FIRM SIZE AND INFORMATION TECHNOLOGY INVESTMENT APPRAISAL: EVIDENCE FROM COMMERCIAL BANKS IN KENYA

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Abstract

Information technology expenditure in banks consumes an ever increasing portion of operating costs and revenues. As organisations continue increasing their investment in IS, the process of evaluating potential Information Technology (IT) investments becomes an important activity for an organisation's management. This study attempts to establish whether the choice of IT investment appraisal approaches is associated with the size of a firm using evidence from commercial banking institutions in Kenya. Results of the survey show that there is a correlation between choice of approach and firm size. Among the banking institutions in Kenya, medium-sized banks focus the most on both the strategic and analytical approaches to IT investment appraisal. Majority of small banks have adopted relatively simple economic techniques such as payback period and cost-benefit analysis, and they do not focus on the more sophisticated analytical and integrated approaches as much as the medium-sized and large banks. Finally, large banks have adopted all of the appraisal approaches explored in this study. The results of this study help to establish banking industry-wide benchmarks and best practices in IT investment evaluation, thereby assisting IT executives to make more informed decisions for future investments.

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INTRODUCTION

Information Systems (IS) investments have had a tremendous impact on firms by reducing costs, improving product quality and increasing value to customers, thus enabling the firms to gain competitive advantage. Griffiths and Remenyi (2003) found that among firms in financial services, information technology expenditure consumes an ever increasing portion of operating costs. As organisations continue to increase their investment in IS, the process of evaluating potential IS investments is also becoming one of the most important activities for an organisation's management (Lin, et al., 2005).

Numerous methodologies for predicting the potential return on IS investments have been advanced, focusing on different aspects of investment appraisal. Economic appraisal techniques are focused on measuring expected economic return on IS investments using financial metrics such as Return on Investment, Payback Period, Internal Rate of Return and other discounted cash flow methods. Due to various limitations of using purely financial appraisal techniques, the IS community has promoted the use of 'strategic' techniques that consider criteria such as competition, the attainment of industry leadership and expected future developments in the industry (Small, 2006). Other researchers have recommended the use of hybrid appraisal approaches that integrate both the financial and strategic approach to analysing potential investments in IT (Stewart and Mohamed, 2002).

There are elements that may affect or influence the selection of particular techniques, such as type of investment (Farbey, 1992; Irani et al., 1997; Small, 2006), how companies allocate the IS investment decision making responsibility (Paul and Tate, 2002) and the size of a firm (Pike, 1996; Arnold and Hatzopoulos, 2000). No consensus has been reached as to whether there is a relationship between firm size and the techniques a firm uses.

This study attempts to establish whether the choice of IT investment appraisal approaches is associated with the size of a firm using evidence from commercial banking institutions in Kenya.

REVIEW OF LITERATURE

Grembergen (2001) defines IS investment appraisal as "the weighing up process to rationally assess the value of any acquisition of software or hardware which is expected to improve the business value of an organisation's information systems" (pp. 3).

Are capital investments in IS any different from other capital investments in the firm? Some researchers assert that there is no difference, as standard investment appraisal techniques i.e. capital budgeting techniques, are as applicable to IS projects as to any other type of project (Ashford, et al., 1988). Other scholars contend that many benefits resulting from IS investments are intangible, and therefore difficult to quantify (Parker et al., 1988; Farbey et al., 1993; Renkema, 2000; Berger, 2003). Renkema and Berghout (1997) found that as a result of this difference of opinion, many studies about IS investment appraisal carried out over the past four decades sought to establish the principles and criteria relevant and necessary for developing appraisal methodologies that address both the tangible and intangible aspects of IS investments.

Numerous methodologies for predicting the potential return on IS investments have been advanced, focusing on different aspects of investment appraisal. Irani et al. (1997) grouped formal appraisal techniques into four classifications: the economic approach, the strategic approach, the analytical approach and the integrated approach. Table 1 outlines appraisal techniques grouped within these four categories:

Approaches to IS investment appraisal

Financial returns are the most significantly considered criteria in business project appraisal. When financially appraising capital expenditures, capital budgeting methods have been used popularly. Typical techniques utilize Discount Cash Flow (DCF) methods, e.g. Internal Rate of Return (IRR) and Net Present Value (NPV), and ratio based techniques e.g. Payback Period (PP), Return on Investment (ROI), Return on Assets (ROA), etc (see standard finance and accounting texts e.g. Shapiro (2004) for an exposition on capital budgeting methods). Capital budgeting methods have been adopted in financially appraising capital investments in IS (Ballantine and Stray, 1999).

