

# After IT Outsourcing: An Exploratory Research of an Agency of Taiwan from the Perspectives of IT Personnel's Ability and IT Budget Allocation

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**ABSTRACT**— *Building an Information System is essential for achieving the goal of implementing Electronic Government (E-Government). Outsourcing has become the strategy for Taiwan government in terms of building the Information Systems. Sixty percent of the Information Technology (IT) budget for Taiwan government was spent on maintaining and operating the information systems built by the contracting companies in 2014. The ability of IT personnel and IT budget allocation for a government agency may have an impact on the operation of the information system. However, there is limited literature about it. This exploratory research used in-person observation and In-depth interviews to study an information system inside X agency of Taiwan government. This study found that since the IT personnel in this agency did not involve in the development of the system, even though the IT personnel in this agency had sufficient technical skills, the lack of knowledge of technical details of the system weakened their ability to operate and maintain the system. This study also found the limited budget made operation cost a priority over system upgrades. The insufficiency of technical knowledge of system not only impair the normal operation of system, it also made adequate budgeting for IT department difficult. This study provides practical solution and recommendation for future researches.*

**Keywords**— E-Government, Information Technology Outsourcing, IT Personnel, IT Budget Allocation

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## 1. INTRODUCTION

E-Government has been an important issue for all the countries in the world [1, 2, 3]. According to the investigation by United Nations in 2014 [4], all of its member countries have implemented certain degree of e-Government. The investigation report in 2016 showed that the number of countries implementing one-stop platform to provide public services has increased tremendously. It is commonly agreed that information and communication technologies and e-government are extremely important to achieve governments' Sustainable Development Goals (SDGs). Using the technologies to build information systems is part of reaching the goal of e-Government [5].

Information systems for any organization can be either built by internal IT staff or outsourced. The advantages and disadvantages of outsourcing have been widely discussed in the literatures. However, the discussion about the challenges the organization faces after the outsourced system is developed and delivered is very scarce. This is an unfortunate since outsourcing has become an international trend and even become a policy for Taiwan government [6]. Within the 11.9 billion US dollars IT budget for Taiwan government in 2014 [7], 60% of it was spent on the operation and maintenance of the information systems [8]. Therefore, we think there should have been more attention paid to the operation of information systems. This study focuses on how IT personnel's ability and budget allocation affect the operation of information system built by outsourcing contractors. It may lay a foundation for future researches.

## 2. LITERATURES REVIEW

### 2.1. e-Government

The term, "Electronic Government, e-Government", appeared first time in the part of "Reengineering through Information Technology", accompanying Report of the National Performance of USA, 1993 [9]. The report announced

Information Technology (IT) was the way to implement e-Government. After that, the literatures researching e-government have been accumulated enormously. E-government can be defined as government organizations use Information and Communication Technologies to improve government efficiency and public service quality to its citizens [e.g., 10, 11, 12, 13, 14, 15, 16]. Building information systems is an important method to implement e-Government.

## 2.2. Taiwanese e-Government

According to National Development Council website of the Republic of China, Taiwan government started to promote e-government since 1998 [17]. Phase one was to build government's network infrastructure, develop networks to connect citizens and administration application from 1998 to 2000. Between 2001 and 2007, the focus for phase two was to establish information systems within government organizations. Phase three was to integrate the services among government organizations between years 2008 and 2011. Phase four emphasized on one-stop service model from year 2012 to 2016. Starting from year 2017, e-government will be undergoing redesign in accordance with data-driven model.

The achievements of Taiwan government to establish e-government have gained international recognition. In the 2015 report on e-government by Waseda University of Japan, Taiwan was ranked as 10<sup>th</sup> in the world. According to the global assessment by World Economic Forum (WEF) in 2013, Taiwan was in the top 10 countries. Open Knowledge Foundation ranked Taiwan No.1 in terms of Open Data Index in 2015 [17]. It is obvious that the scale of Taiwan's e-government has been expanding significantly.

With the policy of outsourcing in place in recent years [6], and the dominant 60% budget allocation for operating the information systems after development and delivery [8], it becomes an increasingly urgent issue for Taiwan government to maintain such scale of e-government.

## 2.3. Information Technology Outsourcing & e-Government

Information Technology Outsourcing, ITO, is defined as an organization transfers portions or all of its software and hardware works to outside suppliers rather than completing the works internally. The purposes of ITO are to reduce costs and to make better usage of the ever fast-changing technologies [e.g., 18, 19, 20, 21, 22, 23]. Scholars recognized ITO is a trend [24] and an important strategy for the success of e-government [25]. However, ITO should not be considered merely as a purchase. It needs long-term strategies for management [26, 27].

