Support to the Public Services Mutation Through Continuous Improvement in a French Metropolis

Gautier Aubourg, François Galasso, Bernard Grabot, Jacques Lamothe

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Gautier Aubourg[1,2,3], François Galasso[2], Bernard Grabot[3] and Jacques Lamothe[2]

[1] Toulouse Métropole, 31000 Toulouse, France
[2] IMT Mines Albi-Carmaux, Université de Toulouse, 81000 Albi, France
[3] Laboratoire Génie de Production, Université de Toulouse, 65000 Tarbes, France
gautier.aubourg@toulouse-metropole.fr, francois.galasso@iut-rodez.fr, bernard.grabot@enit.fr, jacques.lamothe@mines-albi.fr

Abstract. Public Services have their own principles and codes in order to address needs of general interest through the procurement of physical objects, information or services to various kinds of users. Characterized by a political context and a dedicated legal framework, public services have also specific constraints and objectives. This communication shows how continuous improvement methods born in an industrial context could be adapted for addressing the specificity of public service, especially in the new context of "Smart Cities".

Keywords: Public service; Service science; Smart City.

1   Introduction

A Public Service can be defined as an action performed by a public authority in order to address needs of general interest. This communication aims at showing how various methods linked to continuous improvement, born in an industrial context, could be adapted to Public Services. This topic is here addressed in the context of a large French metropolis: Toulouse, which has the will to improve its processes using information technologies. The domain of activity of this metropolis includes various types of production of goods (e.g. meals for scholars) or services (e.g. transportation, cultural services like museums…), addresses thirteen "competences" (culture, transportation, public safety…) and employs persons representing nearly 200 professions.

Improving the performance of public services is not a new topic: in France, various reforms have occurred through time, e.g. the New Public Management (NPM) [1] or later, the so-called "Loi Organique relative aux Lois de Finances" (LOLF) [2]. These projects stressed the importance of efficiency within the organization of public services but suffered from difficulties for being integrated in the operational processes. Similarly, the use of improvement methods coming from the industrial sector, like Lean, also often resulted in failures [3] [4].

The new context of "Smart City" [5], based on an increased involvement of users in services through ICT (Information and Communication Technologies), may allow to redefine the performance of public services inside a metropolis. A project was so

launched in Toulouse Metropole in order to investigate the possibility of embedding "Smart City" technologies and industrial improvement methods (like Supply Chain Management or Lean) in order to improve the performance of Public Services.

In sections 2 and 3 is provided a short state-of-the-art on methods for assessing or improving the performance of an organization. In section 4, the guidelines of a method for improving the performance of Public Services are suggested. The method is illustrated on a project conducted in Toulouse Metropolis that showed encouraging results (section 5).

2 SCM and Continuous Improvement for Public Services

Most Public Services are now produced by multiple partners, either public or private, grouped in real "Supply Chains". It is therefore tempting to try to apply the principles of Supply Chain Management (SCM) to Public Services. Based on this idea, this study began by three audits performed in the waste recovery and sorting center, in the central kitchen providing the meals for kindergarten and elementary schools, and in the mechanical workshop having in charge the maintenance of all the vehicles of the City. The "Supply Chain Master" reference framework was used [6] and showed a low penetration of the Supply Chain Management (SCM) principles within the metropolis (average score 1,4/4) [7]. These audits showed nevertheless a great potential of improvement through the two main pillars of SCM: integration and coordination.

A basis of SCM is to increase the interoperability of the partners through the standardization of the business processes (see the SCOR model [8]). Unfortunately, the broad spectrum of activities that defines the public services makes the standardization of the management processes difficult: each mode of management must be put in adequacy with a specific type of production, in a context of collaborative processes [3]. Furthermore, the integration of political aspects requires a complex management for addressing the issue of justice [9].

Some attempts for using industrial improvement methods in public services have nevertheless been made, e.g. Lean in Human Resources [9] or SCM in the hospital sector [10], sometimes with important benefits [11]. In 2015, South Africa published a report on the integration of SCM in its public processes, supposed to provide better planning, transparency, decreased costs and wastes, and decrease of corruption [12]. Continuous improvement may also help an organization to improve its performance level, for instance through the use of tools such as the Plan-Do-Check-Act wheel [13]. In the Public sector, tools like Jidoka and Poka Yoke were tested in prefectures, Value Stream Mapping in courts, and 5S in operating rooms of hospitals [14]. Lean and SCM may indeed be complementary for increasing benefits, as shown in the "SUCCESS" model of government management combining four methods: ABC, BSC, TQM et PPBS [15].

In all these cases, the principle of a participative system attracted the state agencies involved in these projects, but the integration of continuous improvement has often not survived the test phase, the performance assessment principles associated with these methods being badly perceived by the employees [16].

The adaptation of industrial methods to the specificity of Public Services is in our opinion a condition for their adoption. For instance, while the industrial sector is motivated by benefits and profitability supporting business sustainability [17], Public Service has to balance productivity and efficiency concerns with shared values like quality of result and equity for the users [18].

This short state-of-the-art shows the interest of public bodies for industrial principles, applicable in many services. It also shows the difficulty to adapt industrial methods to the specificities of Public Services.

