SD model is likely to support a coordination of strategies between the Regional administration and various private institutions, such as enterprises and education centres. It would have also an impact—in terms of communication—with young unemployed people and their own families. Such policies could be outlined into four main areas on intervention, i.e.: (1) analysis of training needs; (2) selection and certification

²⁵A case-study on this regard will be discussed in the next section of this paper.

of education centres, delivering Regional subsidized courses; (3) communication to unemployed people, about the offered courses and (4) placement of trained people. Each of the above areas is important to reduce the entry time in the labour market for young people getting a University degree.

While the inter-institutional context implies that a player in a given institution undertakes a strategic dialogue with other players in other institutions, the *institutional context* implies that a player undertakes a strategic dialogue with other players operating in the same institution where he (or she) operates. For instance, in Italy, this happens in a regional strategic planning context, when the governor sets a number of goals that will provide the issues for strategic planning inside each councillorship of the same institution. These last goals will represent the field for a *sectoral analysis* ²⁶. Typical sectoral views are related to: tourism, agriculture, health care, industry and education. Framing the relationships between such sectors in a given geographic area provides the field for SD models covering a *multi-sectoral domain*, where policies undertaken by different units operating in a same institution should be coordinated ²⁷.

This is the case of SD models covering Public Works. For instance, in the Region of Sicily, the political authority for Public Works is not only attributed to the Councillorship for Infrastructures; it is instead fragmented among several Councillorships according to the respective spheres of competence ²⁸. Such fragmentation may require a coordination that SD modelling can support.

Another example of a *multi-sectoral domain* for SD modelling in the public sector at institutional level can be referred to immigration policies. Although in a Region a Councillorship for Welfare may have the primary authority to deal

²⁶The term 'sectoral' is used to mean a problem context involving a specific responsibility that is attributed to a unit (e.g. Ministry or Councillorship) inside an institution.

²⁷The term 'multi-sectoral' is used to mean a problem context involving different related responsibility areas, which imply that multiple units (e.g. Ministries or Councillorships) inside a given institution are required to cooperate.

²⁸That is Agriculture, Tourism, Industry, etc.

with issues associated to immigration and employment, a proper coordination of such policies with those undertaken by the Councilorships of Health and Education in the same Region is needed. This also requires consistency with the National policies, e.g. covering illegal immigration and internal security. Therefore, such example provides a dimension of analysis involving both an institutional and an inter-institutional context.

Micro 'level' applications of SD focus the perspective of management. Relevant fields for SD modelling in this area are related to mapping 'products' and processes, strategic resources and results, with the aim to foster performance improvement at departmental or inter-departmental level. On this regard, mapping the value-chain leading to the internal and external 'customers' is a vital area for improving the coordination between different sectors of the PA, and fostering a proper communication not only among managers but also between them and their political counterparts.

This last issue provides the field for the third application area, i.e. the *meso* level—related to the strategic conversation between politicians and managers. Such strategic conversation is a crucial aspect in the public sector, for both the implementation and the design of policies. Lack of strategic conversation between the political and managerial role is likely to generate a kind of 'administrative schizophrenia'. In fact, the setting of managerial objectives, actions and targets should imply a deep understanding and communication of the strategies outlined by the political level. On the other hand, the design and assessment of policies cannot ignore the emerging problems and opportunities that can be better perceived on a managerial level (Boyle, 1999).

APPLYING SD MODELLING ON A POLITICAL AND INTER-INSTITUTIONAL CONTEXT: INDUSTRIAL DISTRICT POLICIES

The final section of this paper proposes a second case (on industrial district policies), which aims

to illustrate how using an internal perspective in public sector modelling can foster the implementation of a DRBV, also when one refers to political, i.e. macro-level problems.

Industrial districts are networks of firms that are located in a bounded territory (Alberti, 2002). Such a space is characterized by a mix between competition and co-operation between firms and by a wider community of institutional actors²⁹. A horizontal division of labour, i.e. a focus on a phase of a given production process by small-medium enterprises (SMEs) located in such areas is another characteristic of industrial districts. Also the presence in the district of strategic resources³⁰ that can be easily accessed by several firms is a distinctive feature of such areas. This allows industrial district SMEs to benefit by important competitive advantages and strong entry barriers into the district³¹.

