<div align="center">博士論文審査報告書</div>

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論文題目	An Analysis of Business Process Reengineering in the Public Service Delivery System of the Government of Sri Lanka
	（日本語訳「スリランカ政府の公共サービス提供システムにおけるビジネスプロセスリエンジニアリングの分析」）
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〇論文内容の要旨

1. Summary of the Thesis

Sri Lanka's colonial heritage has a significant bearing upon the design as well and functioning of its public service apparatus. Despite being a British colony like many other countries in the region, Sri Lanka's society and government structure is a special case unlike many of its neighboring countries. I have attempted to put the case of BPR and PSD in a broader perspective, however this is a case with evidence and analysis related to original field data collected from public sector in Sri Lanka. While the data is unique, the model used and the findings are applicable to many other countries seeking improvement of PSD through BPR expecting improved efficiency of the public sector administration. Sri Lanka Administrative Services (SLAS - established 1972) is the successor to Ceylon Administrative Services (CAS – established 1963). CAS was, in turn, successor to a much older Ceylon Civil Services (CCS – established 1833). While the purpose of CCS was to help British colonial power to govern over its colony, SLAS has significantly different demands and expectations from its Sri Lankan clients. While, SLAS is one major public service provider in Sri Lanka, its functions are supplemented, and sometimes even duplicated, by layers of other offices, across several ministries and departments. It certainly has been a great challenge for SLAS, along with other departments and ministries, to deliver service in modern times with a design and functionality inherited from CCS. As a result of mounting expectations and demands of more modern, independent and highly educated populace,

SLAS and many other departments and ministries of Sri Lanka underwent a major BPR regime during the last decade. BPR regime, in this context, meant (i) structural reforms, (ii) regulatory overhaul, and (iii) better performance control mechanisms. These three measures were put in place as mainstay of the BPR regime in order to ensure an efficient delivery of public services. In this paper I analyze the post-BPR-implementation state of affairs and measure the efficiency of the service across 29 ministries and departments of Sri Lankan government through which most public services are delivered to the populace.

BPR is a continuous process instead of one time even, thus it is imperative that acontinuous IOI feedback process be carried on and thus allow innovation be incorporated into the process. This way of defining BPR takes account of two key areas important to our case i.e. fundamental rethinking and radical redesign. Two critical areas that stand out as prime targets for a BPR regime are: first, fundamental rethinking of the philosophy; second, a complete redesign of the structure of the business process in order to provide public service in an efficient manner. In Sri Lanka BPR process happened incrementally over many years by 2010, almost ten years have passed since various BPR measure were implemented. In the next section, I lay down the details of the data used and the methodology applied to estimate the outcome of the BPR. I conducted a two-pronged analysis of the situation as explained below.

1.1. The Data

A broad-based ground survey on a five-point Likert scale was carried out, and performance data was collected. Data was collected through a questionnaire-based field survey conducted across 29 departments and ministries of the Sri Lankan government. I collected a total of 290 responses—each questionnaire composed of 40 questions regarding the inputs and the outputs of the regime's implementation. The survey was conducted during the February and March of 2020. In total 290 respondents returned the completed questionnaire. The questionnaire was designed on 5-point Likert type scale with 5 meaning strongly agreed, 4 agreed, 3 neutral, 2 disagreed and 1 for strongly disagreed. Input questions were categorized into three areas of the regime i.e. (i) Structure, (ii) Rules, and (iii) Control and compared with the set of questions related to outcomes. The questions were deliberately planned per se to verify the inputs the outcomes of the BPR regime for PSD.

