Government Process Re-engineering of an E-governance Implementation for Motor Vehicle Registration in India

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Abstract

The study analyzes the performance of an e-governance implementation for motor vehicle registration in a state in India. Registration of new vehicles is a process which calls for detailed Government Process Reengineering study as the frequency of this process is very high, to the tune of several lakhs per year, and is increasing day by day. The objective of implementation of the e-governance project is to register a new vehicle in less than five days. However, data collection revealed that there are cases where the process took even more than twenty days, that too after the implementation of the electronic method for the same. Seven hypotheses have been stated and tested to reach a conclusion about the cases studied - whether the average time taken for registration crosses the target of five days, and also to test whether a difference exists between groups such as, transport and non-transport vehicles or between dealers. These are set as the objectives of this Government to Citizen (G2C) services. The study also comes up with a reengineered process, after eliminating non-value adding approvals and steps to minimize the delay in the process, thereby improving the overall productivity.

Keywords: government process reengineering, vehicle registration, time, hypothesis, G2C services

1. Introduction

It is stated in literature that citizen adoption of e-government systems is sluggish, particularly in developing countries (Rana & Dwivedi, 2015). An analysis on why e-government projects are prone to design-reality gap is available in literature (Guha & Chakrabarti, 2014). E-government information flow between government, intermediaries and users in varied ways impacts the effectiveness of e-government policies (Taylor et al., 2014). Another study (Alawneh, Al-Refai & Batiha, 2013) relates to the determinants of e-satisfaction with e-government. Analysis of stakeholder expectations helps to develop e-services that offer external services and improve internal efficiency (Axelsson, Melin & Lindgren, 2013). Another research (Fogli, 2013) proposes a novel approach to the development of e-government applications for citizens and public administration employees. Also literature reveals a study on the usability of e-governance software (Kumar & Subramoniam, 2013). In developing countries with limited resources, it is vital to judiciously set e-government strategies and direct investment, giving due consideration to the risks involved (Abdallah & Fan, 2012). Another research aims to discover the quality priorities of e-government users and analyses the attitude of Greek citizens towards e-government sites (Papadomichelaki & Mentzas, 2011). Understanding the key determinants of e-government services is an important issue for enhancing the degree of the usage of services (Sharma, 2015). Nograšek & Vintar (2015) have worked to develop a more comprehensive framework that would provide better insight into the characteristics of organisational transformation of public sector organisations in the e-government era. The purpose of another research found in the literature is to assess the maturity level of the Jordanian e-government program from citizens' perspective (Anas, Hussein and Saheer, 2014). Alomari, Sandhu & Woods (2014) have explored how citizens socialise and network while using and adopting e-government. The importance of evaluation and optimization of e-government services is imperative if the government organisations consider to have an effective impact on the success and take-up, or proper buy-in of the services offered (Lee, Sivarajah, Molnar, Weerakkody & Irani, 2015). Another study focuses on a comprehensive review of the literature related to e-government satisfaction and adoption, with particular focus on the most critical factors and the manifested variables that influence user satisfaction in e-government (Weerakkody, Irani, Lee, Hindi & Osman, 2014). The primary intention of the literature review is

to establish the gap in literature as stated in the motivation section that follows.

2. Motivation for the Present Study

Literature review section has discussed the presence of a gap in the literature with respect to reengineering of existing government process flow of an already implemented e-government system, led to the establishment of the stated gap that is studied less or totally absent in the research articles, especially in the case of e-government implementations in India.

Business Process Reengineering (BPR) is defined as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed. BPR applied IT is the new Industrial Engineering (Davenport & Short, 1990; Davenport & Stoddard, 1994). BPR involves a thorough analysis of the current business processes that are redesigned to improve performance (Al?Mashari & Zairi, 2000; Davenport, 1993). Government Process Re-engineering (GPR) has evolved from applying Business Process Re-engineering (BPR) concepts to Government Services. Most organizations, both public and private, have traditional bureaucratic procedures that hinder performance and ultimately, the productivity level (Rainey, Backoff & Levine, 1976). Antiquated processes, historical Acts and Rules, and status quo continue, even with the introduction of technology to facilitate improvement of service delivery. Costly and time-consuming business processes cause inefficiency and ineffectiveness. So there is a desperate need to thoroughly analyze and reengineer the old-fashioned and obsolete business processes to improve performance (Davenport & Beers, 1995). Any e-project, at the time of implementation, will not be based on the most optimal streamlined process for various reasons such as, gaps in communication between the user and developer resulting in project failure (Bashein, Markus & Riley, 1994; Cao, Clarke & Lehaney, 2001). Firstly, jobs set aside for each section in an office or for an officer have stabilized over time due to the process of conflict over ownership of the sub-processes involved and their resolution. Secondly, pressure on the developer for speedy implementation may result in launching the software product before it is fully ready in all aspects. Third is the time and finance constraint involved in every project. Ineffective change management, lack of awareness for training and fear among the employees about downsizing, are other contributing factors that act as barriers for communication between the client and the software supplier, preventing full understanding of the process before development.

