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CONFIRMING, IDENTIFYING, AND CATEGORIZING IS LIFECYCLE COSTS

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Abstract

With the ever-increasing global investments in Information Technology (IT) and Information Systems (IS), one question remains the same: what aspect of IT/IS projects is costing the organizations? Unlike any non-IT/IS investment, there is no straightforward answer due to the special nature of IT/IS projects having Human and organizational dimensions that make it difficult to identify their related cost factors during investment evaluation processes. Although many cost models exist in the literature, their aim to identify and categories IT/IS lifecycle costs remain often verbose. These different cost taxonomies aim to assist manager in their decision-making but lack practicality, as their associated cost factors cannot fit into current business accountancy frameworks used by many organizations. It is in addressing the relative invalidity of these models that the authors of this paper add to the literature surrounding the evaluation of information systems. In doing so, presenting a critical review of the limited literature in the area of cost taxonomies associated with information systems adoption. This paper highlights the need to identify the far-reaching costs associated with IT/IS and in doing so, presents eight cost models for IT/IS cost classification and an attempt to validate the various cost elements that exist throughout the eight models.

Keywords: Costs, information systems, taxonomy, survey

Introduction

Organizational reliance on Information Technology (IT)/ Information Systems (IS) continues to grow and is in part reflected by the large sums of moneys spent on its adoption (Irani and Love 2002) and by the significant allocated portion of corporate budgets for IT (David et al. 2002). The ongoing increase in the global Information and Communication Technology (ICT) industry allocated budgets doubled in size between 1992 and 2002, from 1.3 trillion to over 2.4 trillion (WITSA, 2000, 2002). While, Surprisingly little attention has been given to the tricky issue of IT costs (Bannister et al. 2001), cost is a still critical factor during the appraisal of IT/IS investments (Irani et al. 2002). The reason for this is that management often assesses the relative *success* or *failure* of such investments based on their 'roll-out' within budget. According to a questionnaire based survey by (Gardner and Stewart 2000), 63% of all IS projects experience budget overrun between 40 percent and 200 percent, which is caused by the managers inability to identify their IT/IS investments' full cost portfolios. Nevertheless, it is not trivial to estimate the organizations total IT cost and it could be argued that it might be impossible to establish an accurate figure for total corporate IT and certainly the question of whether it is actually worth while to be able to do this needs to be carefully considered (Bannister et al. 2001). But being worth while or not, the organization has to identify these cost factors to be able to plan ahead for their management thus achieving control over them. The control over these costs especially the soft/indirect costs may means that we are able to reduce these costs, which is the main aim of the IT/IS investment evaluation process.

IT/IS Evaluation

The adoption of IT/IS remains a lengthy, time-consuming and complex process. Too much money being spent on IT/IS adoptions. (Irani and Love 2001) argue that the issue of effective management of technology needs to get proper attention by managers, thus offering organizational learning throughout the lifecycle of the technology.

The use of traditional appraisal techniques are deemed inappropriate for the evaluation of IT/IS investments (Hochstrasser 1990) due to the special nature of these projects having intangible benefits and indirect hidden costs (Ezingeard et al. 1998). The traditional appraisal techniques are based on conventional accountancy frameworks (i.e. Cost benefit analysis, ROI, NPV, etc.) which set direct quantifiable cost against quantifiable benefits, thus ignoring the intangible benefits and the far more reaching indirect costs associated with IT/IS adoption. In addition, the lack of knowledge of inexperienced managers on how to identify and manage IT/IS related costs was expressed by Irani and Love (2001). Unfortunately, (Alshawi et al. 2000) affirm that managers view investment justification as a 'hurdle' that has to be overcome, and not as technique for evaluating the worth of implementing IT. This fact was expressed by (Irani and Ghoneim 2002) in a case study where managers identified the indirect costs associated with their IT/IS projects but chose to avoid them in order not to add to the complexity of the evaluation process and to gain support of top management. This fact is confirmed by (Lefley and Sarkis 1997) who found the process of investment justification to be a major barrier to implementing IT/IS in many companies. (Primose 1991) identifies the perception of investment justification as a budgetary process that gives a final 'yes' or 'no' - 'pass' or 'fail' verdict of an IT infrastructure proposal.

Due to the special nature of IS projects, they tend to affect other departments and business units, inducing indirect costs that is hidden in other departments. As an example, training employees in other departments to use the new system appears as an cost external cost to the project but in reality is caused by the new systems development or new technology adoption.