Promoting the constitution of *industrial districts* or enhancing those already existing ones is an important role for public rulers and administrators to generate wealth. In Italy, since the beginning of the '1990s', the national law has focused the domain of industrial districts. In order to define the context for industrial policies³², the Italian law outlined the prerequisites for the recognition of industrial districts. It also delegated Regions to sketch specific policies aiming at promoting the constitution and growth of local business networks.

The district of Pesaro is characterized by a flourishing furniture industry, where a small number of large firms outsource a huge percentage of their production to a myriad of small firms. In this area about 500 manufacturing firms are networked with more than 700 artisans. The role of artisans is very

²⁹For example agencies/committees, schools, funders.

³⁰For example skilled labour force, raw materials.

³¹Being local communities of people, industrial districts are also characterized by a strong culture and high similarity of values. In such areas, a *district entrepreneurship* emerges. Not only the values of hard working and sacrifice are practiced but also those of solidarity, confidence and trust.

³²For example in terms of financial or logistical support to networked firms or even infrastructure investments.

important for the district. In fact, since they both make end products (furniture) and produce accessories and component parts, the full production process is fragmented along different specialized businesses in the area. The district firms export about 30% of their production, and their total sales revenues are about 1.3 millions Euros.

In such context, the Pesaro Municipality has started a reorganization project implying the launch of a *Territorial Marketing* division, with the following objectives: (a) defining actions for promoting the area and exploiting its tangible and intangible assets (e.g. know-how, culture); (b) creating favourable conditions for the development of existing resources, with the aim to improve territorial strategic assets; (c) improving the territory attractiveness through an inter-institutional cooperation strategy aimed to increase the quality of local PA services. To pursue such objectives, a number of projects have been started. A *unified desk for production activities* has been started together with seven other small Municipalities of the district, with the goal to simplify bureaucratic processes and rationalize resources through IT services. The outcome of this reorganization is not only limited to a more predictable and shorter time for entrepreneurs to receive various permissions from Municipalities but also supports territorial marketing. In fact, the network provided by the territorial information system—through which the unified desk operates—allows entrepreneurs, potential investors and other possible district stakeholders to get online a comprehensive view of the potential of the district. The second stream of activities started by the Municipality of Pesaro has been focussed on the opening of a *Europe Desk*. Such desk fosters the submission of new European (EU) projects by local district actors. It also supports district actors in evaluating their projects and finding partners from other European countries. A third stream of actions refers to the improvement of collaboration projects with the *Pesaro Studi* (Pesaro

Studies) Association, related to the University of Urbino. This is pursued through the promotion and funding of new higher education programs aimed to increase the quality of the district human capital. A fourth area of intervention is related to the support of new business start-ups. This activity is specifically oriented to the new generations, and is focussed on the promotion of new entrepreneurship, both from inside and outside the district.

These streams of action have been embodied later in the *city strategic plan* for the years 2003–2015. This document is considered as an example of excellence, especially concerning the level of involvement of different public and private actors and the quality of the process aimed to achieve a common shared view on the policies to adopt, according to a negotiated planning approach. In particular, among the policy areas included in the strategic plan, the one focused on *business attraction* includes and frames in higher detail most of the issues discussed above.

If we try to model according to a DRBV through the ‘lenses’ of the Municipal administration (internal perspective) the district policies undertaken in the area of Pesaro, we may first identify expected end-results according to the following set of indicators:

- district firms’ sales revenues and income rates;
- employment rates in the district;
- business net birth rate;
- the quality and scope of learning processes in the district;
- the image of the district.