3. Problem Statement

There is scope for dramatic improvement in performance by switching from the "as-is" process flow to the "to-be" process flow in every e-project implemented in the country. Though technology is a key enabler for Business Process Reengineering in areas other than software, like RFID or bar code for engine or chassis identification, this study focuses mainly on dramatic improvement by taking a re-look at the software process flow alone. The study is focused on the motor vehicle registration process to see whether the implemented e-project met the objective of delivering the Registration Certificate before the fifth day from application submission. Also, it seeks to ascertain whether the initially set objective of five days could be further reduced to target a lower time period through the implementation of the reengineered process.

Figure 1 shows eleven steps of the "as-is" process starting from the customer who is a citizen initiating the process and ending in the final dispatch of the Registration Certificate by post. As a first step, citizen approaches the dealer for registration, remits payments and signs papers. Then the dealer submits the details to the website. This is followed by the dealer visiting the RTO for tax token and for generation of number for remitting fees. The dealer takes the vehicle to the ground for physical verification of chassis and engine numbers by RTO, along with the originals of the submitted documents. Verification is carried out in the system and registration number is allotted for the vehicle. After this allocation, the clerk retrieves details from the implemented system and verifies. The Superintendent repeats this step. Issue of Registration Certificate is the next step. Registration

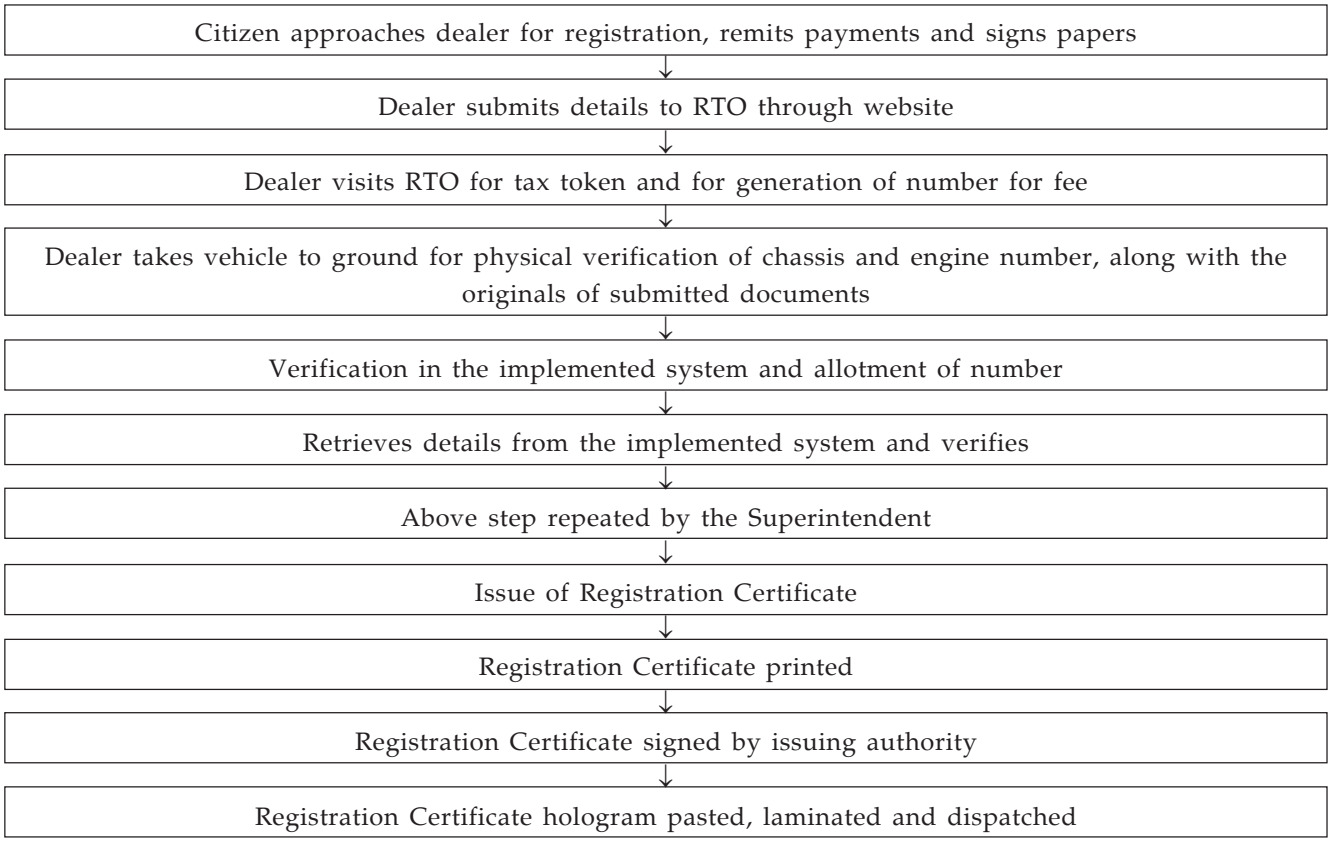

Figure 1: Schematic Representation of the "as-is" Process in Focus

Certificate is printed on a card that is later laminated. Then physical signature is affixed on the Registration Certificate by the concerned authority prior to hologram fixing, lamination and dispatch. This is the 11-step process which is the focus of this study.

4. Research Methodology

The population consists of all new vehicles registered in the state where registration is growing at the rate of ten lakh per year through nearly twenty or more Regional Transport Offices (RTO) assisted by sub RTOs numbering a little more than two and half times the number of RTOs. Three RTOs were randomly picked by Simple Random Sampling from districts where the registration rate of new vehicles is high. Twenty to thirty samples each of transport and non-transport vehicles were randomly picked from