1.2. Stage I - Analysis

Using the data, a non-parametric data envelopment analysis (DEA) has been employed to

measure the performance of ministries and the departments denoted as decision making units (DMUs). A DMU's efficiency is depicted by the ratio of the sum of its weighted outputs to the sum of its weighted inputs. DEA is applicable to the case of both public and private sector entities. DEA has widespread use across a whole host of areas of public or private service provision industries. The data was analyzed using data envelopment analysis program DEAP Version 2.1 developed by Coelli (1996). DEA enables us to construct a non-parametric frontier over the input and output data and calculate the efficiency scores. I assess input-oriented constant return to the scale (CRS) and variable return to the scale (VRS) models to calculate technical efficiency and scale efficiency for 29 DMUs in our data. Using DEA, one can calculate each DMU's efficiency score, calculated in relation to an efficiency frontier. DMUs positioned on the efficiency frontier have an efficiency score of 1. DMUs operating below the frontier have an efficiency score lesser than 1. DMUs can also be used for benchmarking, as DMUs that fall on efficient frontier can serve as benchmark for the DMUs that fall below the frontier and hence peers at frontier can serve as guideposts for the slackers. A non-parametric DEA can be conducted both from an input orientation as well as from an output orientation in order to ascertain efficiency scores. However, for this very situation that we are dealing with input orientation will be most appropriate, as DMUs have control over only the inputs; public service DMUs are expected to provide a minimum level of service which is usually given and cannot be arbitrarily controlled.

1.2.1. Primary research questions – Stage I

The stage I analysis was conducted in order to evaluate the overall as well as unitary efficacy of the implementation of the BPR regime in the public services of the country. So we can identify the basic research question that needed an answer from the outcomes of the analysis. Those questions can be listed as;

・Has implementation of the BPR regime resulted in increasing the efficiency of the system as a whole?
・How disparate are the outcomes of the BPR regime across various DMUs of the government of Sri Lanka?

1.2.2. Outcomes - Stage I

The data analysis shows that 4 DMUs out of a total of 29 DMUs are efficient with reference to the scale. The disparity of the scale efficiencies can be attributed to the latent inefficiencies or lack of full implementation of the BPR regime across the DMU. Out of 29 departments and ministries, 12 are having IRS, meaning there is still a room to improve performance in order to achieve full-scale efficiency. 5 DMUs are faced with DRS meaning

there is a capacity to increase the scale of service delivery in order to achieve scale efficiency. Other 12 DMUs are in a state of CRS, including 4 DMUs (DMU14, DMU22, DMU27 and DMU29) who have achieved CRSTE, VRSTE as well as scale efficiency, adjusting the scale towards optimum scale we can enhance the level of efficiency. We can therefore safely conclude that out of 29 DMUs, 25 DMUs can increase public service delivery efficiency by adjusting the scale of their operations. Additionally, we have also prepared results on peer, groups, targets and slacks too and individual DMU results too.

1.3. Stage II - Analysis

In the second stage of the analysis, applying an ordered multivariate logistic regression model, I have estimated correlations amongst inputs, results, and overall perception of success or failure of the BPR regime across ministries and the departments (29 in total). I have also tabulated summary statistics and regression results.

The analysis also allows us to test the efficacy of IOI based systematic innovation ingrained in the regime. We can summarize the primary research questions raised in this paper as follows:

1.3.1. Primary research questions – Stage II

・What is the relationship amongst the various BPR measures (structure, rules and control) and the outcomes (effectiveness) of the BPR regime in total?
・How are the outcomes perceived by employees, i.e. level of agreement/disagreement level of effectiveness of the BPR?
・How correlated are the BPR measure per se to understand the inner structure of the BPR measures?

1.3.2. Outcomes – Stage II

The outcomes suggest that while all inputs and outputs are significantly correlated, some inputs have a more significant effect on the results expected from the BPR regime. I have used original data acquired through a survey carried out directly through the PSD organizations in the country, and this study is the first of its kind in this regard. expect this study will be of high utility to the personnel engaged in the planning and implementation of PSD. Through systematic innovation and BPR, not only in Sri Lanka but also for many other professionals and researchers who are engaged in designing and execution of similar service improvements and reengineering strategies in different countries around the world.

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○論文審査結果

①テーマ：学術的・社会的意義を明確に意識したテーマ設定がなされているか

Ms. Wijeratne Elapatha Vishakha gave a satisfying explanation of the academic and social significance of the thematic aspects of her research. The candidate explained the academic and social importance of the thesis topic with ample references and examples. The theme was related to the concept of social welfare that results from the better and more efficient provision of public services through business process reengineering (BPR) related to public management. The thesis data and the problem sets are about the situation related to the public service structure of Sri Lanka. BPR regime, in this context, meant (i) structural reforms, (ii) regulatory overhaul, and (iii) better performance control mechanisms. These three measures were put in place as a mainstay of the BPR regime to ensure efficient delivery of public services. The candidate analyzes the post-BPR implementation state of affairs and measures the efficiency of the service across 29 ministries and departments of the Sri Lankan government through which most public services are delivered to the populace.