Focusing on IT/IS Cost

The costs of IT/IS are often perceived to be easier to estimate than the benefits associated with such projects, however, (Hogbin and Thomas 1994) explain that this is rarely the case. The costs associated with IT/IS projects appear more tangible in nature because the assumptions and dependencies on which they are based are often not fully acknowledged, or are poorly understood by management. Indeed, it is considered widespread practice during the investment decision-making process to account for the upper estimates for costs and the lower estimates for benefits. However, this heuristic appears not to be solving the problem of IT/IS projects running over budget, as much of the problem lies in management not fully understanding IT/IS cost portfolios. There might also be political and organizational reasons for not understating the cost implications of an IT/IS investment; the main one being the need to gain support for [the release of funds], and acceptance of the project, from senior managers.

It is never possible to know the full cost of an activity as ubiquitous as IT. Some IT professional would agree that it is because of these underestimates of the costs of IT in the organization which has allowed much IT investment to take place. The idea is that if senior management had known in advance what the total cost would actually have been, and then it is unlikely that they would have authorized that expenditure. This approach to IT costing is sometimes referred to as the creeping commitment approach and is based on the fact that if a substantial amount is already spent on a project, then management will find it very difficult to abandon it and will continue to fund it despite the escalating costs evolved. In addition, few IT projects proceed in isolation. They are often part of a much larger IT programme. Almost all IT projects use and share existing resources, and this gives rise to the question of cost apportionment (allocation). IT projects frequently disturb other activities and these disruptions push the organization's total cost bill by generating a variety of *indirect costs*.

Different cost model exist throughout the literature, each identifies its own set of cost elements and taxonomies differently. Some of these cost taxonomies are highlighted by (Irani et al. 2002), table 1), including Initial and ongoing costs, Direct and Indirect (Human and Organizational Costs), IS Cost Divisions and lately Acquisition, Control, and Operations costs by David et.al., (2002). These different cost taxonomies are based on individual case studies conducted by individual researchers throughout the literature with few based on surveys other than Ezingeard et al., (1998) who only investigated the perceived costs identified by the 30 different industry sectors companies. In his structured interview survey, only the most obvious cost elements are always mentioned. Although the cost categories differ in name, they have similar cost elements and other that are similar in nature but different in name (i.e. initial cost and direct cost are similar in nature and include similar cost elements and operation costs by David et.al., (2002) is the same as initial cost by Dier and Mooney (1994). This makes it difficult to choose among these existing taxonomies since there are also some differences between them in terms of cost elements and categories.

No attempt was made to empirically confirm the various cost elements stated under the different taxonomies. None of the existing models can be generalized since they are based on one or more case studies, thus just adding to the confusion that managers experience when trying to identify the cost of their IT/IS investments. There is no one model that embraces the existing cost elements offered by the literature and those costs that are used in the practical world but not apparent in the literature. In order to develop such a model, there is a need to validate the existing cost elements offered by the literature, and add costs that are used in practice and overlooked by the literature.

Cost Taxonomies from the Literature

The literature offers many cost models that identify various information technology and information systems cost factors under different taxonomies. It is the variation of taxonomies and cost factors identified by each of the researchers in the literature that made the research aim arise. While many cost taxonomies are deemed acceptable by academics, some of them cannot be applied nor included during the appraisal of the investment proposals. Table 1. summarises some of the cost taxonomies identified through the literature:

Table 1. Summary of the Cost Classification Models (Modified from Irani and Ghoneim 2002)

Cost Taxonomies	Authors
Initial/Ongoing Costs: These costs are identified and assigned during the systems lifecycle. However, they tend to be retrospective, which make their consideration during ex-ante evaluation difficult. Yet, as legacy systems and enterprise solutions become more integrated, such cost taxonomies warrant closer consideration in terms of identifying their respective cost elements.	(Dier and Mooney 1994)
Financial/Non-Financial Activities: These costs are classified according to the activities causing them thus, emphasizing a causal relationship. Hence, reactive in nature	(Kusters and Renkema 1996)
Initial Investment/Ongoing Costs: these are based around the costs relating to the development of an information system infrastructure (initial investment) and operation of the infrastructure (ongoing cost)	(Remenyi et al. 1996)
Development / Hidden Costs: Costs related to purchasing, installing, training, and testing the system.	(Anandarajan and Wen 1999)
Social Subsystem Costs: those costs that reflect the changes in the social subsystem brought about by a new IT.	(Ryan and Harrison 2000)
Direct/Indirect: Human and Organizational: The direct cost element is assigned to the information technology component, whereas the indirect element relates to the effect of the information systems on the organization and the people.	(Irani and Love 2000-2001)
IS Cost Divisions – Management, Employee, Finance, and Maintenance: This cost taxonomy identifies a set of cost factors and sub-systems that impact the organization. However, this taxonomy falls short of identifying performance measure.	(Mohamed and Irani 2002)
Acquisition/Administration: Control and Operation Costs: the model identifies a set of cost factors that constitute the Total Cost of Ownership of information technology.	(David et al. 2002)

