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Insourcing A Government Information System

An analysis using institutions and the capability approach

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Abstract — **This study explores the effectiveness of insourcing in the Malaysian Government. The research discusses the factors and issues of insourcing in a Malaysian government agency in the context of post contract termination of an outsourcing agreement. A qualitative research method was conducted by using semi-structured interviews based on the OPTIMISM approach in designing the interview questions. The number of respondents was 21 government servants, from top management to programmers. We used a combination of institutional theory and the capability approach to analyse the data. We found that insourcing could enhance the skill and knowledge of the government's IT officer by using potential opportunities and systematic training approach that are presented despite challenges such as lack of ICT infrastructure, the high-level system complexity, lack of recognition from the government and complicated business process. We envisage that as insourcing evolves over time, participation and responses from large organisations that provide direct services to the citizen would represent the practice of insourcing as a whole. These findings will be of interest to the research community interested in insourcing information system support.**

Keywords - *insourcing; institutional theory; capability approach; semi-structured interviews; OPTIMISM*

I. INTRODUCTION

Government information systems are large and complex and help government officers to monitor and control the function, resources and other responsibilities in the public organisation [1]. They play an important role in ensuring that the organisation delivers information and communication services needed by the civil servants [2]. Therefore, there are three types of approach for developing a complete government information system that is insourcing, outsourcing and co-sourcing. However, outsourcing is the preferred approach by organisations because it can reduce costs, and the risks related to business and technology where an organisation can focus on core capabilities [3]. As government information systems are large and complex, the system development should be developed which fulfills the specific requirements of stakeholders.

As there are comparatively few studies that address insourcing, many researchers want to focus on outsourcing an information system in the organisation [4]. Outsourcing can be defined as an appointment of a third party service provider or a vendor to perform and complete the task for the management within a specified length of time (pp. 4) [5]. Therefore, Schniederjans et al. [6] defined insourcing as internal sourcing of business activities by allocating or re-allocating of resources internally within the organisation. This research contributes to the literature by investigating the factors and issues of insourcing a government information system and its implementation by public organisations. The research question this paper addresses is: **How can we determine the factors and issues affecting an organisation after termination of the outsourcing vendor using institutions and the capability approach?** Furthermore, this research studies the organisation's action to insource a large system with a large number of users, and explores the system's performance four years after the vendor's contract terminated. A qualitative research method was conducted in the selected Malaysian government agency to acquire empirical evidence by using semi-structured interviews based on the OPTIMISM (Objective and Values; Process; Technology; Information; Management System and Structure; Investment Resources; Staffing and Skills; Milieu) approach by Bass & Heeks [7] to explore more on the role of organisation and staff. The number of respondents was 21 government servants, from top management to programmers.

A brief literature review of the problem domain is discussed in the next section about related work in insourcing and then followed by an analytical framework by using the institutions theory and the capability approach. In section four, the use of a research methodology will be explained. While the findings are presented in section five and section six, the paper discusses insourcing an information system in the public organisation. Finally, the conclusion and further work are explained in section seven.

II. RELATED WORK

System development plays an important role to make sure the systems in the organisation can be adopted and implemented successfully according to the stakeholders' requirements. A government information system is a system owned by the government in providing services to government servants in particular and the public in general that can be seen as enhancing the access, transparency, efficiency, and quality of public administration [8]. However, the development of government information systems is subject to legal and formal

constraints which are often influenced by the political vagaries of changing administrations [9]. Thus, the overall system development should be carried out thoroughly because the government information systems are very complex and complicated.

As previously mentioned, there are three types of ICT project development and implementation, namely insourcing (internal personnel and expert); outsourcing (external services); and co-sourcing (external services with internal expert) [10]. Insourcing an information system is the use of internal IT officers (in Malaysia, government staff members who are graded above clerical staff are titled officers) to continue the system development and maintenance. As Malaysia provides low costs of labor and taxes, good infrastructure, business environment and high levels of global integration [11], organisations in Malaysia prefer to outsource the information system.

In order to reduce dependence on vendors in system development, competencies of the IT officers are an important factor in insourcing to ensure the officer has up-to-date knowledge and skills. Thus, if the software architecture is well-defined and clearly documented, insourcing can provide constant service in a timely manner because the system is managed by internal officers who are responsible, trustworthy and familiar with an organisational policy and regulation [12]. As stated by Ahonen & Savolainen [13], the software engineering project can be cancelled due to the unavailability of experienced people. Therefore, the firm should develop the IT-related resources with the officers as part of their core competencies to achieve the strategic plan through IT investments [14]. However, the success of insourcing adoption in the organisation is closely related to who evaluates the performance of information systems which depends on the stakeholders' expectation and perceptions.