②研究の位置づけ：先行研究や関連研究が幅広く十分に渉猟され、的確に理解されたうえで問題設定がなされているか

Ms. Wijeratne explained that sufficient literature had been examined and, in the process, explained that the study was appropriately positioned. The candidate asserted that BPR is a continuous process instead of a one-time event; thus, a continuous inside-outside-inside (IOI) feedback process must be carried on and thus allow innovation to be incorporated into the process. This way of defining BPR takes account of two key areas critical to the case, i.e., fundamental rethinking and radical redesign. Two critical areas that stand out as prime targets for a BPR regime are: first, a fundamental rethinking of the philosophy; second, a complete redesign of the structure of the business process in order to provide public service efficiently. In Sri Lanka BPR process happened incrementally over many years; by 2010, almost ten years had passed since various BPR measures were implemented. The candidate conducted a two-pronged analysis of the situation and explained that relevant empirical evidence was investigated and included in the thesis. The examiners reconfirmed such explanations given by the candidate by examining the thesis submitted. They found that the facts described by the candidate were mentioned at length in the thesis, upon which they concluded that the explanation was satisfactory. The examiners were satisfied by the explanation and concurred that the candidate had made minor textual improvements by the final examination, as advised in the preliminary examination. In this regard, the examiners did discuss the material amongst themselves

and concluded that the thesis was well written and met the standards of academic thesis writing.

③論文構成・体裁：テーマに沿って問題が適切に設定され、一貫した論述が展開された上で明確な結論が論理的に導きだされているか

The examiners agree that the description of the research questions was consistent with the topic of the thesis. The candidate divided the related research questions and the analysis into two stages. The stage-I analysis was conducted to evaluate the overall and unitary efficiency of the implementation of the BPR regime in the public services of the country. The stage-I fundamental research question can be listed as;

- Has the implementation of the BPR regime increased the efficiency of the system as a whole?
- How disparate are the outcomes of the BPR regime across various DMUs of the government of Sri Lanka?

  In the stage-II of the analysis, the candidate applied an ordered multivariate logistic regression model. The stage-II research questions are;
- What are the relationships amongst the various BPR measures (structure, rules, and control) and the outcomes (effectiveness) of the BPR regime in total?
- How are the outcomes perceived by employees, i.e., level of agreement/disagreement level of effectiveness of the BPR?
- How correlated is the BPR measure per se to understand the inner structure of the BPR measures?

The examiners also questioned, discussed, and confirmed the "placement of research" in the greater body of knowledge. The candidate explained that the topic is about improving public service delivery through better public management. Public management is a subfield of an extensive management theory. Examiners also raised specific questions regarding efficiency in providing public services. As a result of lengthy discussion and cross-examination, the examiners concluded that the candidate's response and references laid down in the thesis were acceptable and relevant.

④研究方法：テーマおよび問題設定にふさわしい研究方法が選択されているか／資料の取り扱いや分析結果の解釈は妥当か

In the final exam presentation and in the thesis, the candidate explained the data and the research methodology applied in the research. The candidate explained that a broad-based ground survey was carried out on a five-point Likert scale, and performance data was collected. Data was collected through a questionnaire-based field survey conducted across

29 departments and ministries of the Sri Lankan government. The candidate collected a total of 290 responses - each questionnaire composed of 40 questions regarding the inputs and the outputs of the regime's implementation. The survey was conducted during the February and March of 2020. In total, 290 respondents returned the completed questionnaire. The questionnaire was designed on a 5-point Likert scale with 5 meaning strongly agreed, 4 agreed, 3 neutral, 2 disagreed, and 1 strongly disagreed. Input questions were categorized into three areas of the regime, i.e. (i) structure, (ii) rules, and (iii) control, and compared with the set of questions related to outcomes. The questions were deliberately planned per se to verify the inputs and the outcomes of the BPR regime for public service delivery (PSD).