A considerable amount of effort has been devoted to developing IT/IS cost models so as to make the investment justification process more understandable for managers. Since these various model result from individual case studies, it is noticed how different companies use different classification for IT/IS related costs. It is noticed that the most common classification are: initial, direct, development and acquisition cost classification which represent the start-up cost of a system. The other ongoing, and operations cost classifications represent the ongoing expenses of running the system during it lifecycle. These two groups of cost classification are found under the various cost taxonomies identified in the literature. The indirect and hidden costs are the costs that were rarely mentioned as main cost classifications, while they do have serious consequences on the overall success of any system.

Research Aim and Scope

The aim of the research is to develop a generic model for IT/IS life Cycle costs that helps decision makers during the IT/IS investment evaluation process. As one of three objectives to be achieved, the model would empirically confirm and validate the various cost factors that exist throughout the literature. The second objective is to identify new cost elements that exist only in the industry and are not included in the literature. The third objective is to categorise the various cost elements identified both throughout the literature and in the industry.

There exist similarities between most of the eight cost taxonomies identified in terms of their consideration of the initial acquisition and ongoing costs to be the main cost categories that consist any information systems lifetime cost. The case is the same when trying to match the many cost factors that are presented under each cost taxonomy. The authors tried to identify the similarities and differences between each of the cost models and presented them in table 2. which can be found in the appendices. The main difference between the cost models is that a number of indirect cost elements were found under some of these taxonomies. These indirect cost elements were identified and classified in the work of Irani and Love (2001) and Mohamed and Irani (2002), yet there is a potential that there might exist other indirect costs that have not yet been identified in the literature.

Research Methodology

Previous work throughout the literature identified different sets of IT/IS cost elements categorised under different classifications. Each cost model was based on individual case studies conducted by different authors throughout the IT/IS evaluation literature. No attempt was made to empirically validate the various cost elements and their taxonomies. This makes it somewhat inaccurate to generalize any of the cost models or elements that exist in the literature. Taking these facts into consideration, there was a need for a research methodology that would ensure the empirical validation of the various cost elements especially the indirect costs and to make the resulting model generalizable. A large-scale cross-sectoral survey questionnaire was adopted as a research strategy. The survey targeted both Small and Medium Enterprises (SME's) and Large Enterprises, which could ensure capturing the breadth of costs that exist throughout the different IT/IS projects.

Questionnaire

The survey sample is 1000 organizations, and the questionnaire targeted the IT managers in the co-operating organizations. The survey questionnaire is divided into six sections as summarized below:

Table 2. Questionnaire Sections

Sections	Sub-sections
1- Company Profile	- Justification Factors - Motivation fro adopting IT
2- IT related Indirect Costs	-various indirect cost elements
3- Appraisal Techniques used to evaluate IT investments	- Methods and Techniques
4- Post Implementation Evaluation	- Post-implementation Benefits - Post-implementation Participants - Post-implementation Elements - Evaluation Process
5- General Questions	
6- General Comments	

The sections of the survey aim to mainly confirm the existing cost elements that exist in the literature as well as identifying new ones. In doing this, the questionnaire investigates issues regarding the evaluation process especially the appraisal of investment and the post-implementation process of information technology investment. This additional information provides a deeper understanding of the participants' level of experience in the evaluation process. The survey aimed at testing the validity of the various indirect cost elements identified in the literature. The likerd scale model was used to test the extend to which the organization experienced each of the cost factors. The questionnaire also identified whether each of the cost elements experienced by the managers was expected or not. In other words, whether managers were familiar of this cost element or faced with it during the projects lifecycle. This would indicate the level of managers' awareness of each of the cost factors and could indicate which cost factors are still not widely identified or popular in the business environment. The survey aims as well at pinpointing the critical cost factors (from the point of view of practitioners), as well as exploring new cost factors that are experienced by an individual or a small group of organization and thus, being unknown to the academic society.