3 The New Paradigm of the "Smart City"

As shown in [19], the "Smart City" concept develops a participative model for better involving the users (citizens) in their environment (urban life), which is also the case for the continuous improvement model. The concept of "Smart City" can make the city more attentive and attractive to individual (and sometimes versatile) needs [20] [21].

In order to measure improvements, smart indicators are defined and are usually grouped in six categories: (1) smart economy (e.g. Public expenditure on R&D), (2) smart people (e.g. Foreign languages or computers skills), (3) smart governance (e.g. e-Government use by individuals), (4) smart mobility (e.g. sustainable public transportation), (5) smart environment (e.g. efficient use of water) and (6) smart living (e.g. number of public libraries) [22]. However, these "smart standards" do not cover all the needs of nowadays metropolises and a brand new set of indicators (not listed here) has been published in the ISO 37120 standard dealing with sustainable development of public communities [23]. Both smart and sustainable indicators provide a performance level but are not sufficient to define and position improvement actions within a metropolis organization and regarding its stakeholders.

Like SCM, the "Smart City" principles promote collaboration between actors and could play a role in the supply chains in which the metropolis is involved through the implementation of new collaborative technologies [24]. In that purpose, there is a need for a performance measurement system enabling a link between smart initiatives and SCM indicators in order to assess the global performance of Public Services.

According to this short state-of-the-art, the authors consider that there is a clear opportunity in the integration of industrial improvement methods and "smart city" technologies in order to improve the performance of public services.

4 An Integrated Approach in Toulouse Metropolis

A new monitoring method, summarized in Fig. 1, has been instantiated on the case of the "central kitchen" of Toulouse Metropolis. This industrial kitchen has initially been designed for providing 12 000 meals/day and has to insure now 33 000 meals/day with an almost equal production system.

Step I considers the definition of a strategic control. In this case, the main problem of the central kitchen is to respond to a strategic plan created by the politicians for one

to five years linked to the "Smart City" principles through a global roadmap involving the Toulouse metropolis in a global development of smart initiatives through an open call for projects and experimentations [25]. Moreover, the central kitchen has to be able to improve its shop-floor flow control and to decrease the wastes.
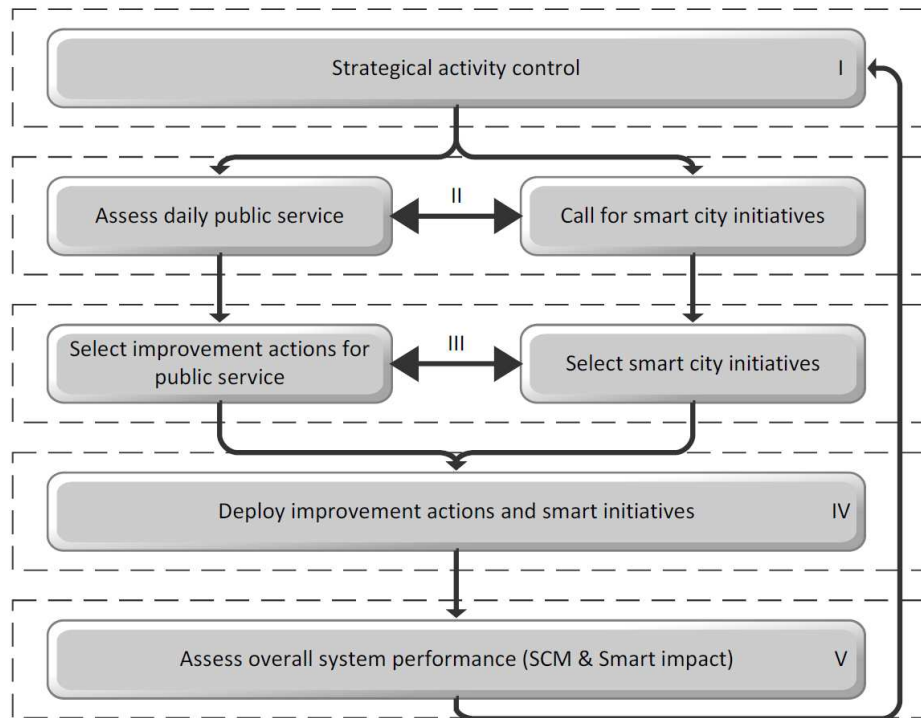

Fig. 1. Method of Implementing SCM Actions and Smart City Initiatives in Public Functions

Step I leads to several SCM problems assessed within a comprehensive study encompassing a consulting work based on the audits introduced in section 1:

- Improve the global SC performance,
- Gain agility for the incorporation of customized meals, local procurement and organic food,
- Improve the relationships with users and/or citizens through ICT,
- Find out any applicable proposals from calls for smart city projects.

Process reengineering (step II of the method in Fig. 1) should allow to find out which processes may be embedded in these political and strategical objectives. A VSM (Value Stream Mapping) approach enabled the identification of the involved stakeholders, in addition to the usual customer-supplier relationship:

- the user: for whom the service is designed and who can say if it is satisfactory or not.