III. Institutions and The Capability Approach

North [15] defined the institutions as the rule of the game in a society that evolves through time and shaped by institutions change and Scott [16] defined institutions as "*comprised of regulative, normative and cultural cognitive elements that, together with associated activities and resources, provide stability and meaning to social life*" (pp. 48). Organisational decisions are not only driven by goals of efficiency, but also influenced by social and cultural factors and concerns for legitimacy [17]. Thus, a combination of certain social norms, cultures, structures, and routines by the organisation would lend support to the achievement of its mission and goals.

The capability approach can be defined as a basic concern about human development of what their capability, responsibility, and the opportunity can do and be [18]. Whereas, Robeyns [19] stated that the capability approach has a broad normative framework for the evaluation and assessment of individual well-being and social arrangements that give some influence in the design of policies and proposal about social change in society. However, the capabilities approach is difficult to identify, which is detrimental to the freedoms of others either physical or psychological harm. It

also queries which course of action is better, it could be better in some area or group but worse for others [20]. Nevertheless,

In this research, the combination of institutional theory and the capability approach is to see the different perspective of institutions, capabilities and technology into a framework which is developed to create a model of insourcing a government information system. The analytical framework can model factors which inhibit or enable individuals from taking full advantage of ICT resources. The relationships between technology and institutions and how institutions recommend government information system will be studied by using the framework to their cultural, social and institutional features [21]. Institutional theory focuses on social and organisational factors, whereas the capabilities approach is focused on individual capabilities and their welfare.

By combining top-down and bottom-up perspectives into a framework, we gain unique insights into our field in a study in which a "top-down" perspective of institutional theory provides the rules and norms used to regulate interactions and transactions in society, whereas a "bottom-up" perspective by the capability approach is the starting point that gives consideration to individuals' opportunities to achieve their wants and needs [22].
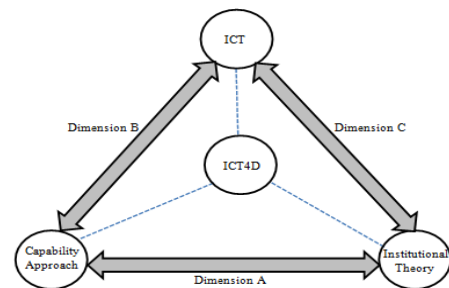

Figure 1. Institutional theory, the capability approach and ICT

The goal of a government information system can be affected by technology, the capabilities and institutions as shown in Fig. 1. The influences or effects can be either positive or negative between institutions and capabilities; institutions and technology; technology and capabilities. The positive influence can be referred to as an exciter and negative influence as an inhibitor.
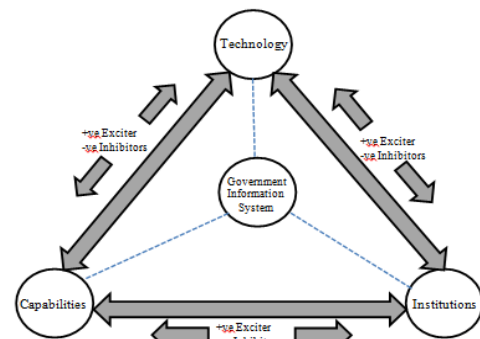

Figure 2. Exciters and Inhibitors

We have proposed an analytical framework by using the institutional theory and the capability approach that links

institutions, capabilities and technology in Fig. 2. The institutional theory and the capability approach have their own substantial body of literature, which must be accessed and understood. The capability approach was derived from Sen [23], in which a good relationship between welfare economics and modern ethical studies can enrich and benefit both disciplines. Institutional theory has two substantial themes; derived from neoclassical economics, and the emergence of sociology and political science which are more in use and broader [16]. The new institutional theory focuses more on the cognitive aspects of institutions that stress the nature of social reality. Therefore, combining institutional theory and the capability approach would share the same common measurement and complement the body of research in the change process of development and technology.

IV. METHODOLOGY

We use a case study to perceive the applicability of the framework, and the investigation of this research is outlined in the form of 'institutions', 'capabilities' and 'technology'. Thus, a qualitative research method was conducted by using a semi-structured interview technique to gather the data. This method is useful to get richer data from the user's experience and open in posing questions to the interviewees. Moreover, it encourages the interviewee to talk freely and can allow the researcher to be responsive to relevant issues raised spontaneously by the interviewee [24].

