



**3rd International Conference
on Public Policy (ICPP3)
June 28-30, 2017 – Singapore**

Panel T 06 P02 Session

Policy Implementation - The Role of Policy Targets

Title of the paper

**Designing a Performance Measurement System in case of Time Bound Service
Delivery Act (SAKALA) in Karnataka**

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Date of presentation

Thursday, June 29th 13:30 to 15:30

Abstract

Extensive research has been devoted to identify the risks imposed by performance measurement system, and mitigating strategies for the same for designing an 'authentic performance' measurement system. As most of these studies are conducted in developed country context, very little we know about the extent to which these learnings have been transferred to public administrative reforms undergoing in developing countries. Under the new public management reforms, performance measurement in developing countries are getting reformed aided by the growing use of IT enabled tools to measure and manage performance, but there have been limited studies examining design and management of these performance measurement systems.

We analyze design and management of performance measurement system for 726 public services in state of Karnataka, India. We compare the performance measured under existing performance measurement system vis-à-vis performance measured using the approach advocated on the basis of an 'authentic performance measurement system. The analysis is based on three-year administrative data on performance indicators for 726 services, in-depth interviews and analysis of official documents.

The comparative analysis reveals that the present performance analysis and measurement approach lacks accuracy, does not pinpoint low performing services and departments, and misrepresents performance by wrongly aggregating performance to create a favorable impression. Thus, the present performance analysis rules out opportunities to identify what contributes to poor performance, critical for any effort to diagnose it. The present performance measurement system also does not tie performance to actors that 'make up' performance but instead punishes front line workers not responsible for poor performance. Thus, the existing performance measurement does not enable to identify weak links in service delivery, does not identify people and reasons for poor performance and therefore, provides little guidance on how performance can be improved. Hence, the present performance measurement and management system do not perform performance the sine-quo-none of 'authentic' performance management systems. The case clearly illustrates that technology is only an enabler and there is little transfer of learning in designing and management of performance measurement systems.

Key Words: Performance Measurement, Performance Management, Time Bound Service Delivery, Public Services, Sakala

Introduction

Public sector is argued to be massive producer of measures and ranking to compare, certify, codify and evaluate performance (Le Gales 2016). The state is termed as a 'performance state' in this 'ranking world' as the state is getting quantified and measured. Though in many parts of the world performance measurement started as a new wave of rationalisation as a function of 'New Public Management' but it has been part of command and control economies and has been associated with efforts to improve accountability and transparency from ages (Le Gales 2016; Goa 2009; Power 1997). Downside of performance measurement in public management is as old as the mega trend of performance measurement. But even after half a century of research, performance measurement remains a contested issue. How to design and implement a performance measurement system that works to achieve performance remains unclear and the debate goes on.

With growing application of information technology in public sector, adoption of performance measurement systems in public sector has grown considerably even in developing country context. There is growth in both demand and supply of performance measurement in public sector in developing countries as the public sector goes through a number of reforms like decentralisation, marketization, anti-corruption programs and so on (Chandana et al 2007). Though there is a growing demand and supply of performance measurement in developing countries, there are very few studies that have examined the design and implementation of performance measurement. Gao (2015a) in his review of research studies on performance measurement observes that "research on implementation of performance measurement, especially in developing countries, is thin... more studies of the experiences and lessons in developing countries will help to enhance understanding of performance management in a global context" (Pg 94).

Characteristics of public sector context in developing countries-low institutional capacity, limited involvement of stakeholders, high level of corruption and high level of informality- are not conducive for design and implementation of a robust performance measurement systems (Tillema et al 2010). Given an unfavourable public sector context, it is expected that design and implementation of performance measurement systems in developing countries context will face some unique challenges which have not been observed yet in research in developed countries. However, till date there have been only few studies that have examined performance measurement system in developing countries context and most of these have generally explored performance management rather than performance measurement specifically¹.

To address this gap, we analyse the design and management of performance measurement system for 726 public services in state of Karnataka, India. The Karnataka government, through "The Karnataka Sakala Services Act, 2011 and (Amendment) Act, 2014" (hereby referred as Sakala) offers 726 services pertaining to revenue, land, finance, education, health etc. to its citizens within a stipulated time. The performance measurement system tracks the timely delivery of all the 726 services covered under the Sakala Act. We analyzed the performance measurement system of services covered under Sakala for two-year period using administrative data. We compare the performance measured under existing performance measurement system

¹ Studies have largely focused on performance management rather than performance measurement. Some of these studies are Ohemeng et al 2011; Mkasiwa and Gasper 2014; Gao 2015; Jiayuan 2015, Lansana and Abubaker

vis-à-vis performance measured using the approach advocated on the basis of an ‘authentic performance measurement system. The analysis is based on two-year administrative data on performance indicators for 726 services, in-depth interviews and analysis of official documents.

The comparative analysis reveals that the present performance measurement system lacks a number of conditions that foster authentic performance measurement system. The present performance measurement approach lacks accuracy, does not pinpoint low performing services and departments, and misrepresents performance by wrongly aggregating performance to create a favourable impression. Thus, the present performance analysis rules out opportunities to identify what contributes to poor performance, critical for any effort to diagnose it. The present performance measurement system also does not tie performance to actors that ‘make up’ performance but instead punishes front line workers not responsible for poor performance. Thus, the existing performance measurement does not enable to identify weak links in service delivery, does not identify people and reasons for poor performance and therefore, provides little guidance on how performance can be improved. Hence, the present performance measurement and management system do not perform performance.

Theoretical Context

Though performance measurement as a conceptual field is difficult to define, (Choong 2013), scholars have made attempts to define performance measurement. Alach (2016) defines performance measurement as ‘the use of information to measure organizational effort, activities and achievements’; this thus combines both quantitative and qualitative aspects” (Pg 57). Henman (2016) considers performance measurement as a technology, tool or device of government with “the purpose is to use data to govern, manage or steer the objects of performance and/or the actors that contribute to that performance” (Pg 597). Radnor and Barnes (2007) differentiate between performance measurements, performance reporting and performance management as each has a separate set of activities. According to Radnor and Barnes (2007), performance measurement is concerned with measurement of quantitative or qualitative value of the input, output, outcome or level of activity of an event or process. Whereas performance reporting is defined as some analysis of the measurements done in performance measurement against some form of target. While performance management is action based on performance reporting for improving performance of set of activities for which performance was measured and reported.

