

# Case Study on Effectiveness Evaluation of Business Procedure Reengineering: BPR for Local Government in Saga Prefecture, Japan

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**Abstract**—Case study on validation of effectiveness of Business Procedure Reengineering: BPR for local government in Saga prefecture, Japan is conducted. As the results, if it found that BPR is effective. The local government, environment established a government CIO room introduction of a number system was a long-cherished wish is determined in 2013, it is possible to promote e-government and e-municipality and the banner of great incredibly plan called "world-leading creative nation" is being put into place some. We would like you to realize the municipality a cloud can be enhanced administrative services to pour our best to take this opportunity, give the impression to the residents as possible; the operational efficiency of the civil service, the foundation is reduced large flower IT costs.

**Keywords**—Business Procedure Reengineering; BPR; local government

## I. INTRODUCTION

Business Procedure Reengineering: BPR is getting popular for federal and state governments as well as private company, obviously. One of the difficult things is method for evaluation of effectiveness of the BPR.

Nowadays, e-governments are getting popular and common to the local government. Standardized e-government is now populated. On the other hand, through trial and error processes, some of the e-government systems are getting much smart. In particular, information processes and services systems are improved remarkably together with cloud computing technologies. Meanwhile, Business Process Reengineering: BPR<sup>1</sup> is advanced not so remarkably. Not so many business procedures are changed results in poor progress of the total system performance.

As Michael Hammer<sup>2</sup> said in his article of "Reengineering Work: Don't automate, Obliterate" in the Business Review 1990, a new business process reconstruction utilizing computer and network technologies has to take over the restructuring with layoff which has been done in 1980s [1]. The old fashion of the business processes in 1980s are based on the design philosophy of the business processes are constructed with the business processes which can be divided into small pieces of tiny sub processes. He, however, proposed much more integrated business processes without division of

business processes utilizing computer and network technologies. Namely, useless and/or overlapped business processes are removed together with re-design of business processes for creation of a new concept of the business processes. Thus required cost can be reduced while quality of services is improved with acceptable speed. Namely, it is totally better, cheaper, and faster system.

Local government business processes, on the other hand, are computerized in the early stage followed by e-government. The e-government is not extension of the computerized system at all. It is totally different from the old fashioned computerized system. Namely, all the required data for administrative processes are in a commonly useable database. Individual processes are integrated with interoperable system and data in the database (exchangeable data format, character code conversions, file conversions, etc.) [2].

In Saga Prefecture, after the establishment of Saga ICT Promotion Agency August 20, 2008, under the strong leadership of cities and towns and length Governor, joint procurement of information systems, Analysis of the current state of information systems, joint use of information systems it is where you are been working steadily to such [3].

The municipality cloud demonstration project in Saga which I have worked as an information planning audit, analyze the business processes that are carried out each cities and towns, improving to residents service, operational efficiency, and reduce IT costs drastic from the viewpoint, out leads to a new business process, developed a system for interoperable municipalities based on them, verify the effects, eventually, it was the contents for realizing to interoperate. In addition, it was visualized, such as "time required" to improve effectiveness compares the current business processes and (or less - current model), business processes of BPR after (below, next model) specifically.

As a way of BPR, as the current model to create a work flow analyzes, such as business and the amount of business process status quo, for the work that needs to be improved, and displayed over work flow on them make the best business improvement However, - by reflecting in system development pilots for the next model them to achieve a current model, and business execution time of the next model, it was decided to measure the results of the BPR.

<sup>1</sup> <http://e-words.jp/w/BPR.html>

<sup>2</sup> [http://en.wikipedia.org/wiki/Michael\\_Hammer](http://en.wikipedia.org/wiki/Michael_Hammer)

## II. PROPOSED MODEL

### A. Evaluation Method for effectiveness of the BPR

Prior to the BPR, to check the room for improvement for the important business of the cities and towns, we conducted a questionnaire survey as for the person who of cities and towns, but the table above is the result. 0 points if there is no need of improvement, as 4 points if room for improvement is large, it was decided to get the results to say that over the business of many a result of the investigation, room for improvement is large, but the system of tax department in particular it can be seen that in the example leads to 3.2 points, it is necessary to improve the most: Room for improvement degree of critical business.

### B. Current Status of the BPR

Current status of municipalities that participated in the municipality cloud demonstration of Saga Local government's description (March 31, 2009) 51,599 people: Takeo population,

- It is located in the western province, china, agriculture is the main industry. (March 31, 2009) 31,849 people: Kashima population

- It is located in the southern western, Yutoku Inari shrine of one of Japan's three major Inari worshipers of 2.8 million people a year visit is located (March 31, 2009) 29,153 people: Ureshino population
- It is located in the western part of the prefecture, Ureshino Onsen million tourists per year visit the main industry location, and tourism (March 31, 2009) 7,746 people: Omachi town population
- It is located in the center of the county, agriculture, animal husbandry has become a major industry. (March 31, 2009) 9,678 people: Jiangbei town population
- It is located in the center of the county, agriculture, animal husbandry has become a major industry. (March 31, 2009) 26,530 people: Shiraishi town population
- It is located in the southern part of the province, the main industry is agriculture and.

### C. Evaluation Results on effectiveness of the BPR

Figure 1 shows Room for improvement degree of critical business (Source: Saga municipality cloud development demonstration project report).