A. Research Sites

This research is an additional data collection and was conducted in March 2015. Data were obtained and analysed from a central government agency (Organisation A) in Putrajaya, Malaysia with the total of 21 interviews as shown in Table I. Organisation A was selected because it manages a large government information system on the aspects of human resource management called Human Resource Management Information System (HRMIS). Initially, the system was developed by the vendor since 1999 and the system was taken over by Organisation A in 2011 to continue the development and maintenance of the system.

TABLE I. PARTICIPANTS AND JOB TITLES

DATE	INTERVIEWEE JOB TITLES	NO
20 MAR 2015	DIRECTOR	1
5 MAR 2015	SENIOR TECHNICAL OFFICER	1
2 & 3 MAR 2015	SENIOR MANAGEMENT OFFICER	2
2 – 5 MAR 2015	SENIOR SYSTEM ANALYSTS	5
2 MAR 2015	MANAGEMENT OFFICERS	2
2 MAR 2015	TECHNICAL OFFICER	2
4 MAR 2015	SENIOR PROGRAMMER	1
4 MAR 2015	ASSISTANT TECHNICAL OFFICERS	2
2 – 5 MAR 2015	PROGRAMMERS	5
	TOTAL	21

B. Data Collection

This study is an additional data collection; the interview questions were designed based on the OPTIMISM approach [7] in order to obtain a broader and deeper approach to the research. This study uses empirical data from 21 face-to-face semi-structured interviews conducted in March 2015. The breakdowns of interviewees from the Malaysian government agency are as in Table I, and participants were assured that any data used for publication will be anonymized.

The interviews were conducted in Malay in their office premises and transcribed in the Malay language. However, the data have been coded and categorized in English. The average interview lasted between 30 – 45 minutes and all the interview sessions were audio-recorded by using a tape-recorder. The interviews were then carefully transcribed, and the audio records were listened to many times and the transcripts inspected for errors to ensure their accuracy.

C. Data Analysis

Yin [25] explained that the process of data analysis is to produce empirically based findings from data collected which involves examining, categorizing, tabulating, testing, or otherwise recombining the data. Thus, the recorded interview should be transcribed, reviewed, analysed and coded [26] and subjected to an iterative multi-step process of data analysis. The research process started with the framework that describes the institutions changes, individual capabilities and technology events associated with the government information system. Subsequently, the data were examined closely, compared for relations, similarities and dissimilarities found in the transcriptions by breaking the data down into pieces.

The open coding method was used to analyse the data which involved using key point coding to create tentative labels for chunks of data. According to Walker & Myrick [27], in the concept of open coding, interview transcription was analysed line-by-line in many ways and memos created in order to explain the conceptual and theoretical ideas that emerge during the analysis. This process was an interactive process by using constant comparison in order to study all the issues arising that can be grouped into categories representing common themes. Table II gives a preview of some of the key-points and codes generated from selected interview transcripts.

TABLE II. A PREVIEW OF THE KEY-POINTS AND CODES

OPEN CODE	PROPERTIES	EXAMPLES OF TRANSCRIPT
Complexity of System	Modules Large data Migrating from VBScript to JavaScript	Complicated system Integrated among the modules Embedded with General Order and policy
Enhancing Technical Skills	Sharing knowledge and experience Multitasking job Migration process	Sharing new ideas with outsiders Done a lot of task or work Train the officer to be an expert
Management style approach	Project-based approach Project-based attachment Progress Updating	Cross the border of unit or section Group of officers Gather officers from different unit or section

V. FINDINGS

In this section, we consider the case study data through the lens of the analytical framework by using the institutions

theory and the capability approach in dealing with insourcing a government information system. The exciters and inhibitors in each direction on all three dimensions are illustrated and presented on Fig. 3. The findings are outcomes of the analysis carried out as shown in the data analysis section mapped to the framework and they form the basis for the contributions of this paper.
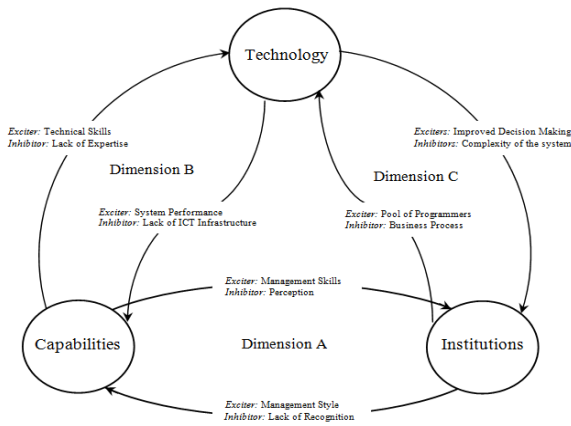