Four different approaches to conceptualising and analysing performance measurement has been identified based on different academic disciplines (Henman, 2016). First, from a principle – agent theory perspective, performance measurement provides the means to assess the agent’s performance. Performance measurement makes agents performance visible which makes agent more accountable and incentivises agent to perform (Miller, 2001). Second, from a broader public performance problem, performance measurement is a technical tool to evaluate public sector performance in relation to organizational or policy objectives (Dooren et al., 2015). In this framework, performance measurement is assumed to objectively and independently measure the operations and effects of public sector operations. Third, performance measurement is also conceptualised as a rationalised governance tool within public sector process whereby performance information is fed back into the governance process (Myonihan,

2009). The fourth approach is to conceptualise performance measurement as a policy tool. Performance measurement is argued to be a new policy tool to exercise authority\control and is seen as an incentive based instrument and an information/communication-based instrument (Le Gales, 2016; Henman, 2016). As a policy tool, policy measurement is seen as a more hands-off policy to governance and part of rise of the regulatory state.

Performance measurement system is not only used for improving performance as Behn (2003) identifies eight different managerial purposes for which performance measurement can be used. According to Behn (2003), performance measurement can be used to evaluate, control subordinates, make budgetary decisions and requests, motivate employees, promote the organisation to stakeholders and political principles, celebrate accomplishments, learn about program efficiency and improve performance (Behn, 2003)

Performance Measurement. How to do?

In spite of extensive research on performance measurement in public sector, still how to measure performance such that it improves performance in true sense remains elusive. Compared to private sector, performance measurement in public sector faces a number of unique challenges that make designing and managing a high performing performance measurement system difficult. First, compared to private sector, performance measurement in public sector is more complex. Public programs are characterized by task complexity, with multiple goals multiple ways to measure those goals and different perspective among stakeholders about which choices to make (Moynihan, 2008). Further democratic values, collaborative and global nature of governance complicates measurement of performance (Moynihan et al., 2011). As public sector addresses complex social problems and has conflicting and contradictory goals with many bottom lines –social political and economic-precise measures of performance may be impossible. Therefore, rather than systematically assessing performance, public sector performance measures, generally assess performance partially as measuring all aspects will be overwhelming. As performance measures only measure part of the performance and there is an assumption that the part on which performance is measured can adequately represent performance on the whole. Therefore, performance measure are proxies for performance and there is a performance phenomenon beyond what is measured. (Henman, 2016; Bevan and Hood, 2006).

Secondly, what domain or area of performance should be measured? In general, three types of performance measures have been identified – measures related to efficiency, related to program impact and related to policy and process (de Lancer and Holzer, 2001). Alach (2016) provides a typology of performance measurements that comprises of four elements- levels of performance; measures of performance; actuals of performance; and targets of performance. Five levels of performance are considered – Outcomes, Impact, Output, process and inputs. Measures of performance are defined as ‘quantitative or qualitative descriptions of activity or change within a level of performance. Actuals are defined as ‘qualitative and quantitative states of performance measures. Targets are ‘desired qualitative and quantitative states for performance measures. Even when managers identify the typology a particular concept of interest can be measured in different ways. Different ways of measuring a concept could lead to divergent conclusions leading to real consequences for public programs (Crotty et al., 2006).

The third issue is identifying appropriate set of performance indicators or performance measures. As explained earlier, precise measures of performance is difficult and therefore, most of the performance indicators are ‘tin openers rather than dials’ (Carter et al., 1995, p 49). Tin openers open a can of worms that is they do not give answers but prompt investigation and inquiry, and by themselves provide an incomplete and inaccurate picture and therefore they are incomplete measures. Dials are good measures but are generally few in numbers.

Fourth, even when domain, level and measures of performance measurement is decided, measurements techniques are never perfect and the more one studies them the more problems will be identified. (Heath and Radcliffe, 2007; Meier and O’Toole, 2012). Research on objective measures that are considered to making reliable judgments independent of individual perceptions, suggests that for these measures to be meaningful measurements need to be contextually specific. Therefore, it is not possible to have a group of measures that will produce good results across different contexts (Gao, 2015a). Oversimplified measurement frameworks are bound to fail to capture the multiple dimensions. Though a group of scholars consider subjective performance measurement system (such as surveys) to provide accurate and valid measure of performance if designed properly, there are others who argue that these produce spurious results due to common source bias (Meier and O’Toole, 2012). In any case, scores from subjective measurements can’t be compared across surveys unless the questionnaires, samples, nonresponse patterns, and context are similar (Van de Walle and Van Ryzin, 2011). As measurement is never perfect it needs goals, targets, and indicators that are clearly defined and that do not change too frequently (Gao, 2015a). But in public sector these are political decisions and change with change in government.

Finally, performance measurements lead to number of unintended effects. Smith (1995) describes nine different unintended consequences of performance measurement. The first three unintended consequences of measurement system are - tunnel vision (measuring only what is easy to measure), sub-optimization (measuring such that it serves their own operation at the expense of organizational objective) and Myopia (measuring only short term targets at the expense of long term targets). The remaining six unintended consequence of performance measurement system has been described by later scholars as part of gaming.

Gaming is defined as reactive subversion by actors or organizations whose performance is measured (Bevan and Hood, 2006). Gaming strategies in performance measurement has been studied by a number of scholars giving various typologies of gaming strategies as observed in different context. These studies argue that gaming is not monolithic and thus has different symptoms, causes and implications depending upon the context- motives and opportunities for gaming and impact of gaming strategies (Gao, 2015b). Bohte and Meier (2000) identified three types of gaming in which organizations manipulate performance criteria– cutting corners, lying and biasing samples. Bevan and Hood (2006) have described three types of gaming strategies- ratchet effects (not to exceed targets in order to keep targets for next year low), threshold effects (underperforming just enough to meet targets) and output distortions (achieving targets at the expense of significant but unmeasured aspect of performance). Hood (2006) describes four types of gaming strategies - performance data is creatively interpreted, contrived or spun with or without change in performance, data is invented dropped or not provided with or without change in performance. Hood (2007) has identified four measurement issues in relation to targets and rankings-simple mistakes (clerical errors), Sampling errors, Categorization errors and Gaming. The gaming strategies in this context are “deliberate massaging or outright

fabrication of numbers collected with the intention of improving the position of an individual or organisation” (Pg 100).