Table 1. Taxonomy of IS Investment Appraisal Approaches

Classification	Appraisal technique
	Gut feeling*
ECONOMIC APPROACHES (ratio based)	Payback
	Return on Investment (ROI)*
	Cost Benefit Analysis (CBA)
Economic approach (discounting techniques)	Net Present Value (NPV)*
	Internal rate of Return (IRR)*
Economic approach (future value technique)	Real option pricing theory*
STRATEGIC APPROACHES	Technical importance
	Competitive advantage*
	Critical success factors*
	Application portfolio approach*
ANALYTICAL APPROACHES (portfolio)	Non numeric
	Scoring models*
	Computer based techniques
	Fuzzy logic
ANALYTICAL APPROACHES (other)	Risk analysis*
	Value analysis
INTEGRATED APPROACHES	Multi-attribute utility theory*
	Scenario planning and screening
	Information economics*
	Balanced scorecard*

Adapted from Irani, et al. (1997)

Reservations that have been expressed about financial appraisal techniques have led some researchers to advocate for the use of strategic arguments in the appraisal of IS investments. Strategic analysis is concerned with understanding the internal organization of the firm and external business environment i.e. opportunities and threats, and developing business strategies to counter competition. Scholars have illustrated how several tools and models can be employed in evaluating the strategic fit of IS projects. Among the most widely accepted techniques are value chain analysis, competitive analysis, appraisal of critical success factors and the adoption of an applications portfolio approach to investment appraisal.

New techniques for investment appraisal that merged the economic and strategic approaches were developed. Analytic techniques are usually models that assign weighed scores to tangible and intangible factors being considered (Locher et al., 2004). Analytic techniques collect more information and frequently consider uncertainty and multiple measures and effects. According to Meredith and Suresh (1986), the superiority of these techniques is that they are more realistic, as they allowed managers to incorporate their subjective judgements into the analysis. Scoring models, risk analysis, simulation modelling and value analysis are among the most commonly discussed techniques in IS evaluation literature.

Recent studies have further promoted integrated appraisal approaches to alleviate the problems inherent in using purely financial or purely strategic appraisal approaches. Integrated approaches combine somewhat subjective strategic approaches with formal structure found in economic approaches. Appraisal techniques in this approach integrate financial and non-financial dimensions together, through the acknowledgement and assignment of weighting factors to the intangible implications of the project, usually incorporating project risk (Stewart and Mohamed, 2002).

In addition to these formal approaches, researchers have found that managers often rely on methods which do not fall within the boundaries of formal investment appraisal methodologies, thus making decisions based on their personal feelings about potential investments. Such decisions are based on `acts of faith', `blind faith' (Weill and Olson, 1989) or `gut instinct' (Bardhan et al., 2004). These methods have often been "used" in very complex decisions (Remenyi, 2000), or due to the lack of adequate guidelines for evaluating investments (Weill and Olson, 1989).

Empirical studies reported in the accounting and finance literature provide a general picture of the extent to which capital budgeting are used to appraise capital projects, in addition to indicating how patterns of usage have changed over time. Studies have consistently shown that payback has been the most widely used technique for appraising capital investments. The more `sophisticated' techniques of Net Present Value (NPV) and Internal Rate of Return (IRR) have for some time been gaining in use and importance within organizations (Gitman and Forrester, 1977; Pike, 1996).

Comparison between empirical studies on the use of capital budgeting techniques to appraise general capital investments in accounting and finance literature, and the use of these

techniques to appraise IS investments in IS literature reveals a difference in the level of usage of these techniques, and the type of techniques applied. While financial techniques, especially discounted techniques, are used significantly for general capital investments, IS literature reveals that simple ratio techniques such as payback period, CBA and ROI are more commonly used, in conjunction with qualitative techniques that consider technical and strategic arguments (Bacon, 1992; Ballantine and Stray, 1998; Lin et al., 2005; Small, 2006). Discounted techniques, which are gaining popularity in general capital investment appraisal, have been found to be unpopular in IS literature.

IT Investment Appraisal and Firm Size

Various empirical studies have attempted to establish a relationship between the size of an organization and the use of particular techniques of appraisal (Pike, 1996; Sangster, 1993; Arnold and Hatzopoulos, 2000). Most of these survey studies conducted between 1975 and 2000 findings suggest a relationship between size and the method of capital appraisal companies select.