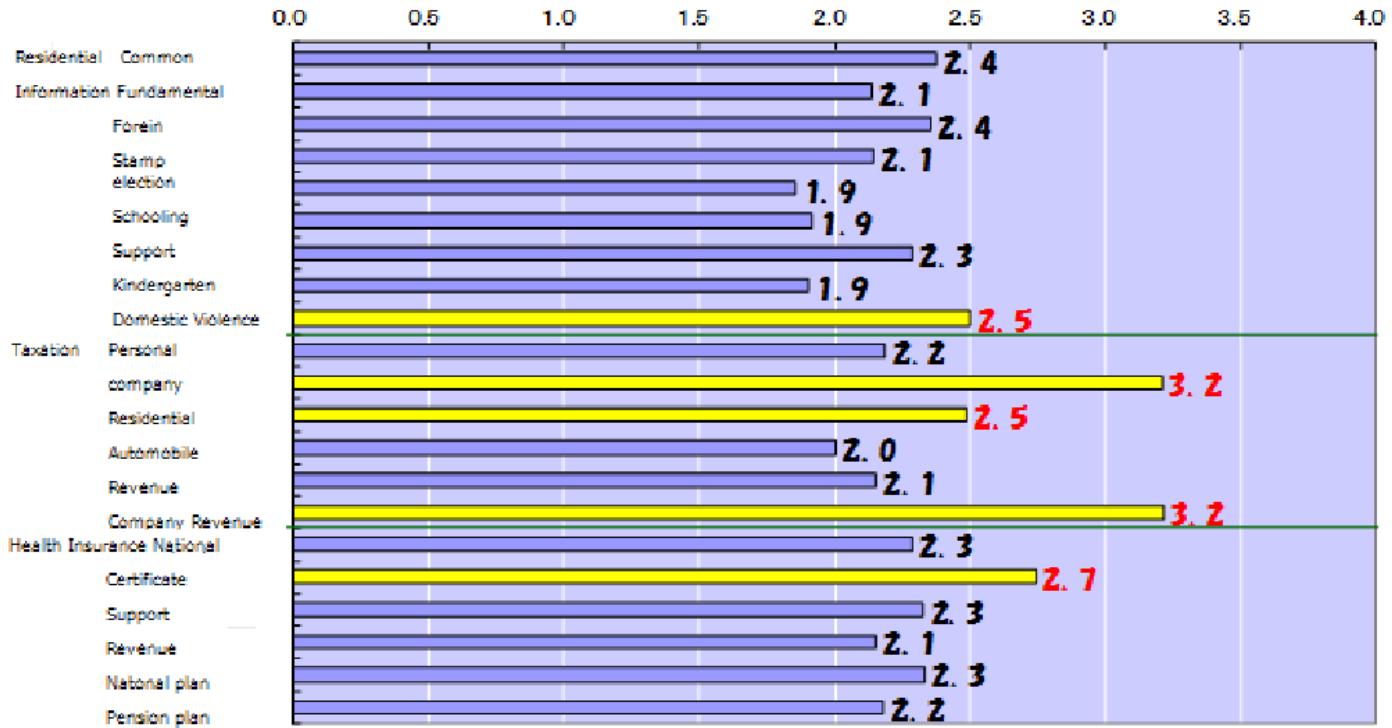


Fig. 1. Room for improvement degree of critical business Source: Saga municipality cloud development demonstration project report

The room for improvement degree survey results for each business Residents better service, operational efficiency in individual, measurement results of field trials of qualitative and quantitative effect is as follows:

Measurements of

① Residents service improvement (shortening the processing time)

Residents visited a government office, after certain procedures, description and delivery. Table 1 shows the results from measurements of the effect by experiment. Meanwhile, Table 2 shows measurement result of operational efficiency in the

case of the transition to next-generation model was BPR from the current model. As the results, it is confirmed that around 30 % of required processing time Business Procedure is reduced by BPR. In particular, systemized procedure from the manual base procedure is effective followed by media conversion from paper

to electronics form, and personal information processing. On the other hand, it is also found that outsourcing is not so effective.

Meanwhile, resident information processing is the most cost effective by 41 % followed by national health insurance (32 %), and taxation business (28 %) processes.

TABLE I. MEASURED EFFECTIVENESS OF THE PROPOSED BPR

Business Lines	Name	City Name	Procedure	Reduction of processing time (1 per procedure) (minutes)				Remark	
				Past	Current	Reduction			
Resident Information	Basic Resident Register	Ureshino	Transference accepting applications for grant-related documents	24.4	16.4	8.0	33%	695	
			Moving out accepting applications - moving out certification issue	22.2	11.2	11.0	50%	785	
			Registration accepted - seal return	16.6	16.4	0.2	1%	1,100	
	Seal Registration		Certificate application forms check-receipt issue	3.7	3.7	0.0	0%	950	
			Deregistration application forms check-notice distribution	4.5	4.5	0.0	0%	500	
			Deregistration application forms check-notice distribution	11.0	9.0	2.0	18%	3	
Taxation	Corporate inhabitant tax	Kashima	Contact reception - answer	43.0	18.0	25.0	58%	20	
	Property tax		Certificate accepting applications-price receipt	3.5	3.5	0.0	0%	100	
National Health Insurance	National Health Insurance levy	Takeo	Contact reception ~ levy tax calculations described	16.0	7.0	9.0	56%	1,500	
			Transference Social Insurance retention withdrawal reception - elderly claimant certification issued	2.5	2.5	0.0	0%	36	
			Burden classification certificate accepting applications for grant-	8.0	6.0	2.0	25%	30	
	National Health Insurance Eligibility		Retirement insured qualification acquisition and loss delivered accepted - insurance card issued	5.5	5.5	0.0	0%	30	
			specialized science-accepted insurance card issued	4.5	4.5	0.0	0%	20	
			Qualification changes accepted - reissue imprint mark, issue	6.5	6.5	0.0	0%	50	
			Insurance card reissue accepted - reissue imprint mark-issue	9.0	9.0	0.0	0%	600	
			Issue short-term proof-acceptance issue	5.0	3.6	1.4	28%	300	
	National Health Insurance Benefits		Request entry written request high-cost medical care accepting applications - appropriation (delinquent)	21.0	21.0	0.0	0%	1,000	
			Specific disease medical treatment proof delivery acceptance-delivery	12.0	6.0	6.0	50%	12	
			Standard burden reduction applied certificate issued reception-delivery	16.0	11.0	5.0	31%	108	
			Total	234.9	165.3	69.6	30%	7,839	