Radnor (2008) further building up on the ideas of Hood (2006 & 2007) developed a typology of gaming consisting of four types of gaming strategies -muddling, massaging, maneuvering and manipulating. Muddling is creatively interpreting or spin the output reported metric in case of poorly defined performance indicators. Massaging is when data is massaged or manipulated when the data is either not available, not reported or not recorded. Maneuvering is when activities are developed creatively to achieve the target. Manipulation is when activities are deliberately changed, implemented and encouraged to hit the target even if it results in poor service delivery and outcomes.

Gao (2015b) developed a typology of gaming differentiating between benign and pernicious gaming. A gaming behavior that ‘does not substantially impede the accomplishment of intended performance results’ is considered as benign whereas ‘deliberate manipulation of activities or performance in order to conceal gaps between actual work accomplished and reported results’ is considered as pernicious gaming (Pg 621). Seven types of gaming strategies have been identified. Ratchet effect and Threshold effect as benign gaming strategies. Storming (creating the impression of achieving required targets by engaging in flurry of activities), cutting corners (doing sloppy work but managing to hide the flaws in works and pass evaluation), playing magic tricks (faking performance activities whilst not actually improving performance), output distortion (pursuing targets at the expense of the results the targets are intended to achieve) and data fabrication (making up performance data to lie about actual performance) as pernicious gaming strategies.

In spite of the complexity of designing and managing performance measurement system, it has been argued that performance measurement systems could be designed that could keep the downside of performance measurement into acceptable low levels. About unintended consequences, though there is no doubt about their presence, at the same time the political dimension of performance measurement needs to be taken into account. It has been argued that many unintended consequences are not necessary result of malicious intentions but could be explained on the basis of constitutive effects – language, discourse and social interaction (Dahler-Larsen, 2014). Further performance measurement could be designed that keep the gaming into acceptable low level. Henman (2016) suggests presence of eight conditions for a performance measurement to be able to produce authentic performance improvements. These are clarity of focus, construct validity or accuracy of measures, agreement on measures among those whose performance is being measured, performance measures attributable to those who make up the performance, neither too high nor too low stakes, publishing of performance data, availability of identifiable mechanisms to improve performance and taking into account variation in motives of the different people. In this study, we try to explore the performance measurement system in Sakala and the extent to which these eight conditions for authentic performance measurement systems are present. Further, we explore the presence of unintended consequences of performance measurement system in the context of Sakala.

Research questions

To what extent the performance measurement system in Sakala program meets the conditions of authentic performance measurement system?

What are the unintended consequences of performance measurement system in Sakala program?

Sakala Program

In 2011, the Karnataka State Legislature passed the Karnataka Guarantee of Services to Citizens Act (KGSC) assuring timely delivery of services to its citizens. The act came to be known as Sakala (meaning “in time”) since November 2012. The Karnataka government believes that it is the right of every citizen to obtain citizen-related services in the state within the stipulated time specified in the act. A comprehensive IT solution supports the act by providing a transparent on-line monitoring mechanism for the services requested by the citizen.

A total of 726 services pertaining to revenue, land, finance, education, health etc are offered. Citizens apply for these services to the designated officer (an officer who is required to provide citizen related service) for one or more services as per the prescribed application form along with the required documents prescribed in the check-list in the counters for receiving the applications/registered post/email. On submitting these, the citizen receives from the designated officer, an acknowledgement slip in Form B with a unique 15 digit number called the Guarantee Services to Citizen (GSC) number. With this, the citizen can monitor the status of his/her application on the official website of Sakala (<http://www.sakala.kar.nic.in>).

This system has a mobile interface too. Citizens can check the status of their application by sending an SMS from a mobile phone. The system will send a reply to them with the status of the application. If all the necessary documents are enclosed with the application and the application is complete in all respects, then the date of delivery is mentioned. In case the necessary documents have not been enclosed with the application, then the same is clearly mentioned in the acknowledgement and the date of delivery is not mentioned in such acknowledgements. If the service is not provided within the stipulated time or if the application is rejected, the citizen can file an appeal to the competent officer (an officer appointed by the Government who is empowered to impose cost on the public servant defaulting or delaying the delivery of service) to redress his/her grievance. A call centre is also available in case the citizen is unable to access the website or send an SMS. The competent officer will hear the appeal and redress the grievance within the stipulated time. Citizens can claim the compensatory cost of INR 20 per day for the delayed period subject to a maximum of INR 500 from the competent officer. This amount is deducted from the salary of the designated officer or any other public servant if found responsible for the delay.

The existing performance management system

In the existing monitoring system, the analysis of pendency or delay is done at the department level and the departments are ranked accordingly. Each of these departments differs in the number of services provided with extensive variation in the quantity of applications received (volume). Thus, the analysis at the department level does not provide a clear and comprehensive picture of the problem areas. Therefore, for a better understanding of the delays, this study uses Services as the unit analysis and compares them across departments within Udipi district. We adopt “Services” as unit of analysis in our study instead of “Department”.

A current monitoring practice captures districts and departments within a district are ranked based on *service volume* (number of requests received for a given service in a month) and

pendency (number of service requests delayed after the stipulated time). The service volume is applied 70% of the weightage whereas pendency accounts for only 30% while assessing performance. The construct of pendency purely captures the quantum of service requests delayed without factoring the extent of delay. For example, a delay of 1 day is treated the same as a delay of 15 or 30 days. Hence, the current construct of *pendency* does not capture the *time dimension* of delayed disposals.

Methodology, Data & Analysis

The data for the analysis was retrieved from the official website of Sakala (<http://www.sakala.kar.nic.in/gscmatrixreports/>). The tab named “Disposal after Stipulated time” was utilized for generating the available data from January 2013 to December 2014. This data comprised of various columns like Month, Service Name (A), District Name (B), Stipulated Time (C), Total Applications Received (D), Total Applications Disposal (E), Total Applications Delayed (F), % age of Variation (G), Delayed Age [1 day, 2 days, 3 days, 4-7 days, 8-15 days] and Rank (Figure 1).