Figure 3. Summary of Findings

A. Management Style (Dimension A)

Management style is an important aspect in the organisation to make the right decision to make sure the organisation's goals and mission can be achieved. Changes in the organisation's leaders also have an impact on the management style as mentioned by the [*Interviewee3*]; the approach used by a new director is different from that used by the former director, in which the new director uses a project-based approach, *"it will be based on project, no more based on unit or section. His (new director) concept, if there is a project; gather all the people from every unit… form as a team"*. The concept of a project based approach was also agreed by the [*Interviewee6*] in that this approach can help the officer become more responsible and accountable in their work, *"it (project-based approach) creates accountability for every one because you have a specific role"*. [*Interviewee10*] also supported the statement by claiming, *"in term of system development, of course it must have a team, not in silo"*. A good management style practiced by the leader can reduce the conflict between institutions and capabilities as well as building commitment and consensus among employees.

B. Technical Skills (Dimension B)

Technical skills among technical officers and programmers have improved since the termination of vendor in 2011. Technical officers and programmers have to learn by themselves in order to enhance their skills and knowledge in technical and programming language as stated by [*Interviewee2*], *"When we have to do it by our self, we have to survive… so, we improve ourselves"* Through experience, training and knowledge sharing, the skills and knowledge of programmers enhance over time as stated by [*Interviewee6*], *"they might upgrade the skill after doing a lot of programming"* and this can be proved by the statement of

[*Interviewee8*] that most of the modules in the HRMIS2.0 were developed by internal programmers*, "For the next second submission of HRMIS2.0, most of the modules developed by our programmers because they already understand the chronology of HRMIS"*.

C. Pool of Programmers (Dimension C)

Pool of programmers is a concept that helps to speed up the development process because the programmers have a common and equivalent work. At the implementation of insourcing in the organisation, this concept to put all the programmers in one unit can help the organisation to manage the programmers more effectively and efficiently as mentioned by [*Interviewee6*] *"I would prefer a system of pooling talent. Programmers right now are pool. That's good because you can manage your resource much better"*. Besides that, programmers are not bound to any modules or system which any available programmer can be assigned to develop a system as stated by [*Interviewee18*] *"it much easier if we are pooling the programmer. So, if we want to develop a system, we can use any available programmer"*. It also can balance the workloads amongst the programmers as claimed by [*Interviewee8*] *"I can see the pool system is good because the workloads amongst the programmers are balanced"*. The pooling approach can enhance the skills and knowledge of programmers, especially the development of a complete system because programmers are not tied to any specific module or system.

D. Complexity of the System (Dimension C)

HRMIS (Human Resource Management Information System) is a large system that requires a large database to accommodate a total of 600,000 active users from a total of 1.4 million civil servants in Malaysia. Moreover, the data might be more than that because the data cannot be deleted until the civil servant is dead. As mentioned by [*Interviewee3*], *"HRMIS is quite complicated because the system starts from the appointment date until retirement date of the officer"*. As HRMIS is a large system, it is a complicated system that combines a variety of systems related to human resource management such as leave management, payroll system, claim, career management and so on as mentioned by [*Interviewee8*], *"if you compared a system at the other agencies or ministries, they have a leave management system as a system and a payroll system as one system but for HRMIS, we called it as a module which each module has a few sub-modules… each sub-module can be representing as a complete system"*. Apart from that, HRMIS is also driven by the policy and circular of human resource management as stated by [*Interviewee14*], *"The system is driven by the process of GO (General Order)…. We develop the system based on the General Order compared to other system"*.

E. Lack of ICT Infrastructure (Dimension B)

Lack of ICT infrastructure in government agencies can make the system difficult to access more effectively and efficiently. Therefore, network connectivity and ICT

infrastructure in the government agencies are the main concern in this study because with technology advancing rapidly, government agencies in rural and remote areas still have problems with infrastructure as mentioned by *[Interviewee3]* *"they blame us for not being able to access the HRMIS but when we looked at the problem, it turned out that the problem was with their networks"* and her statement was supported by *[Interviewee11]* *"it does not mean HRMIS has failed, but maybe because the network has failed"*. There are still some government agencies who are still using outdated ICT equipment as specified by *[Interviewee17]* *"still use the desktop with big CRT and slow RAM which we cannot find here... the agency needs to take action on that matter, we cannot do anything"*.