Colored row shows the process the effect of more than 30% is expected to shaded

TABLE II. MEASUREMENT RESULT OF OPERATIONAL EFFICIENCY IN THE CASE OF THE TRANSITION TO NEXT-GENERATION MODEL WAS BPR FROM THE CURRENT MODEL

Business lines	Business	Reduction of business management (hours / year)				Systemize of manual		Online personal information cooperation		Electronic data from paper storage		Outsourcing		Other	
		Past	Current	Reduced time	Effect	No.	Time	No.	Time	No.	Time	No.	Time	No.	Time
Residents information	Basic Resident Register	681	320	361	53%	0	0	4	188	3	19	0	0	7	107
	Seal	470	422	57	12%	0	0	2	43	1	4	0	0	0	0
	DV • Stoker	16	13	2	15%	5	2	2	0	1	0	0	0	1	0
	Election	228	181	47	21%	7	23	2	1	7	15	8	8	0	0
	School age book	101	20	80	80%	8	50	3	1	6	26	0	0	2	4
	School Aid	189	34	155	82%	7	55	2	10	2	28	0	0	6	46

	Sub-Total	1692	990	702	41%	23	129	15	244	20	91	8	8	16	158
Taxation	Individual inhabitant tax	10482	6661	3822	36%	15	1825	9	462	12	1317	217	217	11	12
	Corporate inhabitant tax	433	211	222	51%	12	194	0	0	4	13	0	0	2	5
	Corporation storage	276	120	156	56%	12	156	0	0	0	0	0	0	0	0
	Property tax	7127	6144	983	14%	20	250	11	617	2	11	105	105	3	0
	Sub-Total	18318	13136	5183	28%	59	2425	20	1080	18	1341	322	322	16	17
National Health Insurance	Levy	884	391	492	56%	15	289	19	82	0	0	110	110	1	11
	Eligibility	509	368	142	28%	11	35	1	0	4	8	98	98	3	0
	Benefit	662	637	24	4%	9	24	0	0	0	0	0	0	0	0
	Sub-Total	2054	1396	658	32%	35	497	20	82	4	8	207	207	4	12
Total		22065	15522	6543	30%	121	2903	55	1406	42	1441	537	537	36	185

Results of the measurement of the reduction rate of the operational procedure time for 19 processes to become such, it were reduced by 31% on average. In particular, answer inquiries and corporate inhabitant tax (58%), estimated tax imposition description of national health insurance levy, specific disease medical treatment proof issue of National Health Insurance benefits (50%) , moved out acceptance of Basic Resident Register is (50%) , residents reduction of latency was high.

#### D. Introduction of improvement case

Because when performing the move-out process at the counter, to perform the storage situation confirmation regardless of the delinquent existence, time-consuming, because of the business contact, improvement case traditional

① moving out notification had been spelled to come up with a paper, but the next model in the order to be able to query the system removal and check mark votes of non-payment, work spell in the job mark votes spelling check and to charge storage tissue is eliminated. I can be shortened to five minutes to process 3 per processing time and change in the next model for the 3/17 process per the processing time of the current model before and after performing the improvement of business processes in detail.

② school aid procedures In the past, against one per process processing time was 480 minutes from the fact that in order to make the school aid certification deliberation, it was asked in the paper collection of various types of information to obtain a Person consent of personal information collected in the next model Te, only the required information, staff there are authorizations to be identifiable.

Figure 2 and 3 shows before and after BPR of Basic Resident Register, respectively. Through BPR procedure, 17 minutes of processing time is reduced to just 5 minutes. Due to the fact that it takes 10 minutes for checking the payment status, it takes 17 minutes in total. Meanwhile, it takes just 5 minutes because it does not need to check the payment status because payment status is recorded every time of resident leave their residence.

