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Ahmad Ghoneim
Brunel University, ahmad.ghoneim@brunel.ac.uk

zahir.irani@brunel.ac.uk

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Ahmad Ghoneim
Brunel University
Ahmad.Ghoneim@brunel.ac.uk

Zahir Irani
Brunel University
Zahir.Irani@brunel.ac.uk

ABSTRACT

As the cost of hardware continues to fall, IT projects still experience budget overruns, which in some cases result in the abandonment of the projects. It could be argued that a lack of understanding of the indirect costs associated with IT/IS investments is a major contributor towards this phenomenon. This paper presents findings from an exploratory study that aimed at investigating the level of awareness of IT managers in practice about the various cost factors that exist in the literature and identifying new cost factors that might not be yet included in previous studies. IT managers being unaware or unfamiliar with the variety of indirect costs that occur throughout a project's life cycle might have an indirectly devastating effect on the overall budget successful implementation of the system. Although this fact has been expressed by academics and practitioners, little guidance has been provided to practitioners regarding the issue of indirect cost identification and management.

Keywords
IT evaluation, indirect costs, exploratory survey.

INTRODUCTION

In order to secure a bigger share of the market, organizations tend to invest substantial sums of moneys on IT investments. Yet, the costs of IT infrastructure continues to fall (Hamm, 2004), exerting more pressure on organizations to find another areas of savings to lower down their total investments costs. Organizations must try to find new areas for cost reduction other than the direct costs in the form of hardware and software. An area of cost reduction with lots of potential is that of the indirect costs associated with IT investments, where the indirect costs can be sometimes up to four times greater than the direct costs (Hochstrasser, 1992). This area could yet prove to be more difficult than the earlier, since indirect costs are not well identified and understood by managers in practice (Bannister el al., 1999).

Cost identification has proven to be a problem during IT investment justification (Enzweiler, 1996), which results in an inaccurate recommendation, or sometimes abandoned procedure. As managers are becoming aware of the various costs of investment they tend to face the difficulty of identifying, managing and controlling these costs (Gaterell and Lester, 2000). According to (Powell, 2001), there is a need for a mechanism to identify and allocate IS costs. Furthermore, the process of cost identification is made more complex because many of the cost are hidden and occur outside the scope of the IS function (Hogbin and Thomas, 1994). In addition, there are many different cost models available in the literature and little guidance for manager making it difficult to decide which model to follow. The study presented in this paper attempts to address the gap in the area of IT Indirect costs through exploring and investigating the current situation in practice and highlight the gap between the literature and practice and the need for further research in the area.

RESEARCH METHOD

Previous research in the literature identified different sets of IT/IS cost factors categorized under different classifications. Each classification (cost model) is based on individual case enquiry conducted by authors throughout the IT/IS evaluation literature. No attempt was made to empirically validate the various costs elements and their taxonomies. This makes it 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 serve the purpose of giving an insight about the current situation of indirect cost awareness and usage within organizations and identifies areas for more in-depth investigation. A quantitative research strategy was adopted in the form of an exploratory survey questionnaire. This constitutes the first part of an ongoing enquiry in an attempt to develop a more generalizable cost model that can be used as a frame of reference by managers during the evaluation of IT investment proposals or post-implementation evaluation. The exploratory survey was designed as a cross-sectoral investigation with no pre-defined hypothesis, nor design for data analysis. This design follows the same dimensions of the exploratory survey studies described by (Babbie, 1973; Dillman, 1978). As for the design for the data

analysis, (Pinsonneault and Kraemer, 1993) stated that when exploration is the aim of the survey, analysis frequently involves no more than developing the marginal and cross-tabulations for the variables and using simple descriptive statistics such a as means and medians. This diminished the need for a pre-defined design for the data analysis.

Research Setting

A Collection of cross-sectoral companies from across the UK was selected for this study. Using an exploratory questionnaire survey, the authors attempted to explore the area of IT indirect costs in the context of IT projects evaluation. Aiming to insure the need for further research in the area of IT indirect costs, the authors tested the IT manager's awareness of the various indirect cost factors identified in the literature and to determine which indirect cost factors were accounted for during the investment evaluation process. In addition, the survey examined the IT investment evaluation process. The questionnaire has nine measurement scales, four of which were adopted from a previously conducted survey by Love et al., (2004) that studied IT evaluation and benefits realization of Small Medium Enterprise (SME's) in Australia. These four scales are concerned with IT evaluation namely: the evaluation process, the investment justification, the motivation for adopting IT, and lastly, the IT related indirect costs which the authors amended by adding new costs factors to test along with the scale's existing factors.