the website of the State Motor Vehicle Department for data relating to date of submission of application and date of delivery of the registration certificate. Further, the time taken for each of the sub-processes involved as listed in the Table 1 were collected from corresponding files available in the office. Suitable hypotheses are coined to come to a conclusion about the time taken for the process of registration as discussed in the following sections. The study was done during the period January 2013 to April 2014.

The hypotheses proposed for the study are as follows:

H1: The time delay between registration on the website and data entered status of transport vehicle data is less than or equal to one day.

H2: The time delay between data entered status and verified status of transport vehicle is less than or equal to one day.

H3: The time delay between verified status and RC issued status is less than or equal to one day.

H4: The time delay between issued status and printed status of RC is less than or equal to one day.

H5: The time delay between fresh application for registration and dispatched status of Registration Certificate is less than or equal to five days.

H6: There is no difference between average time taken for registration of transport and non-transport vehicles.

H7: There is no difference between average times taken for registration of vehicles from two dealers.

5. Data Collection

The descriptive statistics of the data collected from the office files for twenty registered vehicles randomly picked-up as sample during period of study are presented here (Table 1).

6. Results

The results of t-tests carried out to test at 5% significance level on whether any of the sub processes crossed the time limit of one day or the whole process exceeded the target objective of five days is shown in Table 2.

For the above set of hypothesis, 't' calculated value t_{calc} is much above 't' tabulated value t_{tab} of 1.79 for both transport vehicles as well as non-transport vehicles for the corresponding one-tailed tests. Hence, hypothesis H1 that the activity is taking less than or equal to one

Table 1: Descriptive Statistics of the Samples for Transport and Non-Transport Vehicles

Average Time elapsed between the following in days	Transport Vehicle (N=20)		Non-Transport Vehicle (N=20)	
	Mean	SD	Mean	SD
Submission and Entered	4.30	4.68	12.25	15.06
Entered and Verification	0.35	0.67	1.20	2.14
Verification and Issue	0.75	1.12	2.30	2.25
Issuing and Printing	0.80	1.36	0.90	0.85
Submission and Dispatch	14.3	11.93	31.65	19.41

Table 2: Summary of the 't' Test Results Carried Out on Sub Processes Time Limit and the Whole Process