Most of the current literature regarding e-government and ITO focus on the discussions of ITO strategies and factors for success. Not much has been discussed about the operation challenges and problems after the system being built. Since outsourcing is a set policy of Taiwan government and the operational cost has exceeded half of the IT budget for Taiwan government [8], the researches on the operation management have become increasingly important and inevitable.

## 2.4. The Ability of Organization's IT Personnel

The ability of organization's IT personnel is one of the key factors to guarantee the success of e-government [28, 29, 30, 31]. Among the four development stages described by Layne and Lee [29], IT personnel tends to promote small-risk, small-scale cases when their IT ability is limited. Lam [28] considered the lack of ability of IT personnel is the obstacle for e-government integration. Chou and Yen [30] reported that the ability of IT personnel affected the model of IT system integration. All these articles emphasized on the importance of IT personnel's ability in the stage of system design and development. However, none of the articles discuss the impact of IT personnel's ability on the system operation. It is odd since it has become an obvious global trend that most of the information systems are no longer designed or developed in-house and the internal IT personnel is mainly responsible for system operations.

## 2.5. Organization's IT Budget Allocation

One of the obstacles for e-government integration is funding [28]. Cost is a key factor in promoting e-government [30, 32]. In the planning stages described by Bowman et al.[33], funding distribution is an important consideration in planning Management Information Systems. However, the operation of the information system built by outsourcing contractors require funding as well. Thus, this study argues the budget allocation affects the operation of information system built by ITO.

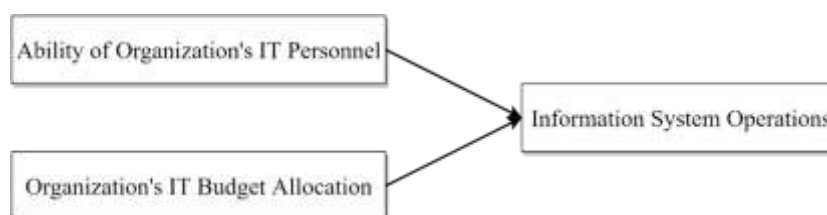


Figure 1: The proposed research model

Figure 1 demonstrates the proposed research model for this study. This study investigates the influence of IT personnel’s ability and budget allocation on the operation of information system in the organization.

### **3. RESEARCH METHODOLOGY**

The goal of this research is to investigate the effects of IT personnel’s ability and budget allocation on the operation of the information system developed by outsourcing companies. This is a case study of agency X of Taiwan government. The methodologies include field research, in-depth interviews and documentary analyses.

#### **3.1. Introduction of X Agency**

Agency X is a part of Central Government of Taiwan. Its services include foreign affairs and relationship between Taiwan and mainland China. Since 1981, agency X started to develop and build its own information systems. At first, the development was done internally. After year 2010, agency X has spent 23.8 million US dollars for outsourcing. The system was finished and deployed in 2011. It has been operating for over 6 years. The operation and maintenance costs exceed 3.2 million US dollars a year.

There are six sections in agency X. Section X1 used to design and develop the information systems internally. Since the policy change, it is currently responsible for outsourcing. Section X2 is responsible for the operation of systems, including hardware maintenance, software monitoring and providing preliminary and timely repair if anything goes wrong. Any new demands and requirements from users will be requested to Section X1 through Section X2.

#### **3.2. Data Collection**

The main approach of this study is field research. The researcher has being long-term participated and observed agency X in person. Agency X has been holding a monthly meeting to discuss new and change requirements for the system. There were 70 meetings between January 2011 and October 2016. This study collected and analyzed all the meeting minutes as well as the records for system operations. The processes of problem solving and decision-making in agency X were in-person observed. In-depth interviews were also conducted with IT personnel of agency X. The interview outline is listed in Appendix 1.

The interviewees were selected by purposive sampling, including both directors (A and B) of Sections X1 and X2. A is responsible for system design and development, B, operation of system. Two interviews were taken in November 2016. The interviews were recorded, under the consents of the interviewees. Each interview lasted about 30 to 40 minutes. After analyzing the interviews, the content that was determined to be related to this research subjects was extracted and categorized.

The content of the interviews was categorized by assigning content codes (CC). The format of content code is ‘CC’ followed by four alphanumeric, for example CC01-A-1. The description of each position of alphanumeric is shown in Table 2. The complete list of content codes and their corresponding coding is shown in Appendix 2.

Table 1: Content Code Descriptions

Code Position	Description
1 <sup>st</sup> , 2 <sup>nd</sup>	Serial Number
3 <sup>rd</sup>	Respondent: A, B
4 <sup>th</sup>	Content: 1: Description of problem and situation related to system operations 2: Descriptions of problem solving 3: Descriptions of the causes of problem 4: Others

### **4. RESULTS AND DISSCUSSION**

This study has conducted analyses of 70 meeting minutes, observation and interviews in agency X. The problems and challenges faced by agency X after its outsourced system was finished and delivered are listed as followed.