Fig. 2 Before BPR (Basic Resident Register)

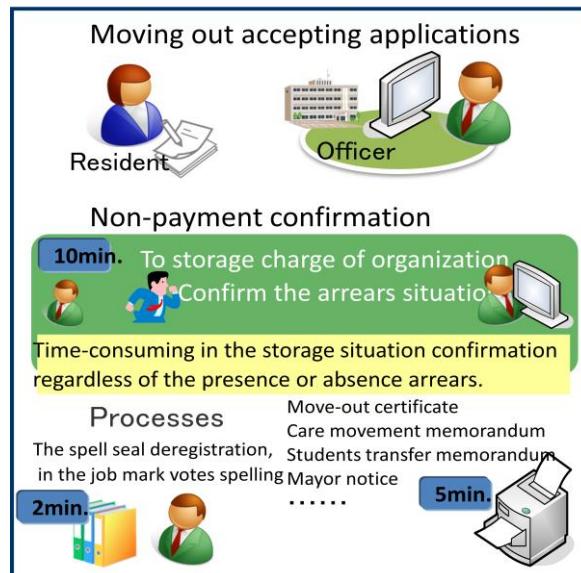


Fig. 2. Before BPR (Basic Resident Register)

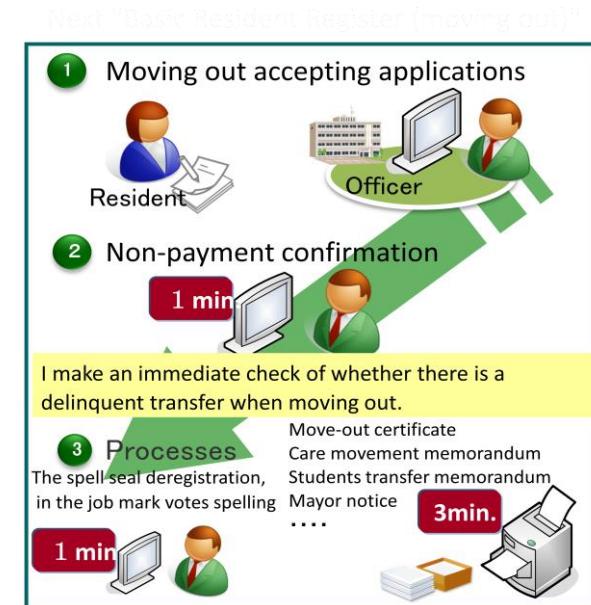


Fig. 3. After BPR (Basic Resident Register)

Can be reduced to 240 minutes per process processing time can be realized by MES "electronic data" from the "paper". Figure 4 and 5 shows before and after BPR of school aid (certificate). In the process of promoting the efficiency of business operations municipality, electronic systems for business use, which was developed as necessary. Hardware Internet and client-server format, use personal computer functions of high performance reduce the load of the main short-range computer networks and communication networks (LAN) technology,

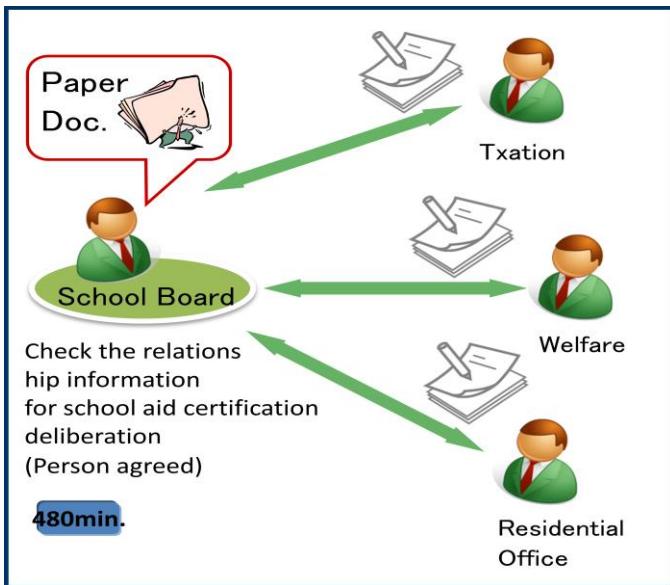


Fig. 4. Before BPR (School aid (Certification))

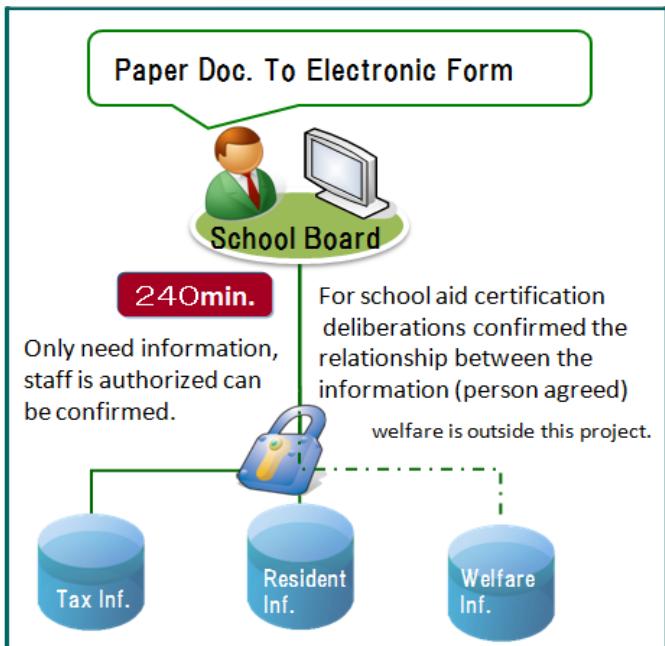


Fig. 5. After BPR (School aid (Certification))

Figure 6, 7 shows another example of BPR of Individual inhabitant tax payment process. Figure 6 shows the past business flow of the individual inhabitant tax payment process while Figure 7 shows the current process flow. Using bar code reader, the required time for individual inhabitant tax payment processes is reduced three minutes. The number of payment is so huge that effect of this BPR is quite large.