S.No	Month	Service Name(A)	Department Name	District Name (B)	Stipulated Time (C)	Total Applications Received (D)	Total Applications Disposal (E)	Total Applications Delayed (F)	Time Wt App Delayed	% age of Variation (G)	1 day	2 days	3 days	4-7 days	8-15 days
1	Jan-13	Issue of Birth Certificate for event data available in electronic form	TOWN MUNICIPAL COUNCIL	Udupi	3	468.00	469	108	1.77	23.1	41	53	13	1	0

Figure 1: Format of the data available on Sakala web portal

To prepare the data for analysis, first all the zero volume services were filtered out. The final cleaned data, thus created, was used for analysis. The final data set consisted of 4898 records each representing Total Delayed Disposal ranging from 0 to 539 instances.

To capture the time dimension, the concept of Volume Weighted Time Delay (VWTD) is proposed. VWTD measures the volume weighted duration of pendency at service level. The uniqueness of this construct is that it lends comparability across various services on a uniform dimension (i.e. time).

$$VWTD(time) = \frac{\sum_{i=1day}^{8-15days} D_i * V_i}{\sum_{i=1day}^{8-15days} V_i}$$

Where,

D_i – No of Days of Delay for an i^{th} service;

V_i – Volume (No of instances of Delay) for an i^{th} service

The Sakala Act pre-specifies a fixed duration for its service deliver. In the present system, each service has a stipulated time ranging from one day to one year. The stipulated time represents the process intensity and complexity of the service. Therefore, it is important to include *stipulated time* as one of the dimensions in the analysis. Each instance of service delivery can be defined in a three-dimensional space comprising of VWTD, Volume (Number of instances)

and Stipulated Time. The unit of measurement for the VWTD and stipulated time is number of days while for volume, it is number of instances.

For the ease of analysis, we first organize the data into a 3 by 3 matrix (Figure 3) based on volume and VWTD. The volume is divided into 3 categories – Low (30 percentile); Medium (40 percentile) and High (30 percentile). However, with respect to VWTD, the split of 3 categories is Low (10 percentile), Medium (80 percentile) and High (10 percentile). This was necessitated due to the skewed distribution of VWTD – about 70% of the total instances have zero delay. VWTD ranges from zero days to 8.83 days with an average of 0.93 days. The 90th percentile for VWTD is 3 days. The third dimension of stipulated time was divided into 13 categories with each category having a 5-day interval.

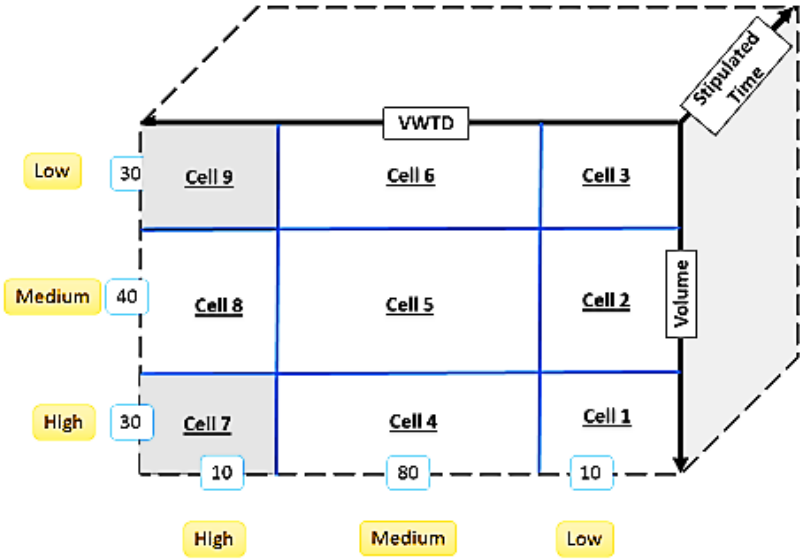


Figure 2: Matrix - VWTD, Volume and Stipulated Time

Among the 9 cells captured in Figure 2, the first 3 cells (1-3) have VWTD of zero days. Cells 7-9 represent high VWTD and hence, are critical for our analysis. Within these 3 cells, cell 7 depicts instances of high volume and high VWTD. Accordingly, monitoring of cell 7 is vital from the perspective of improving the performance of Sakala.

Cells 7 and 9 were further sliced based on third dimension (stipulated time). The core idea was to evaluate whether observations in these cells were independently distributed with respect to the stipulated time. Although the range of stipulated time for these services varied (in cell 7 one day to 120 days and in cell 9, three days to 90 days), we were specifically interested in narrowing down to a specific zone which could explain maximum number of instances within each cell.

The occurrence of instances in cell 9 shows poor operational efficiency in the context of Sakala, as despite low volume, high pendency was observed in this group of services. Therefore, the study of this cell along with cell 7 becomes important.

Using the matrix, further analysis was done to identify the poorly performing services in a sequential manner.

1. Estimation of the incidents of services across the 9 cells of the matrix.

2. A departmental level of analysis of incidents to identify departments which contribute significantly to pendency.
3. Tracing the set of services in each department that contribute to high pendency.
4. Assessment of deterioration/improvement in the quality of services from year 2013 to 2014.
5. Further analysis of these poorly performing 71 services using p-chart (as described below) to identify services that consistently contribute to pendency.

A p-chart is a type of control chart used to control the acceptability of a either a single or group of characteristics. It is generally used to measure and improve the quality of a process, machine, department etc. The chart plots the proportion of non-conforming (defective) units.

While adopting p-chart in the context of our work, we have made the following assumptions:

1. In line with the spirit of Sakala, the characteristic of interest in this analysis is VWTD. If we refer to the framework, cells 7-9 are the services with high VWTD and different levels of volume. From the administration's point of view, these are the services which are critical and need to be focused on. Therefore, each service falling into the range of the cells 7-9 is considered as a non-conforming service.
2. Sample size: For each of the services, the monthly observations for the year 2014 are taken as the sample.