The examiners also asked details about the research questions raised and answered in the thesis by the candidate. The candidate described the analytical techniques and statistical software used to analyze the data used in the study. Using the data, a non-parametric data envelopment analysis (DEA) has been employed to measure the performance of ministries and the departments denoted as decision-making units (DMUs). A DMU's efficiency is depicted by the ratio of the sum of its weighted outputs to the sum of its weighted inputs. DEA applies to the case of both public and private sector entities. DEA has widespread use across many areas of public or private service provision industries. The data was analyzed using the data envelopment analysis program DEAP Version 2.1 developed by Coelli (1996). DEA enables constructing a non-parametric frontier over the input and output data and calculating the efficiency scores. The candidate assessed input-oriented constant return to the scale (CRTS) and variable return to the scale (VRTS) models to calculate technical efficiency and scale efficiency for 29 DMUs in the data. Using DEA, one can calculate each DMU's efficiency score, calculated in relation to an efficiency frontier. DMUs positioned on the efficiency frontier have an efficiency score of 1. DMUs operating below the frontier have an efficiency score lesser than 1. DMUs can also be used for benchmarking, as DMUs that fall on efficient frontier can serve as a benchmark for the DMUs that fall below the frontier, and hence peers at frontier can serve as guideposts for the slackers. A non-parametric DEA can be conducted both from an input orientation or from an output orientation to ascertain efficiency scores. However, for this very situation, input orientation was considered most appropriate, as DMUs have control over only the inputs; public service DMUs are expected to provide a minimum level of service, which is usually given and cannot be arbitrarily controlled.

The candidate also answered some questions asked by the examiners regarding the data collection methods and the questionnaires used in the survey. Overall, the examiners found the candidate's explanation appropriate and satisfactory. Examiners carried out a deep

reading and confirmation of the data, the analytical methods, and relevant materials (data sheets and appendices, etc.) attached with the thesis. As a result, the examiners are amply convinced that the thesis presents a significant improvement in the body of knowledge and research related to public management and public services delivery.

⑤新規性：テーマや問題設定、研究方法や結論等に、学術的・社会的に注目すべき新規性が認められるか。

Through stage I, the data analysis shows that 4 DMUs out of 29 DMUs are efficient with reference to the scale. The disparity of the scale efficiencies can be attributed to the latent inefficiencies or lack of full implementation of the BPR regime across the DMU. Out of 29 departments and ministries, 12 have increasing return to scale (IRTS), meaning there is still room to improve performance to achieve full-scale efficiency. 5 DMUs are faced with decreasing return to scale (DRTS), meaning there is a capacity to increase the scale of service delivery in order to achieve scale efficiency. Other 12 DMUs are in a state of CRS, including 4 DMUs (DMU14, DMU22, DMU27, and DMU29) who have achieved CRTS technical efficiency, VRTS technical efficiency, as well as scale efficiency; adjusting the scale towards optimum scale one can enhance the level of efficiency. Therefore, it can be safely concluded that out of 29 DMUs, 25 DMUs can increase public service delivery efficiency by adjusting the scale of their operations. The candidate also prepared peers, groups, targets, slacks, and individual DMU results.

At stage-II, the outcomes suggest that, while all inputs and outputs are significantly correlated, some inputs have a more significant effect on the results expected from the BPR regime. As the candidate has original data directly from the PSD organizations in the country, and this study is the first of its kind in this regard, it is expected that this study will be of high utility to the people engaged in the planning and implementation of PSD through systematic innovation and BPR. This should be true not only for Sri Lanka but also for professionals and researchers engaged in designing and executing similar service improvements and reengineering strategies in different countries around the world. The candidate also made a strong case that the thesis results are applied. Moreover, the candidate asserted that if the dissertation proposal is implemented, the country and society, in general, will benefit from better and more efficient public services. The candidate also explained how the questionnaire, the data, and the analytical approaches used in this study should be of interest and utility for academia in general too. In conclusion, the examiners agreed that the data used in the paper was original and very practical in its nature and composition. They also concluded that analytical methods in public management are novel and of practical utility, especially in the country under study, i.e., Sri Lanka.