Pike (1996) presents a trend analysis of the change in use of capital budgeting techniques by large UK firms, over the period 1975 - 92. The survey was conducted at three points in time, and all three surveys asked respondents to report current capital budgeting practices for larger projects. In 1980, a questionnaire was sent to 208 largest quoted UK companies requesting them to indicate their capital budgeting practices in 1975 and 1980, and 150 usable responses (72% response rate) were obtained. In 1986, the same questionnaire was distributed to 140 of the companies that participated in the earlier survey, and 100 usable responses (71%) were obtained. In 1992, Pike (1996) revisited the same 140 firms responding in 1980 and operating in 1986 in a third survey, where 99 usable responses were obtained (78.1). In his analysis, Pike (1996) observes that the requirement by larger firms to adopt a specific search for, and screening of, project alternatives has moved from being commonplace (76%) in 1975 to being totally accepted by all firms in 1992. On the use of investment evaluation techniques, he found that steady progress in adoption has been achieved. Discounted cash flow methods, such as internal rate of return (IRR) and net present value (NPV) are well established among these large firms with 81 per cent and 74 per cent usage respectively. On the usage of multiple techniques, in 1975 most firms adopted either one or two methods (typically PB and ARR), by 1992 a combination of four methods (PB, ARR, IRR and NPV) was most common (36%), a threefold increase since 1980. In addition, Pike (1996) found that the use of IRR and

NPV continue to be highly associated with firm size by demonstrating a remarkable consistency in size and investment sophistication association over the 17 years he reviewed. Further, in his 1992 survey, Pike (1996) found that investment practices where regularity of use (i.e. rarely, often, mostly, always) is associated with size of firm, a correlation he was able to establish using chi-square tests.

Sangster (1993) presents contrasting findings in his surveys of current investment appraisal practice on a sample of 491 companies from Scotland's Top 500 Companies. One survey covered 'large' companies, the other 'small', their relative size being on the basis of turnover. The survey sought to answer questions on the current usage of payback, IRR, NPV and ARR, and the difference in the usage of DCF techniques between large and small companies. A comparison of the results from the two studies revealed no significant difference in the frequency of usage of NPV between the large and small companies. Sangster (1993) argued that the Scottish studies findings show that size may no longer have the major impact upon organizational practice, as claimed by earlier researchers like Pike (1984) and Pike (1988).

Nevertheless, Pike (1996) adds a caveat that firm size per se may not be the direct causal factor in determining use of sophisticated methods. He suggests that the size of a firm influences the use of computer-based capital budgeting packages which, in turn, influence the use of discounting methods, sensitivity analysis, and risk analysis techniques. Once size ceases to be associated with use of computers in capital budgeting, he envisages that it will also have far less impact on capital budgeting technique usage rates.

Arnold and Hatzopoulos (2000) considered the extent to which modern investment appraisal techniques are being used among large UK corporations. Out of the 300 companies to whom questionnaires were sent, 145 responses were received, of which 96 were usable. 38 of the responding companies were large, 24 medium and 34 small. They found that all large firms were using discounted techniques, and over 90% of small and medium sized firms were using these methods. NPV was more popular than IRR among large firms in the UK. In addition, they found that two thirds of the firms surveyed were using multiple techniques, with 29% of them using NPV, IRR, Payback and ARR.

In summary, empirical studies have established a relationship between the size of an organization and the use of particular techniques of appraisal (Pike, 1996; Arnold and Hatzopoulos, 2000). These studies reveal that large firms tend to use discounted cash flow

techniques. On the other hand, small firms have historically focused on ratio-based techniques for investment appraisal. However, Pike (1996) found that small firms have gradually begun to adopt discounted cash flow techniques in their analysis. Therefore, it can be argued that small firms are likely to use simple appraisal techniques that adopt the economic or strategic approach, such as ROI, PP, CBA, technical arguments, SWOT analysis and CSF. On the other hand, large firms are likely to use more complex techniques like risk analysis, value analysis, information economics and the balanced scorecard. Consequrnty, the following research hypothesis was formulated for this study:

> ***There is a relationship between the approach a firm adopts when evaluating potential IS investments and the size of the firm. In particular, firms that use more complex evaluation techniques will tend to be larger than those that use simpler techniques***

RESEARCH PROCEDURES

Historically, cross-sectional survey research has been a popular research method for quantitative, empirical studies examining topics related to IS investments, such as IS investments and firm performance (Weill and Olson, 1989; Harris and Katz, 1991) and examination of IS/IT investment appraisal techniques (Bacon, 1992; Ballantine and Stray, 1998; Lin et al., 2005; Small, 2006). This study therefore employs a similar cross-sectional survey research design.

The target population of this study is banking institutions in Kenya. The Kenyan commercial banking system, which consists of 43 institutions, is dominated by several commercial banks and a small number of non-bank financial institutions which concentrate mainly on mortgage finance, insurance and other related financial services (Oloo, 2007). Due to the size of the banking industry, the whole population on banking institutions was included in this study. Thus, no sampling procedures were conducted. It has been noted that in comparison to studies on investment appraisal conducted elsewhere, the size of the population in this study is small.