We use p-chart to plot the 394 unique services to find out whether Sakala as a process is statistically out of the control. Once we have ascertained this, we need to find the possible causes for the same. We define \hat{p} as the sample proportion non-conforming.

$$\hat{p} = \frac{x}{n}$$

Where, x is the number of times a service is falling in the range of cells 7-9 and n is the sample size. The average of these sample proportions non-conforming is used as the central line (\bar{p}).

$$\bar{p} = \frac{\sum_{i=1}^g \hat{p}_i}{g}$$

The control limits in a p-chart are calculated as follows:

$$UCL = \bar{p} + 3\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} \quad \& \quad LCL = \bar{p} - 3\sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$$

Here, UCL is the Upper Control Limit, LCL is the Lower Control Limit, \bar{p} (p -bar) is the estimate of the process mean and n is the size of the sample that has the i^{th} observation on the p -chart.

Analysis based on authentic performance measurement system

In this section, the results of the five-stage analysis are presented. Each step in the analysis builds on the previous step. Before starting the analysis, we start with filtering out the services with zero volume and the analysis is done for 394 non-zero volume services. A list of departments with zero volume services is forty-one.

Estimation of the incidences

The service-level data of each month was classified into 9 cells for the period of analysis. Table 1 shows the aggregated number of instances across various cells. A majority of the services

(69.27%) falls under the category of low VWTD whereas medium and high VWTD account for 20.4% and 10.4% respectively.

Table 1: Summary of instances in various cells of the framework

	VWTD			L:30	Volume
	H:10	M:80	L:10		
1545	68	73	1404		
1952	178	393	1381	M:40	
1401	261	532	608	H:30	
4898	507	998	3393		

Subsequently, a month-wise summary instances across the nine cells for the two study years is carried out. The month-wise analysis suggested that in almost all months, a certain proportion of high volume services experienced high delays (*high VWTD*) but the medium and low volume services experienced high VWTD only intermittently. Figure 3 shows the month wise trend in terms of the number of delayed services across all the departments. According to it, there is a trend of increase in the number of delayed services in the latter half of the year.

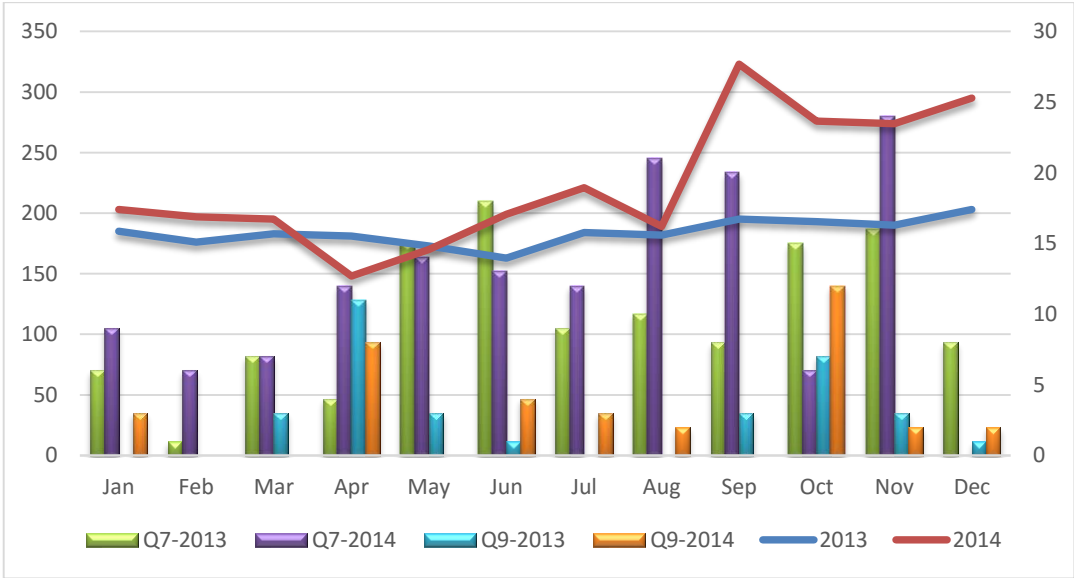


Figure 3: Month wise summary of delayed services (overall and cells-7&9)

A similar trend is observed in the case of services falling in the category of C7 in 2013 and 2014 and in C9 in 2014. For the year 2014, C7 shows improved performance except for the two months – March and September. Also, the highest incidents of delayed cases were observed in September 2014.

Table 2 represents slicing of each of the 9 cells with respect to the stipulated time. Data for stipulated time for services ranges from 1 day to 120 days. These services were categorized into various segments with an interval of 5 days. The most number of delays were observed among services which had a stipulated time of 6 – 10 days (1634 instances) and 26 – 30 days (1132 instances). This suggests that the time allotted to these sets of services needs to be reviewed particularly in the case of those services falling in cells 7, 8 and 9 (161).

Table 2: Summary of cases of stipulated time across cells

Time scale\Cell (Stipulated Time)	1	2	3	4	5	6	7	8	9	Grand Total
A:1-5	156	134	106	122	73	6	41	22	9	669
B:6-10	226	397	485	241	141	22	70	37	15	1634
C:11-15	39	256	61	6	76	2	3	78	2	523
D:16-20	20	66	33	21	15	10	1	5	11	182
E:21-25	32	76	35	25	8		22	1	-	199
F:26-30	80	396	511	20	68	18	10	18	11	1132
G:36-40	3	7	12	-	-	-	-	1	-	23
H:41-45	20	-	55	44	2		26	4	-	151
I:51-55	-	1	5	-	-	2	-	1	1	10
J:56-60	18	18	71	20	6	9	52		9	203
K:66-70	13	13	5	21	4	-	26	11	4	97
L:86-90	-	17	23	-	-	3	-	-	6	49
M:116-120	1	-	2	12	-	1	10	-	-	26
Grand Total	608	1381	1404	532	393	73	261	178	68	4898

Department level analysis of the incidences

A department-wise analysis suggests that certain departments contribute significantly to the delays. Animal Husbandry and Fisheries Departments (72), Food & Civil Supplies Department (42), Health & Family Welfare Department (30), Revenue Department (168), Revenue Development & Panchayat raj Department (66) contribute to approximately 75 percent of the instances of delays observed in high pendency.