All questions were anchored by a 5 point likert scale ranging from 1=Not at all to 5=Strong extent. Respondents used the likert scale to indicate the degree to which the nine scales were experienced by the IT managers during, with the exception of the IT indirect cost scale which in addition to the likert scale examines whether the IT managers expected 'knew about' each of the cost factors. The respondents' responses were tested for reliability and validity, which are illustrated in details later in the paper.

Sample Selection

The companies involved in this exploratory survey were chosen by the authors and were those whom the authors had strong individual contact with, to insure a higher response rate. Unfortunately the response rate proved to be very low as will be discussed later in the paper, but usable since it is an exploratory survey according to (Babbie, 1973; Dillman, 1978) who confirm that exploratory survey studies does not require a minimum response rate.

QUESTIONNAIRE SURVEY

The process of preparing the survey, sending out the cover letter along with the questionnaire. Including a self-addresses pre-paid envelop for the return of the survey. Offering to send a full summary of the results of the study to any respondents who wish to learn more about the end results. Sending the reminder letter along with another copy of the survey and second pre-paid envelope. Describing the response rate 52 returned surveys (17%) out of which 21 were usable. Although the response rate is not enough to cultivate or generate generalizable result, this is an exploratory study, which aims at exploring new cost factors and is a first step towards a more in- depth research in the area of indirect costs

Survey Instruments and Measures

The survey questionnaire consists of 6 sections and includes 9 categories of measurement as shown in table 1:

.Sections	Categories
1- Company Profile	- Investment justification - Motivation for IT Adoption
2- IT related Indirect Costs	- Various Indirect Cost Elements
3- Appraisal techniques used to Evaluate IT Investments	- Methods and techniques
4- Post-Implementation Evaluation	- Benefits - Participants - Elements - Process
5- General Questions	- Approaches towards IT Implementation
6- General Comments	- Comments on Survey and Issues Raised

Table 1. A Very Nice Table

The nine survey categories contained 75 items, and due to the size limitation, the paper cannot accommodate the analysis of all nine categories, thus the authors only present the analysis of the indirect costs related to IT projects which represent the main focus of the paper.

DESCRIPTIVE ANALYSIS

The participating companies cover a variety of industries, which generate a richer output from the survey; especially that one of its targets is to identify the full breadth of indirect cost factors associated with IT/IS projects. The types of industries are presented in figure 1:

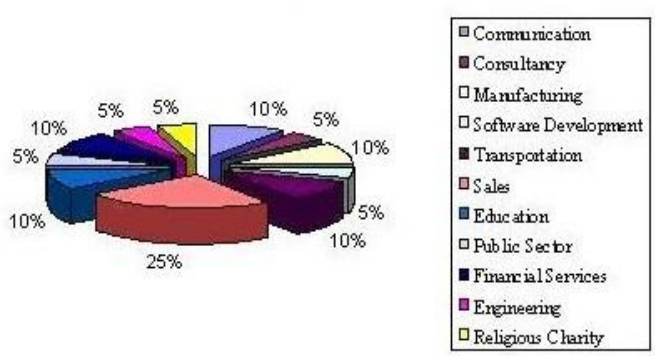

Figure 1. Type of Industry

The number of employees in the participating companies was found to be ranging from small to large size organizations making sure that the survey covered the whole sectors of organizations and industries. The firm size according to the number of employees is presented in figure 2:

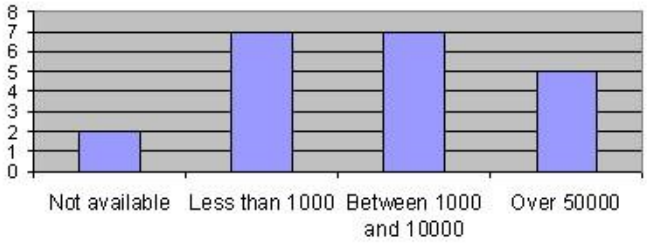

Figure 2. Number of Employees

All respondent companies have specific IT departments and 61% of the surveyed organizations conduct a post-implementation evaluation after the information technology project was implemented. IT specialists represented 66.7% of the respondents while only 4.8% were non-IT business managers. And 23.8% were a combination of both IT specialists and business managers. The decision to whether invest or not was found in 57.2% of the cases mutually exclusively divided between the IT department management and the business management, each having 28.6% of the total response rate. The remaining cases, which represent 33%, the decision was jointly taken by the IT department and the business management.