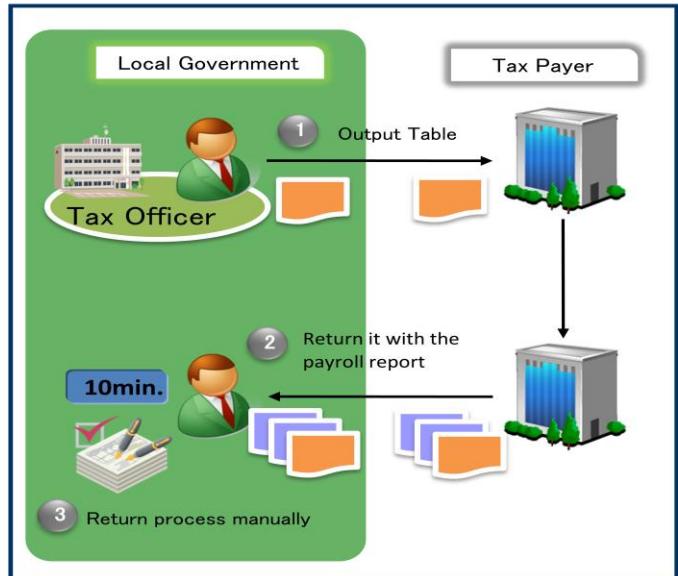


Fig. 6. Past business procedure for individual inhabitant tax payment process.

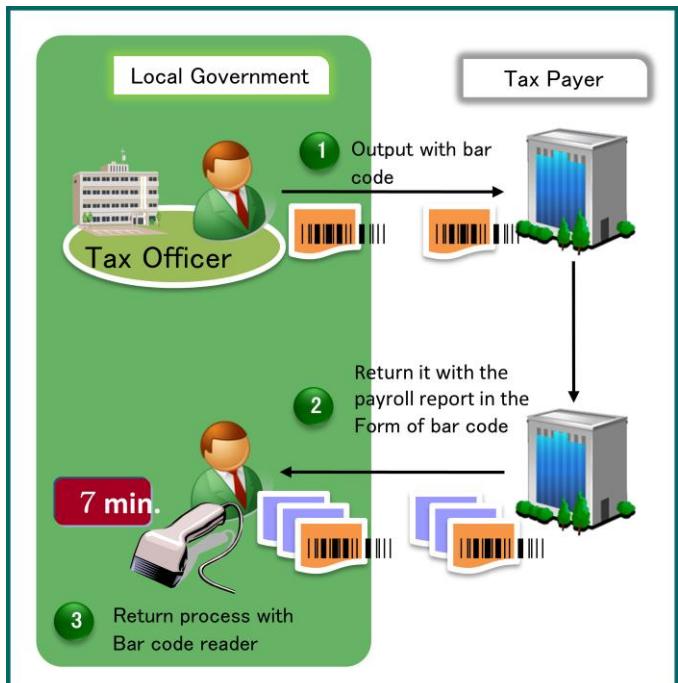


Fig. 7. Current business procedures for individual inhabitant tax payment process.

Another example for property tax payment processes can be shown with Figure 8, 9. In the past decades, property tax form is forwarded with paper form. Electronic form of property tax is available from law office to taxation office currently. Therefore, 1/3 of required process time can be reduced.

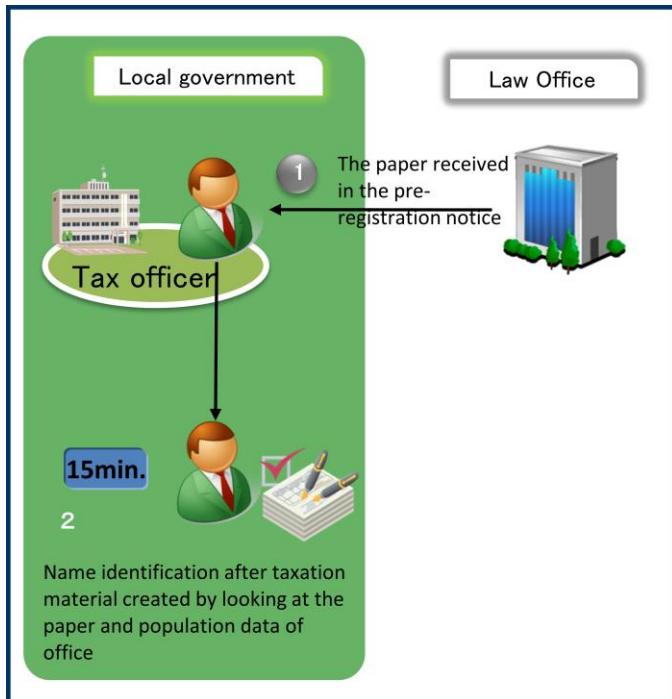


Fig. 8. Past business procedures for property tax payment process.