In a second step, in order to realistically pursue the above end-results, public policy makers should figure out those *performance drivers*, according to which the impact of undertaken policies can be assessed. In this case, possible interrelated performance drivers are:

- quality and scope of education, that will affect learning;

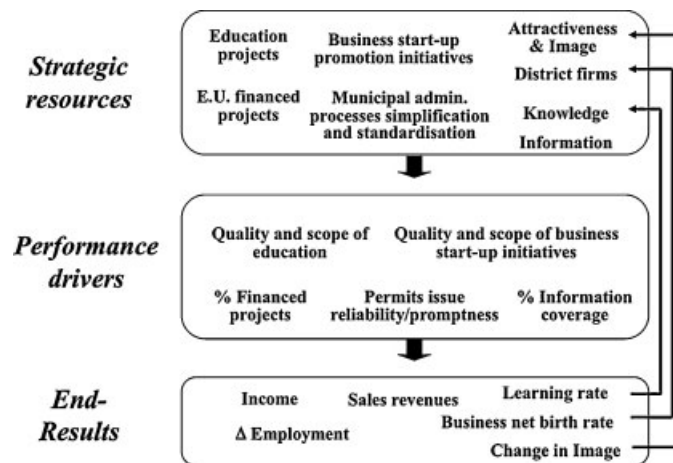


Figure 11 A three-layers approach in framing industrial district policies based on a dynamic resource-based view: an application to the case of Pesaro district

- quality and scope of initiatives undertaken by governance bodies to promote new business start-ups in the district;
- the share of projects submitted by district actors and financed by the European Commission, as a consequence of the promotion and consulting activities undertaken by governance bodies³³;
- the degree of reliability and promptness of various permits issued by Municipalities on request of district firms³⁴;
- the quality and scope of information provided on the Internet to potential investors and other 'actors' in the district³⁵.
- number of higher education projects. This asset will affect quality and scope of education, and—though it—the learning rate, which will in turn impact on district knowledge;
- number of EU submitted and financed projects. Such resource will affect the financed projects%;
- number of business start-up promotion initiatives³⁶;
- level of municipal administrative processes simplification and standardization;
- district attractiveness and image;
- level of district knowledge;
- information accessible online by various district actors.

In order to affect the above performance drivers, another *layer* of analysis must be added in the policy framing process. In fact, though performance drivers can be affected in a shorter time than the end-results, in order to improve them it is necessary to detect those district *strategic resources* to build up and coordinate through district policies. Such resources could be referred to:

³³This indicator is a measure of the ability of the system to pursue a given learning rate, to foster an improvement in the district image, to affect district firms sales revenues and income, as well as an increase in employment rate.

³⁴This indicator helps policy makers to estimate a possible impact over time on the district image and attractiveness, and on district firms' net birth rate as well.

³⁵This is another indicator impacting on the business net birth rate.

An overview of this three-layers district policy model is depicted in Figure 11.

Figure 12 shows possible *engines of growth* for the district. The *unified desk policy* may allow district actors to improve the level of standardization/reliability of Municipality processes and the number of available information on the Internet. Policy makers should figure out the time delay needed to increase the above strategic assets, and the size of such increase. Both strategic assets will affect respective performance

³⁶This resource will determine a given quality and scope of business start-up initiatives, that will in turn affect the business net birth rate. This outcome variable will affect the number of district firms, i.e. another important strategic resource of the district.