#### **4.1. Internal IT Personnel can not fulfill the needs of users independently**

Since agency X is responsible for foreign affairs and relationship between Taiwan and mainland China, its information systems have to be adjusted according to the government policy changes. In addition to the built-in report system, the agency’s IT personnel often get requests from the senior officers and Congress for various ad-hoc reports.

Currently, only the contracting companies can fulfil all the demands for system changes and report generation, not the IT personnel of agency X. The cause may be the IT personnel of agency X does not have enough understanding and control of the system.

This study found the scale of information system used by agency X is huge. Its database structure is very complicated and constantly changed. The IT personnel of agency X cannot fully master the technical details, such as program codes, database structure and database relationship (CC01-A-1, CC02-A-1). Therefore, they have to depend on the contracting companies (CC07-A-1, CC08-B-1, CC09-A-1, CC10-A-1) to do system modifications and ad-hoc report generation (CC07-A-1, CC08-B-1, CC09-A-1, CC10-A-1). The consequences of this kind of dependence include the request may not be completed in a timely manner and it may incur extra costs.

The reasons why the IT personnel of agency X cannot master technical details of the systems may be that the IT personnel has spent most of their time to do administrative work involving system purchasing and project management (CC14-A-3, CC15-A-3). Although they may have good technical background, they do not have time to understand the programing codes and database structure of the system. Consequently, they have to completely rely on the contractors to do system modification and report generation (CC16-A-3). Furthermore, because of the constant change of policies, the system has been changed very often. The high frequency of changes makes the documentation update more difficult. Lack of comprehensive documentation of the system causes the ability of the IT personnel to control the system becoming weaker and weaker (CC03-A-1).

#### **4.2. High maintenance cost limits the budget usage of the agency**

The cost of operating and maintaining the information system for agency X is 3.2 million US dollars, about 70% of the total IT budget. The budget of the whole agency is fixed every year. If the maintenance cost increases, it becomes more challenging to allocate budget for other tasks (CC17-B-4, CC18-A-4, CC19-B-4).

The IT budget needs to be used, in not only operating the system, but also strengthening the system, purchasing new equipment, and even building new information systems. However, the majority of the budget has already been spent on system maintenance, there is not enough fund to upgrade or modernize the equipment. In the long term, it may make the system obsolete (CC20-B-4, CC21-B-4, CC22-A-4). In other words, in order to maintain and operate the system, it may cause other important tasks delayed or become crowded-out.

#### **4.3. Increasing items of maintenance caused increasing of maintenance costs.**

Since the IT personnel of agency X highly depends on the contracting companies, many maintenance works need to be accomplished by the contractors. The number of maintenance items keep increasing, meaning the cost can only go higher (CC19-B-4). This could explain why the maintenance costs occupy the majority of the IT budget (CC17-B-4, CC18-A-4). Therefore, we can conclude that the more the IT personnel relies on contracting companies, the higher the maintenance costs get. It may also impose some risks onto system operations.

In summary, if the agency's IT personnel lose the ability to understand and control the system, it would become overly rely on the contracting companies. It not only causes some schedule delay, but also increase the difficulty to allocate budget properly. Once the budget becomes insufficient, the system operations will be affected. In the meantime, the extra maintenance costs it incurs would further affect the system operations. The findings of this study is demonstrated in Figure 2.

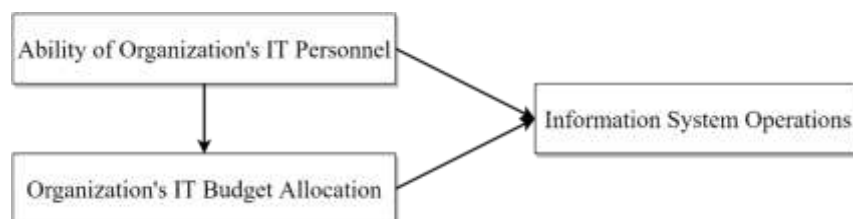


Figure 2: Findings

## **5. CONCLUSIONS AND FURTHER WORKS**

### **5.1. Conclusions**

The main goal of this research is to investigate while Taiwan government is promoting e-Government, how the IT Personnel's ability and IT budget of an organization affect the operation of the information systems developed by outsource providers. This research uses agency X of Taiwan's central government as a study case, to do observation and research.

This research found, after the system has been developed and delivered by the contracting companies, there were still many system modification needs because of government policy constant changes, or ad-hoc report needs. However, the IT personnel focused primarily on project management and other administration works while the system was being developed, and the system documentation was not updated promptly. These caused the IT personnel lack of ability to understand the system technical aspects and resulted in overly relying on the contractors. The dependency created some risks to the system operations, including the schedule delay and extra costs. This research also found, under a limited IT budget, agency faces challenge of how to efficiently allocate budget. If maintenance budget is not sufficient, it affects normal operation immediately. However, with high maintenance costs, agency faces the dilemma of sacrificing updating and strengthening the systems as well as replacing out-of-date hardware, which would eventually affect operations of the systems.