Findings and Analysis

Prior to undertaking a detailed analysis, each of the eight scales was tested for reliability. The reliability of the research instruments was evaluated using Crombach's coefficient alpha (α). According to (Nunnally, 1978; Pallant, 2001), a value of 0.70 or above indicates a reliable measure instrument. The α value of each of the constructs examined is presented in table 2. The internal consistency was measured using the inter-item Pearson correlation coefficients which are shown in table 2. The inter-item correlation for each of the scales were significant at the $p<0.000$ level.

Scales	Mean (n=21)	Crombach's Alpha (α)
Justification factors	2.49	0.80
Motivation for IT adoption	3.47	0.67
IT indirect costs	2.52	0.92
Appraisal Methods and techniques	3.00	0.96
Post-implementation evaluation benefits	3.19	0.80
Post-implementation participants	3.22	0.28
Post-implementation elements	3.47	0.84
Evaluation process	2.82	0.66

Table 2. Reliability and Consistency Measures for Scales

Content validity was not measured numerically, and was subjectively judged by the researcher. The content validity measure indicates whether there is a general agreement that the instrument has measurement items that cover all aspects of the variable being measured. The measures of the constructs have content validity because their measured items were selected from the literature review. In addition, one of the objectives of the survey is to explore new items that were present in the literature in order to insure content validity. Furthermore, as stated earlier, four constructs were adopted from a previous study by (Love et al., 2005) which were tested for content validity. The test for correlation was conducted between different indirect cost factors to determine whether there is a relation between the cost factors and determine the significance of the relation.

IT Related Indirect Costs

From the 17 indirect costs tested in the survey presented in table 1, it is noticed that the main indirect costs factors experienced by most of the respondents deal with *Time* for both management and employees, and with organizational restructuring. The analysis shows that over 90% of respondents experienced the following four indirect cost factors:

- Management and Staff resources,
- Management time,
- Employee time, and
- Organizational restructuring.

It is not correct to presume that if the cost is expected to occur then it should be experienced by a great extent. While the most experienced indirect costs factors were the organizational restructuring and the employee time; both identified by 95% of respondents, it was noticed that 55% of the respondent did not expect this cost factor to occur. This situation where the cost factors were not expected or identified before the project's implementation can be attributed to one or more of the following reasons:

- Lack of management awareness: whereby the cost factors are not identified by the managers nor included in the cost portfolio. This in tern leads to an increase in the overall cost portfolio once the project starts.
- Political reasons: whereas the goal of the IT manager is to secure the needed funds for his projects while facing competition from other capital investments. In this case, the manager might be aware of the existence of the indirect cost factors but chooses to ignore them and do not include them in the project proposal in order to decrease the overall cost portfolio and makes the awaited benefits exceed the costs. This is the case where many organization where top management regards IT investment as other capital investments not as a strategic investment necessary for the prosperity of the organization.

Whichever the reason for not including the indirect cost factors when financially appraising IT investments, they will still occur, and sometimes will have a devastating effect on the overall total costs of the system. According to (Hochstrasser,

1992) the indirect costs can be up to four time as great as the direct costs. In summary, the indirect costs cannot be avoided; instead, they can be better managed. A summary of the Indirect Costs characteristics and expectancies are presented in table 3. Employee time was found to be sharing the highest mean of 3.00 with management time and cost of ownership factors, but had the lowest standard deviation of 0.82 as shown in figure3:

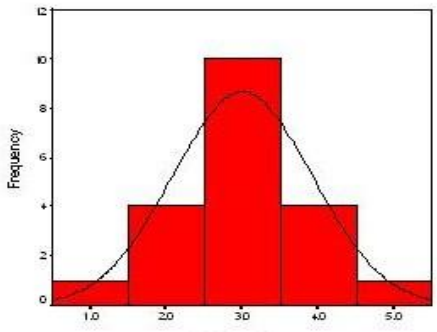

Figure 3. : Frequency Distribution of Employee Time Cost

As it is shown in figure 3, the frequency distribution is symmetrical, which means that the mean can be used as the measure of central tendency. The analysis showed that the least experienced indirect cost factor was the change in salaries; which was experienced by only 50% of the respondents. This could be due to the fact that this cost factor when the staff becomes more skilful as a result of the new systems development. Thus, the survey results could be attributed to the fact that the implemented system did not require new skills or are already skilful. Another reason would be that the size and technical complexity of the implemented project do not require new skills to de acquired by the staff.