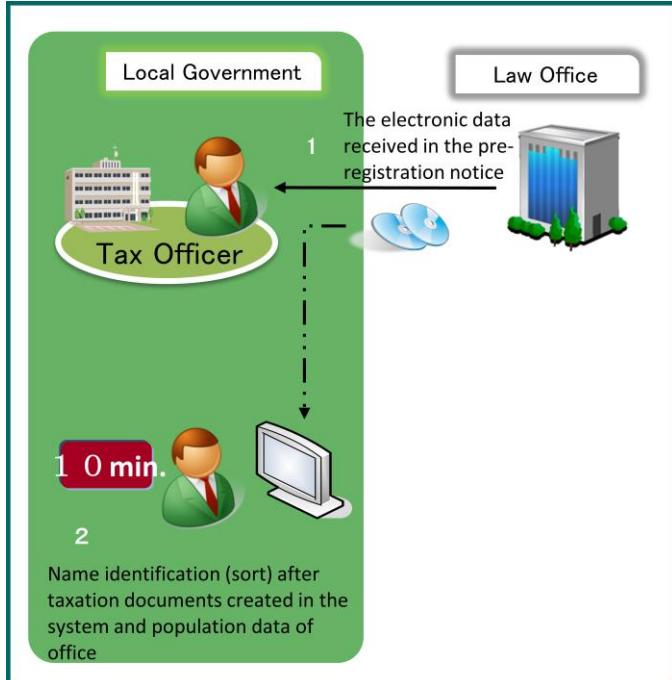


Fig. 9. Current business procedures for property tax payment process.

This is same thing for income tax payment process. As shown in Figure 10 and 11, the required time for income tax

payment process is reduced 10.3 minutes by using electronic form of file transfer instead of paper from processing.

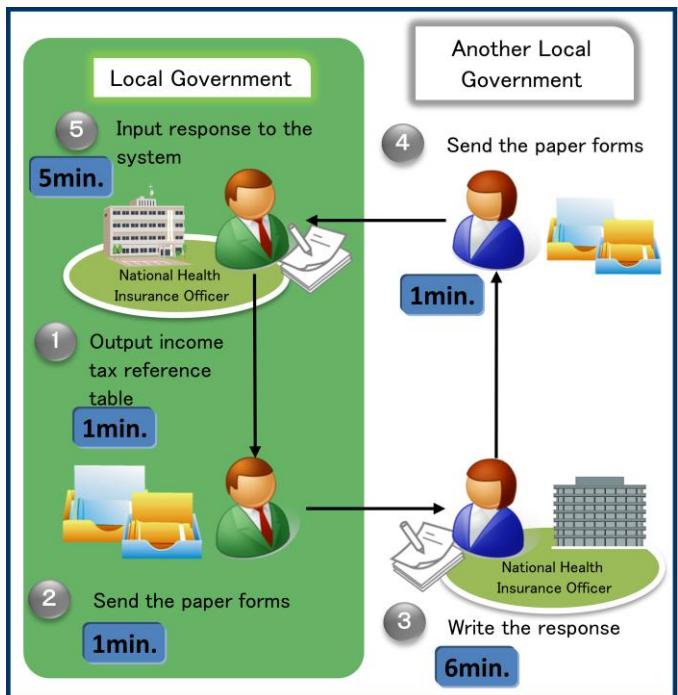


Fig. 10. Past business procedures for income tax payment process.

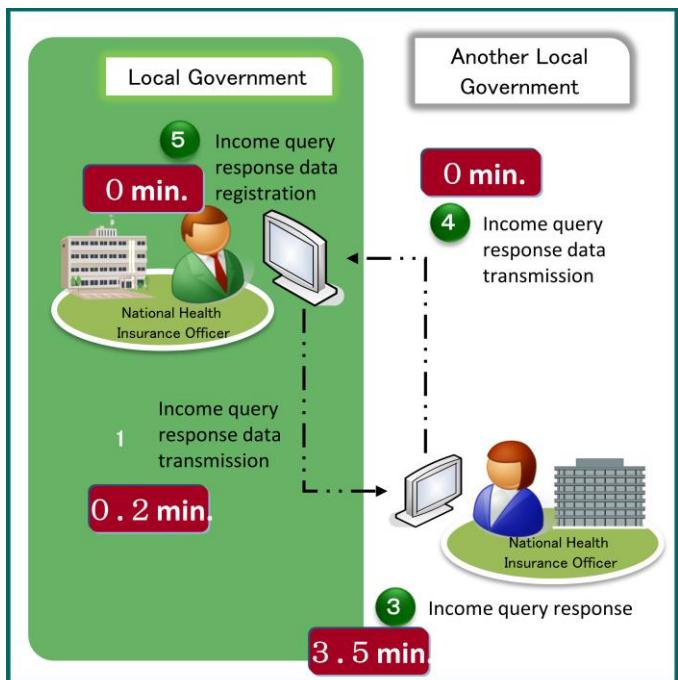


Fig. 11. Current business procedures for income tax payment process.

Another example is National Health Insurance levy (NHI tax calculations) process. As shown in Figure 12 and 13, the required time of National Health Insurance levy (NHI tax calculations) process in the past is 10 minutes while that in the current is just 1 minute. By using electronic form of National

Health Insurance levy (NHI tax calculations) file, the required process time becomes 1/10.