In summary, this study found the ability of the agency's IT personnel and budget allocation affect the system operations. It is also concluded that the ability of the agency's IT personnel affects how the agency allocates and implements its budget, which affects the system operations at the end.

## 5.2. Suggestions for Practitioners

Although IT outsourcing is the policy of Taiwan e-Government, the government IT personnel still need to pay attention to the technical details of the information systems being built by the contractors, to avoid overly depending on the contractors. In this case study, the agency IT personnel spent most of time and energy doing project management and administration work while the system is built by the contractors, therefore they did not have enough time to understand the technical details of the system. Hence, we suggest, in the future, there should be more administrative staff get involved, so they can be responsible for the administrative duties. With this administrative and technical staff cooperation new model, the IT personnel will not be distracted by administrative work and can focus more on the technical aspects and gain more control of the system. If the system is modified, the documentation needs to be updated at the same time, so that it would be consistent with the current system, which will also give the IT personnel more control.

Under limited budget, it is only natural that keeping the system running is the top priority. However, the agency needs to have a long-term development strategy. The potential risks that the system's software and hardware getting out-of-date, and the possible impact of new technologies, should all be put into consideration. In the meantime, the agency should do their best to improve their IT personnel's ability to control the system so decrease the degree of dependency on the contractors. This would not only decrease the maintenance costs, but also better use the limited IT budget.

## 5.3. Further Works and Limitations

This study is an exploratory research, discussing how IT personnel's ability and IT budget allocation of a specific organization, influence the operation of information systems developed by outsource providers. There must be other influential. Future researches can investigate other organizations of various businesses and characters.

Since the research of this study was conducted only in one organization, agency X of Taiwan, the scenarios or findings are specific for this organization.

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## **7. APPENDIX**

### **7.1. Appendix 1 Interview Outlines**

- A. Interviewee’s Profile: Title, Annual Salary, and Position.
- B. Duties of IT Personnel while system being built
- C. Duties of IT Personnel while system in operation

**7.2. Appendix 2 Interview Record Summary and Coding**

<b>CODE</b>	<b>Contents</b>
CC01-A-1	The system is huge and database structure is complicated.
CC02-A-1	Colleagues is able to understand the system structure, but cannot handle all the programming details.
CC03-A-1	Requirements are constantly being changed. The coding is always under modification but the system documentation are not updated in time.
CC04-A-1	Often time, we need to change our system to comply with the government policy change.
CC05-B-1	The Congress often request data that are not included in the reporting system, therefore, we need to generate extra reports from the databases.
CC06-B-1	Our senior officers also often request some ad-hoc reports, which is also needed to be handled by us.
CC07-A-1	Colleagues do not have ability to modify the system.
CC08-B-1	Only the contractors can query the databases directly, our colleagues cannot.
CC09-A-1	When the ad-hoc reports requested by our senior officers are not too complicated, we can generate them ourselves. However, if the report is not that simple, we have to ask our contractors to do it because our system is so big and the database is very complex.
CC10-A-1	We have to ask the contractors to do the modification of systems because our colleagues do not understand the programing structure of the system.
CC11-A-2	Since we have to rely on the contractors to modify the system, sometimes we have to compromise on the schedule.
CC12-A-2	Even for generating ad-hoc reports, the contracting companies not only have to do estimate of time, it usually incurs extra cost.
CC13-A-2	When requesting the contractors for modifying program or getting data, sometimes they cannot match our needs in time, but we have to yield.
CC14-A-3	IT Department is also responsible for administrative works like procurement.
CC15-A-3	While the contractors were developing the system, the IT Department was still responsible for project management and the final check upon delivery.
CC16-A-3	Since most of our colleagues were focusing on project management, it was difficult to understand the programing coding and database structure.
CC17-B-4	With the expansion of system and equipment, the maintenance costs get higher and higher each year. In the past couple of years, insufficient budget started to become a problem.
CC18-A-4	It is relatively easier to fight for budget for building a new system or purchasing new equipment, than for maintaining the existing systems. We were usually asked to work within the limited budget.
CC19-B-4	Because there are too many items for the contractors to maintain, it is difficult to lower the maintenance costs.
CC20-B-4	The IT budget for this agency includes maintenance, system strengthening, purchasing new equipment, and developing new systems.
CC21-B-4	The majority of budget was spent of maintaining the existing systems, so that there is not enough money to strengthen existing systems or replace old equipment.
CC22-A-4	Insufficient budget will affect the day-to-day operation of the systems.