- the citizens: who provide a financial participation in the change of the deployed services through taxes and may discuss about its integration regarding other services or include some participation regarding distribution on finances in the municipal territory. Moreover, the citizen has the possibility to express an opinion about the services provided by a metropolis through the election process.
- the employees, at different hierarchical levels.

Indeed, the process assessment highlights difficulties in the demand management with a lack of global collaboration between stakeholders and an important lack of a performance measurement system. Thus, the metropolis has created a service dedicated to the assessment of the public policy with the objective to develop methods and tools assessing the performance service through the opinion of the final users, with the following objectives:

- Being reactive in order to have the changes applied for the next start of the new school year.
- Improve demand management for a better link between customers and suppliers,
- Promote Continuous improvement through better employee implication.

Two axes of performance improvement were defined: the User Relationship Management (URM) and the Citizen Relationship Management (CiRM). Both have to be considered in comparison with the classical CRM in an industrial context. The development of tools for the CiRM or for the URM is in progress in that purpose: studies and projects have been launched in the metropolis in order to standardize the data and increase their quality in order to establish a dashboard. This assessment has been positioned according to the smart performance axis (see section 2): smart economy, governance, people and living while the others are not impacted in this case study. The application of the suggested method leads to the Key Performance Indicators listed in Table 1.

Step III and IV of the method (Fig. 1) led to the choice of an Internet application (accessible through a mobile app) that creates a direct link with the final users of the central kitchen: the pupils' parents. Through this application, the parents may have a direct access to the menus, give their opinion on the quality of the meals and can also look for allergens. A side effect is that they can adapt the meals prepared at home in the evening to what their children have eaten in school. Service disruptions are also directly notified. This application has demonstrated the lever of improvement that brings the Smart City approach within the processes of the public service. Moreover, this new technology facilitates the respect of legal responsibilities about the information about allergens to the users. In this application, parents can inform when pupils will miss the school, alert on allergen issues, asks for special meals, etc. By the end, it is also expected to decrease wastes using these information. It also increases the transparency in the public service and the direct involvement of the final users, which have a direct impact on the URM and CiRM. Based on the implementation of this experiment, we noted its contribution to the improvement of the interactions with citizens and the qualitative evaluation of the service. The usual continuous improvement "industrial" methods did not have such effect on these problems in the past.

Table 1. KPI selection to improve both smart and SCM performance

Fields	Improvement Actions	KPI	Smart Dimensions
Human Resources Production and Services Management	Maintain a constant level of employee	# of employees	Smart Economy
	Promote local economy/production	% food locally produced	
	Improve Supply Chain Performance	Average of wasted meals a day	
		Follow-up rate of the daily production	
		Delivery fullfilment rate	
		Order Fulfilment rate	
URM	Measure users involvement	# of application users/# of service users	Smart People
	Measure user's global satisfaction	Average of the evaluation (# of complains)	
CiRM	Measure citizen involvement	# of evaluation received by the application	
Develop customized meals	Increase the share of organic meals	% of organic food	Smart Governance
	Integrate new requirements: vegan food	% of meals with vegan food	
Health conditions	Provide information about menus	# of users adapting their menus/# of services users	Smart Living

At step V, the joint use of SCM, continuous improvement and Smart City technologies has filled a gap in the supply chain process, especially by allowing users to assess the received service. They can express a subjective opinion (on the quality of the meals for instance) through quantitative appreciations (1, 2,..., 5). The first tests showed for instance a global dissatisfaction on the quality of the organic bread.

Finally, in order to close the loop and have a primary evaluation of the strategical objectives at step I, the required modification in terms of introduction of organic food have been made in the allocated time, showing the responsiveness of the supply chain. However, the policy is not yet fully effective as the users were not fully satisfied by the meals, while they appreciate the use of a new smart application. Nevertheless, the introduction of smart technologies had multiple effects. Firstly, it improved the URM and CiRM and the associated Smart People axis. Secondly, it supported the introduction of the continuous improvement and SCM principles among the stakeholders resulting in better smart governance. The economy became smarter as the local promotion of products increased.

Now, the direct feedback from users (parents and school restaurants) enabled a transparent assessment of the service. That transparent feedback is presently being used to improve internally the flows from the kitchen to the schools. But, this is a next story.

5   Conclusion

This communication addresses the problem of continuous improvement, supply chain management and performance assessment applied to public services. It emphasizes that more than a cosmetic adaptation, it is necessary to come back to their inner philosophy for taking into account the specificities of the context of public service.

After a long period of observation of the environment of public services, the method as described here is in test by the service in charge of modernising the metropolis. Several positive effects have already been noticed, like the improvement of the information chain by the introduction of ICTs (mobile app for instance); the integration of collaborative methods, both internal and for involving the citizen; a simplification of the public-private partnership, and an indicator-based control on external or internal actions. Nevertheless, the adoption of such ambitious method requires a long-term support and a smart city approach gives a framework for this [26].

The perspectives of this study mainly concern a more precise formalization of the steps of the methodology allowing to transfer improvement methods from the private to the public sector, and on more exhaustive tests allowing to investigate the crucial problem of the adoption of the methods, supposed to create a real cultural change.

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