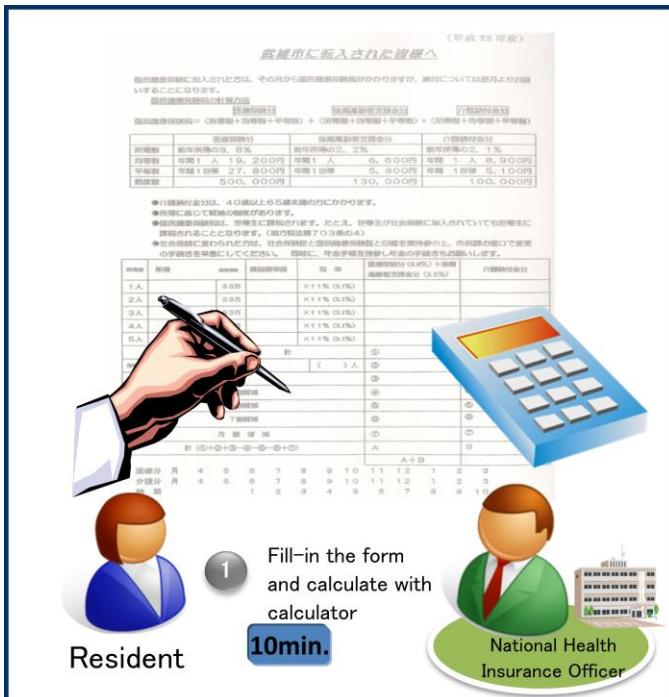


Fig. 12. Past business procedures for National Health Insurance levy (NHI tax calculations) process.

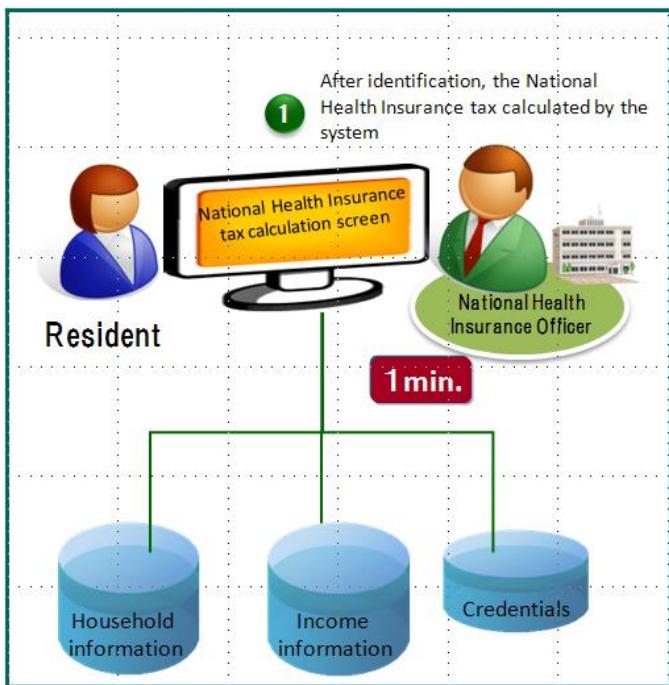


Fig. 13. Current business procedures for National Health Insurance levy (NHI tax calculations) process.

Also, the effectiveness of BPR for National Health Insurance Certificate (envelope stuffing outsourcing) process can be shown. As shown in Figure 14 and 15, the required time of the process is reduced by the factor of 1/10.

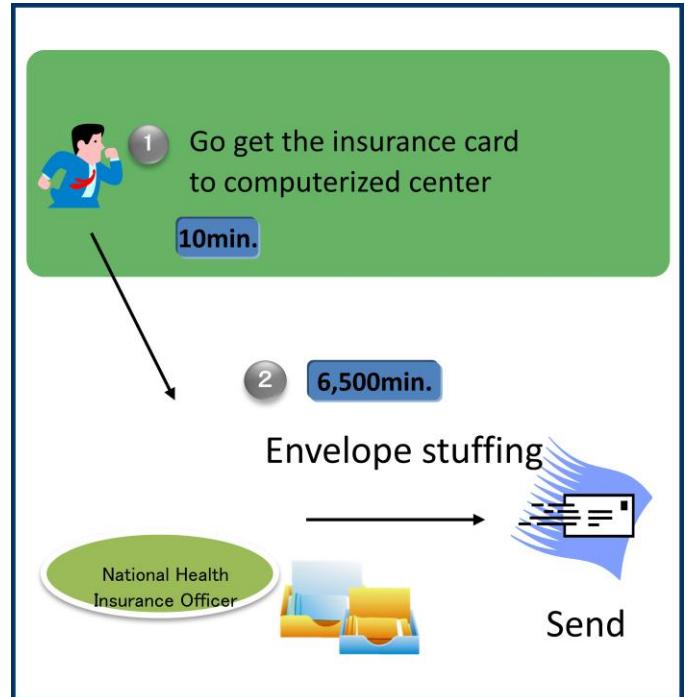


Fig. 14. Past business procedures for National Health Insurance Certificate (envelope stuffing) process.

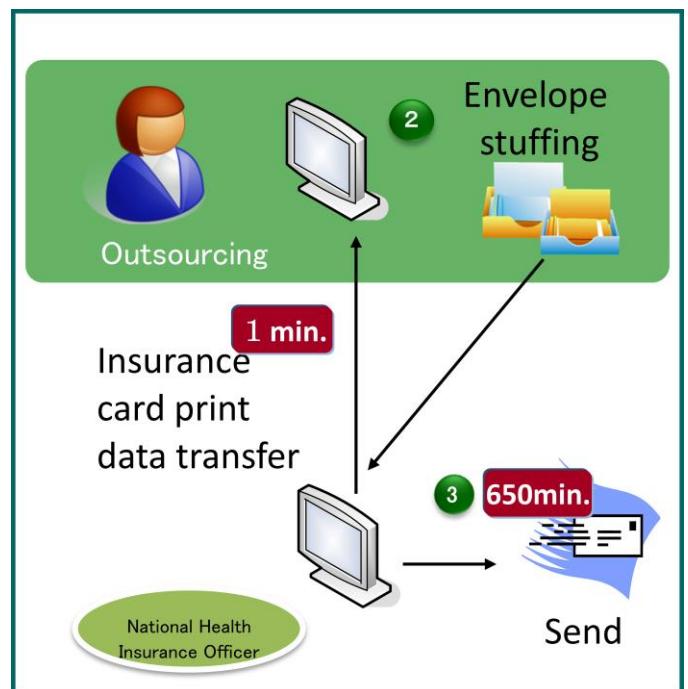


Fig. 15. Current business procedures for National Health Insurance Certificate (envelope stuffing outsourcing) process.