Conclusions

It is not trivial to estimate the organizations total IT cost and it could be argued that it might be impossible to establish an accurate figure for total corporate IT and certainly the question of whether it is actually worth while to be able to do this needs to be carefully considered. But being worth while or not, the organization has to identify these cost factors to be able to plan ahead for their management thus achieving control over them. The control over these costs especially the soft/indirect costs may means that we are able to reduce these costs, which is the main aim of the IT/IS investment evaluation process. The proposed survey questionnaire aims at validating existing work done throughout the literature as well as providing a frame of reference of the various cost elements that could be experienced by an organization when considering an IT/IS investment. It would help the process of financial appraisal techniques improvement more accurate as it should consider all possible valid costs associated with IT/IS investments. There is a potential of providing a new cost taxonomy depending on the outcome of the survey, which would present the full breadth of costs that might occur during investments in information systems.

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Table 2. Comparison of Cost Taxonomies

Categories	References							
	Dier & Mooney (1994)	Kusters et al., (1996)	Remenyi et al. (1996)	Anandar-ajan & Wen (1999)	Ryan & Harrison (2000)	Irani et al. (2001)	Mohamed & Irani (2002)	David et al. (2002)
Development		•		•	•			
Training	•	•		•	•	•	•	•
Implementation		•						
Operations		•						•
Maintenance	•	•	•	•		•		
Security		•						
Phasing out		•		•				
Communication	•			•	•	•		
Hardware	•	•	•	•	•	•		•
Package software	•		•	•	•	•		•
Custom software	•			•				
System software	•							•
Cabling/building	•							
Project management	•							
Licenses	•							
Support	•			•				•
Modification	•				•			
Upgrades	•				•			•
Overheads	•					•		
Installation and configuration		•				•		•
Management/staff resources						•	•	
Management time						•	•	
Cost of ownership: system support				•		•		
Management effort and dedication						•	•	
Employee motivation						•		
Employee time				•	•	•	•	
Personnel issues						•		
Software disposal						•		
Productivity loss						•	•	
Strains on resources						•		
Business Process Re-engineering (BPR)		•				•	•	
Organizational Restructuring		•				•		
Implementation risks (covert resistance)		•		•	•	•	•	
Opportunity costs and risks						•		
Hardware disposal						•		
Data communication			•					
Commissioning			•					
Infrastructure			•		•			
Staff related costs (Changes in salaries)	•	•	•				•	•
Accommodation/Travel		•	•					
General expenses			•					
Tangible			•					
Intangible			•					
Conversion		•						
Data conversion	•							
Environmental						•		
Data preparation and collection				•				
Displacement and Disruption				•			•	
Evaluation								•
Futz								•

Categories	References							
	Dier & Mooney (1994)	Kusters et al., (1996)	Remenyi et al. (1996)	Anandar-ajan & Wen (1999)	Ryan & Harrison (2000)	Irani et al. (2001)	Mohamed & Irani (2002)	David et al. (2002)
Downtime								•
Integration							•	
Learning					•		•	
Moral Hazard							•	
Knowledge reduction							•	
Employees Redundancy							•	
Change management					•			

Mark your answers by ticking the responses as shown:

Use black/blue pen or pencil.
Place a tick in the response box.
Erase or white-out errors completely

Example

1
 2
 3
 4
 5

Please answer every question.

Section 1. Company Profile

The following questions are designed to provide background summary of the organizations taking part in this survey. Remember, no one other than the Brunel University researcher will have access to the information you provide here.

Please tick one option for each question.

1. How many people are currently employed in your organization?

2. Do you have a specific IT department within your organization? Yes No

If yes, please specify the level of its involvement in IT investments, planning, and control over expenditure.

If no, please specify who is responsible for IT planning and expenditure.