It is surprising to notice that the productivity loss which in most cases is a normal consequence of many indirect costs was not identified by 61% of the respondents. Productivity loss is expected to occur when a new system is implemented and can be caused by other indirect costs, for example, covert resistance by employees who are unwilling to make the transition from the old system to the new system; ending up not using the system efficiently or sometime at all. Management time, staff turnover, employee time and training indirect cost factors affect the productivity. For example, during employees training, they are trained to use the new system and their overall productivity decreases.

Staff turnover is another good example of productivity loss, where the management spent time interviewing the candidates, and the candidates go through a learning curve whereby they are trained to use the system and sometimes they require assistance from their colleagues which affect their overall productivity. Having said that, the interesting issue is not that respondents did not experience productivity loss as this can be attribute to the small project size and well trained and prepared employees, but that 61% of respondents did not expect or identify such cost to be exit.

The analysis showed that there is a significance correlation between the covert resistance and the productivity loss at ($P < 0.05$) as shown in table 4. This indicates that the two indirect cost factors are directly correlated, whereby any increase in covert resistance will be followed by an increase in productivity loss. This correlation was previously described in the analysis of tables and.

IT indirect Cost Factors	**Expected**	**Unexpected**	Mean (n=21)	SD	Not at All	Some Extent	Moderate Extent	A large Extent	Very large Extent
Management and staff resources (e.g. integrating computerized administration and control into work practices)	19 95%	1 5%	2.85	0.99	2 (10%)	4 (20%)	10 (50%)	3 (15%)	1 (5%)
Management time	17 89.5%	2 10.5%	3.00	1.15	1 (5.3%)	7 (36.8%)	4 (21%)	5 (26.3%)	2 (10.5%)
Cost of ownership (e.g. system support and troubleshooting costs)	15 78.9%	4 21.1%	3.00	1.08	2 (10%)	4 (20%)	7 (35%)	6 (30%)	1 (5%)
Management effort and dedication to explore the potential of the system	9 50%	9 50%	2.70	1.26	4 (20%)	5 (25%)	6 (30%)	3 (15%)	2 (10%)
Employee time	18 90%	2 10%	3.00	0.82	1 (5%)	4 (20%)	10 (50%)	4 (20%)	1 (5%)
Employee training	17 89.5%	2 10.5%	2.75	0.97	2 (10%)	5 (25%)	10 (50%)	2 (10%)	1 (5%)
Employee motivation (e.g. maintaining employees interest in computer aided tasks)	12 60%	8 40%	2.70	1.26	4 (20%)	6 (30%)	3 (15%)	6 (30%)	1 (5%)
Staff turnover (e.g. increasing interview and training costs)	11 57.9%	8 42.1%	2.35	1.27	5 (25%)	9 (45%)	2 (10%)	2 (20%)	2 (20%)
Productivity loss	7 38.9%	11 61.1%	2.11	1.24	8 (42.1%)	5 (26.3%)	3 (15.8%)	2 (10.5%)	1 (5.3%)
Strains on resources	13 68.4%	6 31.6%	2.80	1.24	4 (20%)	3 (15%)	8 (40%)	3 (15%)	2 (10%)
Organizational restructuring	9 45%	11 55%	2.90	1.07	1 (5%)	7 (35%)	7 (35%)	3 (15%)	2 (10%)
Business process re-engineering	13 65%	7 35%	2.75	1.25	4 (20%)	5 (25%)	4 (20%)	6 (30%)	1 (5%)
Changes in Salaries (as employees become more skilful)	12 60%	8 40%	1.90	1.25	10 (50%)	6 (30%)	2 (10%)	- (0%)	2 (10%)
Covert resistance (unwilling to make the transition from the old systems to the new system)	7 36.2%	12 63.2%	2.20	1.36	8 (40%)	6 (30%)	2 (10%)	2 (10%)	2 (10%)
Opportunity-cost and –risk	10 52.6%	9 47.4%	2.20	1.11	6 (30%)	7 (35%)	5 (25%)	1 (5%)	1 (5%)
Hardware disposal	16 80%	4 20%	2.30	1.17	6 (30%)	6 (30%)	5 (25%)	2 (10%)	1 (5%)
Disruption costs	11 55%	9 45%	2.30	1.13	5 (25%)	8 (40%)	4 (20%)	2 (10%)	1 (5%)

Table 3. Characteristics and Expectancy of the Indirect Cost Factors associated with IT Adoption

		Productivity Loss	Covert Resistance
Productivity Loss	Pearson Correlation	1.000	.498*
	Sig. (2-tailed)	.	.030
	N	19	19
Covert Resistance	Pearson Correlation	.489*	1.000
	Sig. (2-tailed)	.030	.
	N	19	20
*. Correlation is significant at the 0.05 level (2-tailed).			