PC from birth to age from a general purpose computer, Office computer we used high-performance server and Web browser but its appearance began from Netscape, the appearance of so-called Web system, combining the goodness of client-server and benefits of centralized processing of general-purpose machine format system by it. It is getting to the system development of Web-based era. Also in the

development language, or JAVA used for Web-based and 3GL language, is speak in such as Visual Basic from the COBOL language. It has evolved to the language of HTML5 such as NET languages or the like is used, to accommodate the tablet computer configuration and Smartphone in recent years. In addition, the storage technology of beta also developed, I have done the evolution to an RDBMS ISAM File format.

The private companies that take full advantage of the evolution of such technology, the benefits of them, at all, another world different there. A division cooperation through it. It is at present the system that was developed in COBOL language on a general-purpose machine -based system is still a lot of running. Unbelievable sight is accepted without any thing in local government as a private company.

In addition, the procurement system, in information technology knowledge of the civil service is the side you are using poor, mental state of civil servants want to avoid the trouble of the time of system installation also the apprenticeship, information system of local government, remains the oldest it is a reality has become.

Meanwhile, the vendor side have developed provide a system of local governments, a system utilizing the latest technology with the times the system outdated in a way that is enough for the special circumstances of the municipality such optimized than making the state-of-the-art technology of JAVA, and the like COBOL is mixed development language for some reason she fixes little by little the system was developed in the era of the past, hardware though it is a Web era, RDBMS is ISAM design database of thing to use is the present conditions have been created and will remain in the file, the system malformations, local governments without also have a choice of special for the products most vendors are similar , using the system of existing vendors it is placed in a situation where it is not forced to.

Moreover, no such copyright to the system in the past, database design document or design document that the system is in short supply, and help seeking data migration support to existing vendors when changing to other vendors from the vendor of the existing is not obtained, it is causing such case to be in trouble will be prompted to data migration cost a lot of money in many cases, a variety of problems in that case.

Under such circumstances, in order to save the information system cost municipal, and using the method to say municipalities cloud as a country, and is apparently trying a joint of the system of the municipality. Of course, we can expect the effect even moderate order to interoperate systems municipalities as talking at the beginning. But if you think about the information system of local government with much trouble, municipality of 1700 have much more to take advantage of the local government cloud vendors' systems, development and co-operation. There is also cautious to say information system development projects of local government if there are no, to give a serious blow to the IT industry in the part.

The joint-use integration and ultimate local government system of these, same sex cannot be denied a big blow to the

IT vendors that can not only support the business model until now certainly. However , it can be said that also have a runaway to a specific industry the taxpayers on the other hand , and they will want to mass-produce IT vendors settle for work low level as a result, competitiveness falling international when IT companies it means that it away.

### III. CONCLUSION

Case study on validation of effeteness of Business Procedure Reengineering: BPR for local government in Saga prefecture, Japan is conducted. As the results, if it found that BPR is effective.

In 2013, the government, environment established a government CIO room introduction of a number system was a long-cherished wish is determined, it is possible to promote e-government and e-municipality and the banner of great incredibly plan called "world-leading creative nation" is being put into place some. We would like you to realize the municipality a cloud can be enhanced administrative services to pour our best to take this opportunity, give the impression to the residents as possible; the operational efficiency of the civil service, the foundation is reduced large flower IT costs.

As the results, it is confirmed that around 30 % of required processing time Business Procedure is reduced by BPR. In particular, systemized procedure from the manual base procedure is effective followed by media conversion from paper to electronics form, and personal information processing. On the other hand, it is also found that outsourcing is not so effective.

Meanwhile, resident information processing is the most cost effective by 41 % followed by national health insurance (32 %), and taxation business (28 %) processes

### ACKNOWLEDGMENT

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**Kohei Arai**, He received BS, MS and PhD degrees in 1972, 1974 and 1982, respectively. He was with The Institute for Industrial Science and Technology of the University of Tokyo from April 1974 to December 1978 also was with National Space Development Agency of Japan from January, 1979 to March, 1990. During from 1985 to 1987, he was with Canada Centre for Remote Sensing as a Post Doctoral Fellow of National Science and Engineering Research Council of Canada. He moved to Saga University as a Professor in Department of Information Science on April 1990. He was a councilor for the Aeronautics and Space related to the Technology Committee of the Ministry of Science and Technology during from 1998 to 2000. He was a councilor of Saga University for 2002 and 2003. He also was an executive councilor for the Remote Sensing Society of Japan for 2003 to 2005. He is an Adjunct Professor of University of Arizona, USA since 1998. He also is Vice Chairman of the Commission "A" of ICSU/COSPAR since 2008. He wrote 30 books and published 472 journal papers