Identification of services contributing to pendency

As discussed earlier, certain departments consistently contributed to high pendency. A further analysis of these departments with respect to specific services that repeatedly appear in cell 7

(*low volume, high pendency*) and 9 (*high volume, high pendency*) was performed. The highest instances of delay were observed in the case of Revenue Department, specifically in the case of the service Change of Katha (60 instances of delays) and Caste Certificate (14 instances of delay). Both these services fall under low volume but high VWTD implying urgent need of either review of process or time allotted for these services. Similarly, in the case of Food & Civil Services Department (7 services), Health & Family Welfare Department (3 services), a few services repeatedly appear in Cell 9 (*low volume, high pendency*). A similar analysis as suggested earlier should be carried out in the case of these services as well.

Analysis of deterioration in the quality of services

The previous analysis identifies critical services based on the three dimensions of the framework – VWTD, volume and stipulated time. Specifically, the services falling in the cell categories 7 and 9 are considered critical as they have high VWTD and low volume or high VWTD and high volume. While the above analysis is based on a static data, we analyse the populated matrix further to see the changes in the performance of the services over the two years of study. We focussed on identifying and ranking the services based on the improvement/deterioration in VWTD from year 2013 to 2014. For the same, the incidences of a particular service falling in a cell are clubbed into two categories – those falling in cell 1 to 6 (*zero to moderate pendency*) and 7 to 9 (*high pendency*) of the framework. Then, the incident of a service falling into 7 to 9 category is calculated as a proportion of the total number of incidents each year i.e. p_{2013} and p_{2014} for year 2013 and 2014 respectively. The formula used is:

$$P_{2013} = \frac{C_{7-9,2013}}{C_{1-9,2013}}$$

$$P_{2014} = \frac{C_{7-9,2014}}{C_{1-9,2014}}$$

$$r = P_{2013} - P_{2014}$$

The next step analyses whether the proportion of services with high pendency has increased from 2013 to 2014 (represented by r in the equation above). A positive difference between p_{2013} and p_{2014} shows improvement in service delivery. On the other hand, a negative value indicates that the delivery process for that service has deteriorated compared to the previous year. The changes in the proportions range from -100% to +100%. Based on these values, 394 services under study were ranked from 1 to 8 where 1 means an improvement of 75-100% and 8 means a change of -75 to -100%. The categories made for the purpose of ranking have been mentioned in Table 3.

Table 3: Change in performance of services from 2013 to 2014

Difference between p_{2013} & p_{2014}		Rank	Number of services
-75.0%	-100.0%	8	0
-50.0%	-75.0%	7	0
-25.0%	-50.0%	6	13
0.0%	-25.0%	5	58
25.0%	0.0%	4	318
50.0%	25.0%	3	5
75.0%	50.0%	2	0

100.0%	75.0%	1	0
Total			394

Based on the changes in performance of the services for the 2 years, we arrive at a set of 71 services that have shown deterioration of the order of 0 to 50%. There are no services showing a deterioration of more than 50%. A further analysis of services is done through the p-chart to find out the worst performing services among the 71 services identified above.

Identification of poorly performing services of Sakala

In the present case, the sample size (n) equals to 12 (12 data points for the year 2014) and the standard deviation (σ) values taken to calculate the UCL and LCL range from 0 to 5. The following table presents the \bar{p} (p -bar), UCL and LCL for each of the sigma limits used in the analysis.

Table 4: Input for the p-chart

<i>No. of samples</i>	394					
<i>Sample size</i>	12					
<i>Sigma limits</i>	0	1	2	3	4	5
<i>p-bar</i>	0.065	0.065	0.065	0.065	0.065	0.065
UCL	0.065	0.136	0.207	0.278	0.349	0.420
LCL	0.065	0.000	0.000	0.000	0.000	0.000

In the present case, the lower control limit (LCL) is set as 0 for sigma levels 1-5. Therefore, the observations are plotted against only the upper control limit (UCL). Figure 4 shows the p-chart for all the services for 12 months of analysis.

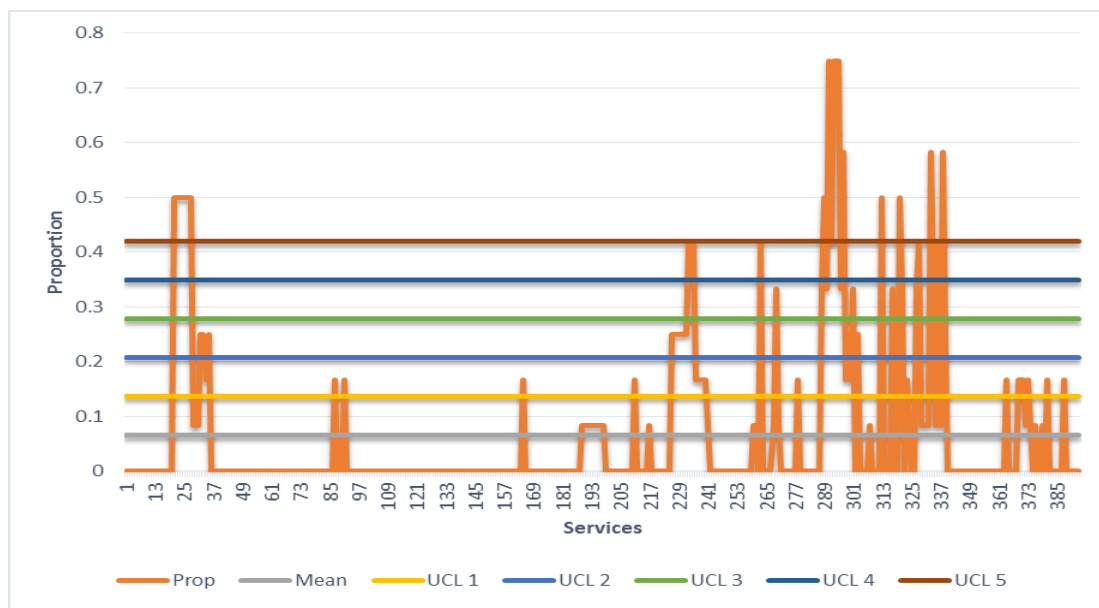


Figure 1: P-chart for services

The coloured horizontal lines in the figure represent the UCLs at different values of sigma. The vertical lines are showing that the service delivery of Sakala is not completely under statistical control even at a sigma level of 5. A few services can be seen to be surpassing the upper control limits and hence the services are not performing within statistical control limits.