H. No.	Hypothesis for the 't' test carried out at 95% significance level for which the tabulated t value is 1.729 for 19 degrees of freedom	Transport Vehicle (N=20)		Non-Transport Vehicle (N=20)	
		t_{calc}	Test Result	t_{calc}	Test Result
H1	Time taken between application submission and data entered in the system <= 1 day	3.15	Reject	3.34	Reject
H2	Time taken between data entered in the system and verification done <= 1 day	4.33	Reject	1.58	Accept
H3	Time taken between verification done and issue registration certificate <= 1 day	1.00	Accept	2.58	Reject
H4	Time taken between Issuing of registration certificate and printing <= 1 day	0.66	Accept	0.53	Accept
H5	Time taken between submission of fresh application and dispatch of registration certificate <= 5 days	6.14	Reject	4.99	Reject

Table 3 : Group Statistics on Time taken for Registration of Transport and Non-transport Vehicles

	Vehicle Type	N	Mean	Std. Deviation	Std. Error Mean
Time taken for registration in days	Transport	29	7.21	4.894	.909
	Non-transport	30	15.37	12.861	2.348

Table 4 : Independent Samples Test on Time Taken for Registration of Transport and Non-transport Vehicles

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
									Lower
Time taken for registration in days	Equal variances assumed	4.406	.040	-3.199	57	.002	-8.160	2.551	-13.267
	Equal variances not assumed			-3.241	37.47	.003	-8.160	2.518	-13.259

Table 5 : Group Statistics on Time taken for Registration of Vehicles from Two Dealers

	Dealer	N	Mean	Std. Deviation	Std. Error Mean
Time taken for registration in days	Dealer1	20	33.35	14.240	3.184
	Dealer2	20	28.00	12.657	2.830

Table 6 : Independent Samples Test on Time taken for Registration of Vehicles from Two Dealers

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Time taken for registration in days	Equal variances assumed	1.579	.217	1.256	38	.217	5.350	4.260	-3.274	13.974
	Equal variances not assumed			1.256	37.485	.217	5.350	4.260	-3.278	13.978

day is rejected in both the cases and it is concluded that the same is more than one day in the case of both transport and non-transport vehicles. A similar set of hypothesis have been developed. To test the hypothesis for serial numbers 2 to 5 and 't' test results on whether to accept the corresponding hypothesis or not have been listed for both transport vehicle and non-transport vehicles respectively.

It can be noted that only four of the listed sub-processes are statistically within the time limit given; rest of them exceeded the time limit. Moreover, hypothesis test on the whole process of new vehicle registration also revealed that the time limit set as 5 days has been exceeded in the case of both transport vehicles and non-transport vehicles. In order to reduce the steps in the process, a new "to-be" process is arrived at by holding internal discussions to arrive at a more simplified process, eliminating duplicated approvals and non-value adding steps as discussed in later sections of this research.

The group statistics (Table 3) and the result of the independent sample 't' test to see whether there is any difference between time taken for registration of transport vehicle and that of non-transport vehicle are presented in Table 4 for testing hypothesis H6.

Based on above results, it is inferred that hypothesis H6 which states that there is no difference between average time taken for registration of transport vehicle and non-transport vehicle can be rejected. This is statistically significant and hypothesis H6 is rejected at 5% significance level as 0.04 is less than 0.05 or 5%. Twenty nine transport vehicle samples and thirty non-transport vehicle samples are taken randomly for the above hypothesis test.

The group statistics (Table 5) and independent sample 't' test to find out whether there exists difference between registration time taken for new vehicle registration by two different dealers are as given in Table 6. Twenty samples are taken for each dealer's case and independent 't' test is conducted to find out whether significant difference exists in the average time taken for registration between the two dealers.

A sample size of twenty from each dealer is taken for testing this hypothesis. The results showed that the hypothesis H7 could not be rejected at 5% significance level as 0.217 is much above 0.05 or 5%. Therefore, it is concluded that there is no difference in the average time taken for registration of new vehicles from two different dealers.