3. Approximately what percentage of turnover does your organization invest in IT?

4. What type of work does your organization undertake?

5. What type of Information Systems do you have in your organization (e.g., ERP)?

6. Would you describe yourself as

an IT specialist Yes No

a non IT business manager Yes No

a combination of both Yes No

Other (please specify) _____

7. Who is responsible for justifying and approving the decision to invest in IT?

IT department management Yes No

Business management Yes No

Other (please specify) _____

8. To what extent have the following problems influenced your organization’s IT/IS justification process?

JUSTIFICATION FACTORS	Not At All	Moderate Extent	Large Extent		
Limited managerial and technical knowledge	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Strategic vision in long term	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Unable to financially identify benefits	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Limited company resources and resistance to technology change	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
The need to show quick financial returns with little risk	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
A multiplicity of justification and implementation paths	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
An inability to account for the “full” business benefits	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Unable to identify and manage the scope of IT/IS related costs	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Reluctance of employees to adapt to new technology	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Inability to select an appropriate IT appraisal technique	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

9. To what extent have the following factors influenced your organization’s motivation to implement IT?

MOTIVATION FOR ADOPTING IT	Not At All	Moderate Extent	Large Extent		
Improve productivity of business process	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Improve the performance of business process	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Seemed like the thing to do at the time	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Improve the organization’s competitive advantage	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Improve profitability	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Pressure from rivals who are implementing IT	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Support the strategic direction of the organization	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Improve service quality	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Improve market place	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Other _____	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Section 2: IT Related Indirect Costs

10. To what extent has your organization experienced the following IT related indirect costs, and were the costs expected or unexpected? (Indirect costs are those produced by an IT investment, which cannot be obviously identified or measured.)

INDIRECT COST	Expected	Unexpected	Extent				
			Not At All	Moderate Extent	Large Extent		
Management and staff resources (e.g., integrating computerized administration and control into work practices)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Management time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Cost of ownership (e.g., system support and troubleshooting costs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Management effort and dedication to explore the potential of the system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Employee time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Employee training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Employee motivation (e.g., maintaining employee's interest in computer-aided tasks)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Staff turnover (e.g., increasing inter-view and training costs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Productivity loss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Strains on resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Organizational restructuring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Business process reengineering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Changes in salaries (as employees become more skillful)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Opportunity cost and risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Hardware disposal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Disruption costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

11. Which costs are considered to be the most critical by your organization during IS investment evaluation?

Section 3: Appraisal Techniques Used to Evaluate IT Investments

12. To what extent does your organization use the following techniques to evaluate its IT investment?

METHODS AND TECHNIQUES	Not At All	Moderate Extent			Large Extent
Return on Investment (ROI)	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Discounted cash flow and internal rate of return	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Net Present Value (NPV)	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Profitability index	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Payback period	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Present worth	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
In-house evaluation techniques Please specify _____	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>

Section 4: Post-Implementation Evaluation

A post-implementation evaluation review assesses project outcomes to verify whether the project achieved the desired results and met the strategic outcomes predicted within the planned cost and schedule.

13. Does your organization undertake a post-implementation evaluation? Yes No
 If yes, then to what extent did you experience the following post-implementation evaluation benefits?

POST-IMPLEMENTATION BENEFITS	Not At All	Moderate Extent			Large Extent
Improvement in subsequent systems development practice	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Decisions to adopt, modify, or discard IS	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Evaluation of personnel responsible for system development, implementation, and operation	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Ensured compliance with user objectives	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Improvements in the effectiveness and productivity of the design	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Cost savings through modifying the system during implementation, before, rather than after, complete integration	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Other _____	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>

14. Who participates in the post-implementation evaluation process?

POST-IMPLEMENTATION PARTICIPANTS	Not At All	Moderate Extent			Large Extent
Project team and management	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
User staff	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Executive management	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Customers directly impacted by the system	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Original team that justified the investment	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Others _____	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>

15. To what extent were the following elements included during the post-implementation evaluation?

POST-IMPLEMENTATION ELEMENTS	Not At All	Moderate Extent			Large Extent
Project history description	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Cost history	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Project management and system development methodology description	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Performance measures (used to justify the investment, by comparing the initial to the actual measures)	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Lessons learned	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Impact of the system (on the managers, users, and customers)	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Others _____	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>

16. To what extent does your organization undertake the following activities during the IT evaluation process?

EVALUATION PROCESS	Not At All	Moderate Extent	Large Extent		
Prepare a benefits delivery plan before approval	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Prepare a benefits delivery plan during system design	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Prepare a benefits delivery plan during the implementation	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Prepare a benefits delivery plan once the technology is adopted	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Plan organizational changes associated with the implementation of IT during approval	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Conduct reviews during the implementation of IT investment	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Conduct post-implementation reviews	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>
Others _____	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>

Section 5: General Questions

17. What do you think are the three most serious issues currently concerning your organization’s approach to implementing IT investments?

Section 6: General Comments

18. This section allows you to the opportunity to provide your comments on the survey and the issues that were raised. Please also provide details of any issues that you feel were not addressed.