Table 5 gives the same result in a detailed manner. Here, the columns are the sigma levels ranging from “zero defect” to 5. Rows, on the other hand, are the ranks arrived at previously by analysing the deterioration in the quality of services from 2013 to 2014. A rank of 5 or more indicates deterioration in service delivery quality. Therefore, as identified earlier, 71 services falling under rank 5 and 6 are the ones which have performed worse in 2014 compared to 2013.

Table 5: Number of services falling under different categories with different levels of sigma

Rank/Sigma ↓ →	Zero Defect	$>\mu$ and $\leq 1\sigma$	$>1\sigma$ and $\leq 2\sigma$	$>2\sigma$ and $\leq 3\sigma$	$>3\sigma$ and $\leq 4\sigma$	$>4\sigma$ and $\leq 5\sigma$	$>5\sigma$	Total
3	5							5
4	290	10	7	7	2	1	1	318
5		20	13	5	4	3	13	58
6		1	1	1	3	3	4	13
Total	295	31	21	13	9	7	18	394

Out of these 71 services, 17 services are beyond even 5 sigma levels indicating the worst service delivery. Hence, these services have been categorized as *critical level I* (most critical). Followed by another 6 services which are between 4 to 5 sigma which are categorized as critical level II and 7 services falling between 3 to 4 sigma are categorized as *critical level III* and so on. The categorization of these 71 services on the basis of their criticality (See Table 6). From the point of view of the administration, services in level I of criticality should be addressed first followed by those in level II, III, IV, V and VI.

Table 6: List of services as per their criticality

S.No.	Level	Services	Department	Sigma	Rank
1	I	Agricultural labour certificate	Revenue department	5	6
2	I	All types of caste certificate	Revenue department	5	6
3	I	General licence (trade licence)	Rural development and panchayat raj department	5	6
4	I	Noc to escoms	Rural development and panchayat raj department	5	6
5	I	Alteration	Animal husbandry and fisheries department	5	5
6	I	Change of name of fishing boat	Animal husbandry and fisheries department	5	5
7	I	Duplicate copy of certificate of registry	Animal husbandry and fisheries department	5	5

8	I	Fresh registration of fishing boats	Animal husbandry and fisheries department	5	5
9	I	Issue of registration/ licenses to boats	Animal husbandry and fisheries department	5	5
10	I	Registry of mortgage	Animal husbandry and fisheries department	5	5
11	I	Transfer of ownership	Animal husbandry and fisheries department	5	5
12	I	Transfer of registry from one port to another	Animal husbandry and fisheries department	5	5
13	I	Change of khata (undisputed cases)	Revenue department	5	5
14	I	Change of khatha (undispute cases - registered)	Revenue department	5	5
15	I	Change of khatha (undispute cases - unregistered)	Revenue department	5	5
16	I	Pension for disabled persons	Revenue department	5	5
17	I	Sandhya suraksha	Revenue department	5	5
18	II	Issue of age certificate	Health and family welfare department	4	6
19	II	Issue of age certificate (age determination that does not need specialist opinion / investigation)	Health and family welfare department	4	6
20	II	Issue of age certificate (for the age determination that needs specialist opinion/ investigation like x-ray, dentist opinion etc.)	Health and family welfare department	4	6
21	II	All types of income certificate	Revenue department	4	5
22	II	Building licence	Rural development and panchayat raj department	4	5
23	II	Maintenance of street lights	Rural development and panchayat raj department	4	5
24	III	Disposal of consent for establishment/consent for expansion applications under water act 1974 and air act 1981-green category.	Karnataka state pollution control board	3	6
25	III	Agricultural family member certificate	Revenue department	3	6
26	III	Issue of job card to unskilled laboures under mgnregs	Rural development and panchayat raj department	3	6
27	III	Agriculturist certificate	Revenue department	3	5
28	III	Landless certificate	Revenue department	3	5
29	III	Record of rights certificate	Revenue department	3	5
30	III	Alteration to assessment list	Rural development and panchayat raj department	3	5
31	IV	Providing employment to unskilled labours (mgnregs)	Rural development and panchayat raj department	2	6
32	IV	Issuance of khatha extract for event data available in electronic form	City municipal council	2	5
33	IV	Issuance of khatha extract for event data not available in electronic form	City municipal council	2	5
34	IV	Khatha extract	City municipal council	2	5
35	IV	Indira gandhi old age pension	Revenue department	2	5
36	IV	Mutation extract	Revenue department	2	5
37	V	Issuance of arms license	Revenue department	1	6
38	V	Issue of trade licence as prescribed	City municipal council	1	5
39	V	1 to 5 std. And 6 to 7 std kannada and english medium	Department of public instruction	1	5