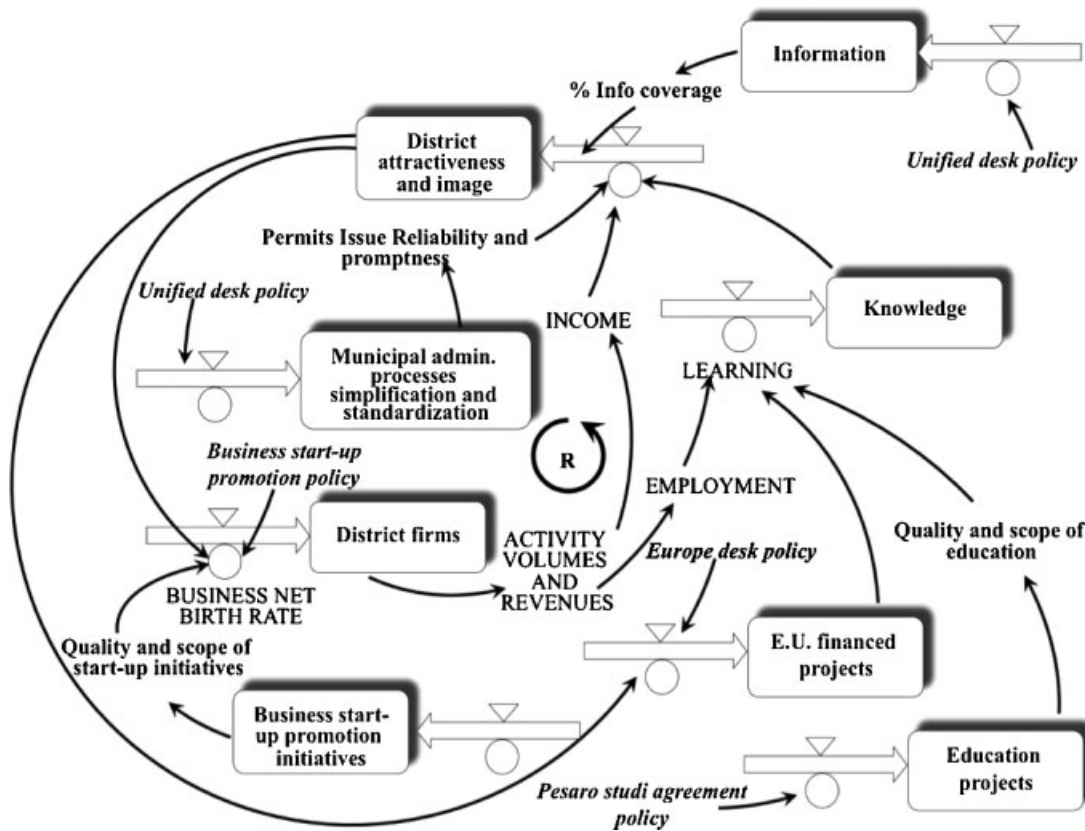


Figure 12 A stock-and-flow dynamic resource-based view of district policies: an application to the case of Pesaro district (reinforcing loop dominance). Key: *Italic Bold Variables* = District Policies; **Bold Variables** = Performance Drivers and Capital Variables = End-results

drivers, which will influence the district image and attractiveness. A higher district image will, in turn, increase the productivity of start-up initiative policies undertaken by governance bodies. This will increase business net birth-rate, which will determine a higher stock of district firms. Such a higher strategic asset will be likely—other conditions being equal—to increase activity volumes, sales revenues and income rates in the district. This improvement in the end-results will determine a further increase in district attractiveness and image (reinforcing loop). Such loop will be likely to be strengthened by a higher employment rate, which—other conditions being equal—will make higher education (*Pesaro Studi*) and Europe Desk policies more productive. This will also result in a higher learning rate, which will determine an increase in

another important strategic asset in the district: knowledge. On its turn, higher district knowledge will further strengthen the above reinforcing growth-oriented loop, based on a district image.

CONCLUDING REMARKS

This paper has outlined the benefits justifying a tailored approach to SD modelling in the public sector, in order to improve performance and foster decision makers’ accountability.

The need of combining an ‘internal’ with an ‘external’ perspective in developing SD models to foster performance improvement and decision makers’ accountability has been emphasized.

Different levels of intervention (i.e. macro, micro and *meso*) have been distinguished.

The discussion of a first case has proved the role of the 'internal' perspective in supporting an analysis of the impact of both back and front office units on performance drivers and outcomes, in respect to a given set of 'administrative products'. The usefulness of a DRBV has been remarked.

A second case has shown how SD modelling based on a DRBV can also be applied to improve performance on a political level.

Further research will be necessary to develop more applied knowledge in adopting the 'internal' perspective and combining it with the 'external' one, to better support the multifaceted decision needs of different involved actors, operating in such a peculiar dynamic complex system, like the public sector.

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