Table 4. Pearson Correlation Between Covert Resistance and Productivity Loss

The analysis also showed a highly significant correlation between employee training and loss in productivity at ($p < 0.01$) as shown in table 5. This implies that an increase in employee training significantly affect productivity loss. For instance, when employees spend their official work time being trained for using a new technology, they are not carrying out their routine work tasks. This in turn causes work disruption and back log of employees' tasks and leads to productivity loss.

		Productivity Loss	Employee Training
Productivity Loss	Pearson Correlation	1.000	.610**
	Sig. (2-tailed)	.	.006
	N	19	19
Employee Training	Pearson Correlation	.489*	1.000
	Sig. (2-tailed)	.006	.
	N	19	20
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 5. Pearson Correlation Between Employee Training and Productivity Loss

Lastly, a significant correlation between the changes in salaries and staff turnover was found at ($p < 0.05$) as shown in table 6:

		Staff Turnover	Changes in Salaries
Staff Turnover	Pearson Correlation	1.000	.553*
	Sig. (2-tailed)	.	.011
	N	20	20
Changes in Salaries	Pearson Correlation	.553*	1.000
	Sig. (2-tailed)	.011	.
	N	20	20
*. Correlation is significant at the 0.05 level (2-tailed).			

Table 6. Pearson Correlation Between Changes in Salaries and Staff Turnover

This implies that an increase in the changes in salaries cost would increase the staff turnover. This could be explained by the fact that when employees acquire new skills as a result of using a new system, they may ask for an increase in salary. If the company is not willing to make this increase in salaries then it skilful employees would evade to competitors for a better salary. Also, when there is pressure on the organization to increase the employees' salaries, a staff reduction strategy might be adopted especially when a most of the tasks require less qualified staff.

CONCLUSION

The literature provides a variety of cost models aiming to guide managers during the evaluation of IT projects. Unfortunately this is not the case as a gape exists between what the literature offers in terms of indirect cost factors and their classification, and what is reflected by the actual exploratory study results. The inconsistency between academics and practitioners as what factors constitutes indirect costs results in a dilemma of models utilization. There is no robust cost model that culminates all of the indirect cost factors and provides guidance to practitioners.

The analysis also demonstrated many relations between indirect costs factors and each other, such as the positive correlation between the loss in productivity and both the employee training and covert resistance. These relations when translated and applied into-real life situations can serve as guidelines for managing and controlling each cost factor; in some cases by reducing or better managing another. This causal relationship could proof useful, but needs further investigation.

The literature does not reflect the actual situation in practice as there is a difference between the literature and the survey analysis. This can be demonstrated by comparing between the level of occurrence of the indirect costs in the eight cost taxonomies and the analysis of the survey respondents in table 7 :

Indirect Costs Experienced by over 90% of Survey Respondents	**Occurrence within the Eight Literature Cost Taxonomies**
Management and Staff Resources	2 out of 8 Taxonomies
Management Time	2 out of 8 Taxonomies
Employee Time	4 out of 8 Taxonomies
Organizational Restructuring	2 out of 8 Taxonomies

Table 7 : Comparison of Indirect costs in the Literature and in Practice

The most experienced indirect costs by 90% of the respondents which as well were all expected by almost 90% of respondents except for the Organizational Restructuring by only 45% of respondents. When these figures are compared to the literature presented in table, it is obvious that managers in practice have a different point of view about the indirect costs associated with IT/IS investments from that of the academics' literature taxonomies. It also means that most of the academic models did not identify the most significant indirect cost factors from the practitioners' point of view.

Thus, there exists a gap between the literature and the practice regarding the identification and classification of indirect costs, which have many implications namely, that the academics and practitioners are not on the same track as they are supposed to be. The reasons of such differences of identification and prioritizations of cost factors cannot be answered through this exploratory study, which brings the need to undertake an in-depth case study enquiry in an attempt to answer this question.

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