40	V	8 to 10 kannada and english medium schools	Department of public instruction	1	5
41	V	Renewal of recognition for schools	Department of public instruction	1	5
42	V	Registration of youth association	Department of youth empowerment and sports	1	5
43	V	Issue of disability certificate	Health and family welfare department	1	5
44	V	Issue of disability certificate for hearing disability	Health and family welfare department	1	5
45	V	Issue of disability certificate for mentally (mental retarded) challenged	Health and family welfare department	1	5
46	V	Issue of disability certificate for orthopaedic disability	Health and family welfare department	1	5
47	V	Issue of disability certificate for visual disability	Health and family welfare department	1	5
48	V	Domicile certificate	Revenue department	1	5
49	V	Distributing clearance/ releasing certificate	Transport department	1	5
50	V	Learning licence	Transport department	1	5
51	VI	Police verification certificate for training apprenticeship at public undertakings /for trainees/ workers working on daily wages at govt. Institutions	Home department	Mean	6
52	VI	Sanction of earned /commuted leave	Department of public instruction	Mean	5
53	VI	Sanction of earned /commuted leave – beos office staff	Department of public instruction	Mean	5
54	VI	Sanction of earned /commuted leave – cpi, acpi, dsert, tbf, kseeb, text books, cmi, jd, mms office staff and officers	Department of public instruction	Mean	5
55	VI	Sanction of earned /commuted leave – cte office staff	Department of public instruction	Mean	5
56	VI	Sanction of earned /commuted leave – ddpi office staff	Department of public instruction	Mean	5
57	VI	Sanction of earned /commuted leave – diet and equivalent office staff	Department of public instruction	Mean	5
58	VI	Sanction of earned /commuted leave – government primary/high school teachers and primary school head masters	Department of public instruction	Mean	5
59	VI	Sanction of earned /commuted leave – head master govt. High school and group b officer/ group a officers	Department of public instruction	Mean	5
60	VI	Sanction of earned /commuted leave – jdpi office staff	Department of public instruction	Mean	5
61	VI	Sanction of earned /commuted leave –aided primary and high school head masters and teachers	Department of public instruction	Mean	5
62	VI	Renewal of license	Drugs control department	Mean	5
63	VI	Pvc for central /state govt. Employees if request is received directly by the employee	Home department	Mean	5
64	VI	Disposal of consent for establishment/consent for expansion applications under water act 1974 and air act 1981 red category non-eia without tac projects.	Karnataka state pollution control board	Mean	5
65	VI	Disposal of consent for establishment/consent for expansion applications under water act 1974 and air act 1981-orange category excluding textile washing units.	Karnataka state pollution control board	Mean	5
66	VI	No objection certificate under lrf grant	Revenue department	Mean	5

67	VI	Unemployment certificate	Revenue department	Mean	5
68	VI	E-payment for the work executed under developmental schemes	Rural development and panchayat raj department	Mean	5
69	VI	Maintenance of village sanitation	Rural development and panchayat raj department	Mean	5
70	VI	Issue of death certificate for data not available in electronic media	Town panchayat	Mean	5
71	VI	B-register extract	Transport department	Mean	5

Conclusion

The study aims to identify the issues in the delivery of Sakala services in Udupi district using the data for the year 2013 and 2014. The analysis is done at the level of services as each service is different in terms of the volume and delay. Services with no demand (*zero-volume*) were filtered out and only non-zero volume (394 services) were analyzed further. Two major components of the analysis were – a three-dimensional matrix and p-chart analysis. The services were mapped on the dimensions of volume, volume weighted time delay (VWTD) and stipulated time and were analyzed for the incidences across the cells.

The results suggest that 10.4% of the services have high VWTD. The delays happen more towards the latter half of the year and some departments such as Animal Husbandry and Fisheries Departments, Food & Civil Supplies Department, Health & Family Welfare Department, Revenue Department, Revenue Development and Panchayat raj Department etc. contribute relatively more towards high pendency. Similarly, services such as Change of Katha (60 instances of delays) and Caste Certificate (14 instances of delay) are the ones showing highest pendency. 71 of the 394 services were found to be deteriorating in terms of service quality delivery from 2013 to 2014. The p-chart analysis helped us to categorize the 71 of these 394 services on the basis of criticality.

Overall, the analysis and the results help us to conclude that (i) a large number of services across departments are not being used because of no demand (zero volume services), (ii) 10.8% of the non-zero volume services have high pendency, (iii) pendency level of the services is not same over the year and increases towards to later part of the year, (iv) service delivery quality of 71 services has deteriorated from 2013 to 2014 and (v) 17 of these 71 services are most critical in terms of pendency.

The study is based on the analysis of publicly available data from 2013 to 2014. Therefore, the results and the conclusions made here are specific to the period of study. The scope of the study is limited to Udupi district. Therefore, the results cannot be generalized to other districts. Also, the objective of the study was to identify the problem areas in the delivery of Sakala services. The analysis helps to identify services which are performing poorly. However, it does not explore the reasons behind the poor performance of the services.

The following table analyses the extent to which the proposed performance measurement system in Sakala program meets the conditions of authentic performance measurement system

Table 7: Mapping of Proposed Performance System vis-à-vis authentic PMS

Sr	Dimensions	Existing Performance Measurement System	Proposed Performance Measurement System
1	Clarity of Focus	Low to Moderate	High
2	Construct Validity /Accuracy of measures	The existing construct of pendency purely captures the quantum of service requests delayed without factoring the extent of delay.	VWTD measures the volume weighted duration of pendency at service level and thereby lending comparability across various services on a uniform dimension of time
3	Agreement on Measures among those whose performance is being measured	The unit of analysis and aggregation is the Department. As any given department is a heterogeneous mix of both well performing services as well as laggards, it becomes difficult to get a uniform buy-in from the people	As the unit of analysis is the Services, it becomes easier to get buy-in from the people as the entire Department is not labeled as a poor / weak performer
4	Performance measures attributable to those who make up the performance		
5	Stakes (Too high/ low)		
6	Publishing of performance data	Yes	The proposed method is also amenable for easy computation and dissemination.
7	Availability of identifiable mechanisms to	The existing method is vague and does not distinguish among services which are 'laggards'	There is a very clear mechanism of identifying services (Eg. Critical Level 1) which can help improve the

	improve performance		overall efficiency of the system
8	Accounting for variation in motives of different people		

Future Scope

The present study is based on past performance of various services of Sakala during 2013 and 2014 in Udupi district. There are several possibilities of extending the work in the future. One of them is to replicate the same study across the state for each district. While this study helped us to identify services with delays in Udupi district, future work can give us insights into the performance of Karnataka state as a whole. As of now, this study includes only three dimensions to evaluate the service delivery – volume, stipulated time and volume weighted time delay. Other dimensions such as *rejections* can be included for a different framework which can be extremely important from the point of view of service delivery.

Also, the weightages being used for the current ranking system can be revisited so that the spirit of Sakala is reflected in the ranking system. The analysis can be further extended to identify factors responsible for poor performance of a given set of services that contribute significantly to poor implementation of Sakala programme in Udupi district. This would involve mapping processes of a given service delivery, estimating optimum human resource requirement, skill mix of human resources and stipulated time duration.

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