Figure 2 shows the "to-be" process after elimination of steps which are found no value adding so that the process can be completed within the stipulated time of less than or equal to one day instead of the previously set target of five days. The main changes which can be noted in the process flow prior to re-engineering as

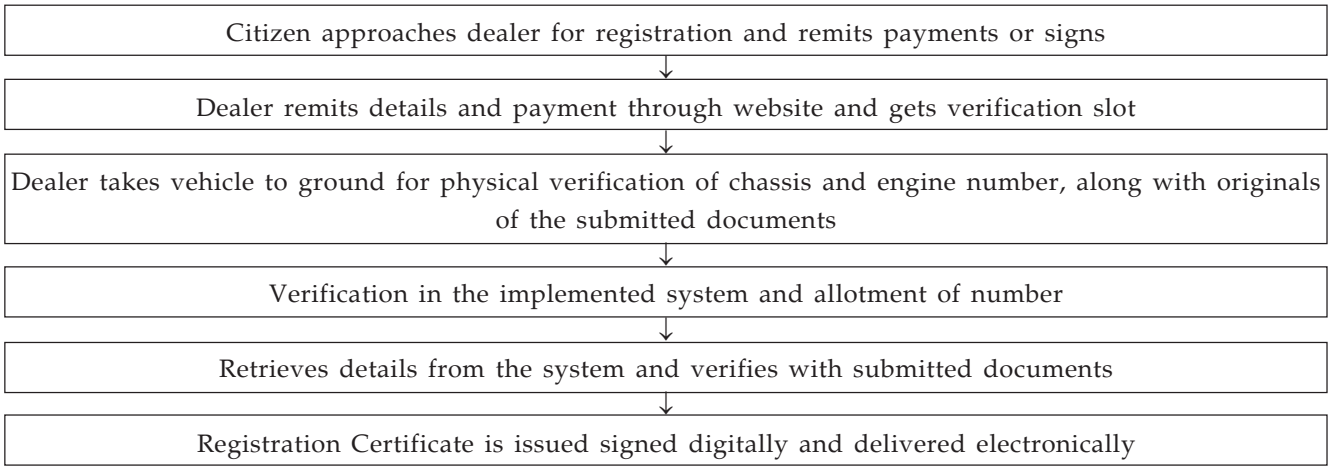

Figure 2: Schematic Representation of the "to-be" Process

in Figure 1 and re-engineered process flow as in Figure 2 are as follows: Dealer visit to RTO office for physical payment and manual receipt of registration number is avoided by online payment and electronic receipt of registration number in the re-engineered process. The verification step which is repeated by the Superintendent is eliminated in the re-engineered process. Electronic generation and delivery of registration certificate is suggested in the place of several steps which follows the step involving issue of certificate. This leads to reducing an eleven step process to a mere six step process, saving time and effort of many, improving productivity at the same time, while improving the lead time in issue of registration certificate for new vehicles.

7. Conclusion and Managerial Implications

Most-government software are designed and implemented in a project mode that results in the accidental inclusion of non-value-added steps in the process flow. Such inclusions can also be due to the organizational power play between interacting members of the system in the allocation of work in the newly introduced e-mode of functioning. Only a revisit at a later point of time with an idea of re-engineering can help to evolve a crispy set of value added tasks in the process flow, ending up with saving of resources. Though an effort is made to achieve an end-to-end process flow in every e-government project, there is a tendency for employees to fall back on the earlier manual method at least partially in duplicating the functionality already available in the software, leading to delays in the process. Revisits on the process flow at planned intervals and up-to-date application of emerging technologies widen the scope for re-engineering possibilities in every e-government project in the post implementation phase.

Seven relevant hypotheses were developed to study and test whether the steps in the process exceeded time limits set by the citizen's charter and to see whether significant difference existed between groups in the average time taken for registration of new vehicles, between transport vehicle and non-transport vehicles or between dealers. Out of four sub-processes for which hypotheses are stated and tested, two hypotheses each, for transport vehicles and non-transport vehicles, concluded that they exceeded the set time limit of one day. The hypothesis test on whether the registration process as a whole exceeded the agreed limit of five days revealed that both transport and non-transport vehicles exceeded the set time limit of five days. Hypothesis H6 which states that there is no difference between the average time taken for registration of transport vehicles and non-transport vehicles is rejected. Further, it is concluded that there is no difference in the average time taken for registration of new vehicles from two different dealers. Every step in the existing process was re-visited to decide whether to retain it in the process flow or not. Redundant steps, if any, are removed and others are collapsed or streamlined for process simplification. In the "as-is" process eleven steps are involved, whereas the re-engineered process has only six steps. Also a reduction of nearly 45% of steps is achieved using the new process. The time limit, according to agreement with citizen's charter, for registration using the present process flow is five days. But in reality it is even more than 20 days in certain cases. It can be seen that using the re-engineered process, registration can be done in one day by the proposed process flow alone, leaving aside reduction in time which can be achieved by envisaging technologies like RFID for engine or chassis number swipe or verifications that are carried out manually at present.

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