F. Cost (Dimension A, B and C)

Cost plays an important role in the system development and maintenance that can influence the implementation of insourcing in the organisation. As the cost of outsourcing for managing the vendor and system maintenance is increasing every year as mentioned by [*Interviewee1*] *"the management of outsourcing became more and more complicated and difficult and the cost of outsourcing actually continued to increase"*, the implementation of insourcing can help to reduce the government expenditure in the system development and maintenance as stated by [*Interviewee19*] *"It was mentioned in the meeting that when HRMIS was taken over from the vendor, it saved a lot of government expenditure"*. Furthermore, the cost of system development is a long term investment as added by [*Interviewee1*] *"it (system developed by the vendor) is just too expensive to get somebody to do it (system) for you because it's not a one off investment... it's a long term investment"*. Besides that, the training cost for staff also contributes to the adoption of insourcing in the organisation, as training provided by the external will be more expensive compared to in-house training and depends on the number of participants as mentioned by [*Interviewee10*] *"if the training is less than 10 people, it saves if we send them to external trainer. We will do the in-house training if more than 10 people"*.

VI. DISCUSSION

In this section, we will discuss management style in Dimension A, technical skills in Dimension B and complexity of the system in Dimension C in the light of the combined framework presented in section two.

Management style approach in Dimension A. The management style approach is a vital aspect in the organisation to make sure the goals and mission can be achieved as planned. Project-based systems introduced by the new director can enhance the skill and knowledge of IT officers because the project team member has clear responsibilities and can focus solely on the project until the task is completed. Moreover, it can create good team work and high cohesion in which team members share the common goal of the project. Previous research has documented that a leader should be a successful problem solver in order to empower and motivate their subordinates as well as manage resources efficiently and effectively. An effective leadership should also have emotional and social competencies, intellectual competencies, and managerial competencies [28]. From the studies, we can agree that a good leader should also be a good problem solver, but a leader also should have an appropriate knowledge of and a background in ICT as well as good management skills in order to monitor and control the ICT project. The findings that contribute to this research are that the leader should be furnished with good technical and management skills that support the acceleration of the implementation of insourcing in the public organisation.

Technical skills in Dimension B help to enhance the competency of IT officers and programmers in programming language, methodologies, software architecture and database. Hussein et al. [29] indicated that the competency of an Information System (IS) professional could make a significant contribution to IS success, especially in solving the technical problems faced during the IS implementation period. Another study from Byrd & Davidson [30] found that IT personnel should have not only technical skills, but also should be well-rounded together with technology management, business knowledge and management knowledge. Based on the studies, we could agree that appropriate technical skills among IT officers and programmers could help the organisations to build a successful system. Therefore, contributions for this research show that government should provide adequate training and support during the development, implementation and maintenance of the system which encourage the employee to use new technologies in order to enhance skills and knowledge.

Complexity of the system in Dimension C. A complex system cannot be developed in a short time because it requires scrutiny to ensure that the system's user requirements are met and the system is easy to use. According to Gichoya [31], the organisation should not underestimate the complex environment of an ICT project because the rapid evolution of ICT technology could make it impossible for the system to be completed in time. In addition, Cordella & Bonina [32] stated that the government should pay more attention to the complexities of ICT developments, especially in the implementation process to focus on the potential consequences of the transformation of the relationship between the citizens and the state regarding shared expectations about the government's actions. Hence, we agree with the studies, but based on our result the complexity of the system is due to the integration of many modules and changes of policy in human resource management. Thus, this contribution, complexity of the system is different depending on the requirement of stakeholders, the service provided and the demands of the users or within the organisation.

VII. CONCLUSION

This study is focused on a large government information system in Malaysia. While most research focuses on outsourcing, this research investigates a large system in the context of post contract termination of an outsourcing agreement.

By using a combination of institutional theory and the capability approach, all information was gathered and

analysed to map to the analytical framework. Thus, this analytical framework helped to identify the six exciters and six inhibitors of insourcing a government information system and its implementation by public organisations. This framework also indicated that insourcing a government information system will give a positive impact on the government in the long run.

From the findings, the management style approach by a leader plays a vital role to make sure the system development and implementation fulfil the stakeholders' requirement. Technical skill is a factor to improve skills and knowledge in programming language, methodologies, software architecture and databases that contribute to enhancing the capability and quality of IT officers and programmers. Nevertheless, the system complexity is an issue for insourcing an information system because it can cause delay due to the system development need for longer periods of time and frequent budget overruns. Furthermore, it becomes complicated when the policy and regulations of human resources keep changing and updating which involve business processes and require an exchange of information.

A limitation of this research is the difficulty to understand both institutional theory and the capability approach because each has its own substantial body of literature which must be accessed and understood. For example, project costs do not neatly map to the analytical framework because they can be mapped into all dimensions in the framework. As further work, we propose to obtain more participation, responses and data from large public organisations to explore and investigate how the organisational and technological factors will influence the implementation and represent the practice of insourcing as a whole.

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