A questionnaire was used to collect information for this study. The correspondence containing the questionnaire and a cover letter was addressed to top-level corporate managers heading the information technology function in the institution, usually referred to as the Head of Information technology, or the General Manager - Information Technology at most banks. Bacon (1992), in a study of the criteria organizations use to make IS investment decisions received 85% of his responses from IS executives (Chief Information Officer, IS Manager, IS Planning Manager and IS Controller), and 13% from the Chief Financial Officer. These response demonstrates that the decision to invest in IS is justified by IS professionals. Therefore, the head of the IS function was identified as the most suitable person to comment on the IS investment appraisal process of IS project acquisition decision making process in the bank.

The questionnaire gathered information on the IS investment approaches and the appraisal techniques that are being used during the appraisal process. The main secondary data source for this study is the Banking Survey 2007 (Oloo, 2007) and the Central Bank of Kenya reports.

DATA ANALYSIS

To examine empirically the correlation between firm size and the IS investment appraisal approach adopted within banking institutions, the chi square (χ^2) test for independence was performed. Preliminary χ^2 tests indicated that there was a significant relationship between the two classifications, with a p-value of 0.000 at the 0.05 level of confidence. To further analyse and explain this relationship, χ^2 tests were conducted for each of the appraisal approaches independently. In addition, the appraisal techniques were cross-tabulated against the firm size.

The size of a firm may be measured a number of ways: assets, sales, employees and value added are commonly used measures. Harris and Katz (1991) in their study of the relationship between firm size and IS investment intensity in the insurance industry used premium income as their measure of firm size. Turner (1982), while analysing whether large banks use IS more intensively than small banks, measured firm size using an index consisting of total bank assets, net income, and the number of full-time equivalent staff.

For the purposes of this study, however, using interest income as a measure of firm size may confound the results, due to its potential volatility over time. In Kenya, there has been a drastic drop in interest rates over the last ten years. Oloo (2007) in his survey of the Kenyan banking sector found that in spite of loans and advances growing by 148% between 1997 and 2006, interest income has grown by a paltry 3%. While the drop in interest rates affected large banks negatively, medium and small banks have realised robust growth in interest incomes over the ten year period. As a result, there has been a shift from reliance on interest income to non-interest income streams. Due to this inconsistency, the use of interest income as a measure of firm size may confound the results.

Technological theories of the firm, which emphasise physical capital and economies of scale and scope arising out of capital inputs, argue for using assets or sales as a measure of size (Kumar, Rajan and Zingales, 1999). Information technology expenditure, which are considered to be capital investments, have a direct impact on these economies of scale and scope, and are included in the total asset figure while preparing financial statements. Thus, when considering the size of a firm in relation to information technology, total assets as the measure of firm size is more applicable, and has been used in this study.

The respondents were sorted into three tiers on the volume of assets they own, as follows:

Table 2. Survey Responses by Total Assets

Firm size	Total Assets (millions)	Participating banks	Percentage
Large	30,001 and above	6	24%
Medium	6,001 - 30,000	9	36%
Small	6,000 and below	10	40%
		25	100%

RESEARCH FINDINGS

Out of the 41 questionnaires hand-delivered to the banking institutions, a total of 25 responses were obtained. During the survey, telephone calls were made to the IS executives

to encourage them to complete the questionnaire. Five banking institutions opted not to participate in the survey, in most cases due to corporate policy.

The response rate was 60.97%. Analysis of non-response using ANOVA tests revealed that there were no statistical differences, at the 5% level of significance, between the respondents and non-respondents with respect to total asset distribution. Thus, it was concluded that the achieved sample was representative of the banking industry population.

Total asset values of the responding banks for 2007 ranged from Kshs 744 to Kshs 91,252 million, with a mean and a median of Kshs 16,451 million and Kshs 7,039 million respectively. The large variance of total assets and difference between the mean and the median illustrate the structure of the banking sector in Kenya. The sector is dominated by 10 banks that control more than 75% of the market, with the remaining 32 banks sharing the balance. This scenario is also reflected in other measures such as customer deposits, loans and advances to customers and earnings (Oloo, 2007). The average IS budget allocation within the banks ranged from Kshs 1.167 million to Kshs 528 million, with a mean allocation of 61 million, and a median of Kshs 26.5 million. This scenario also reflects the disparity in bank sizes, and consequently, IS spending.

The actual respondents by job title are shown in Table 3.2.

Table 3. Survey Responses by Job Title

Job Title	No of Responses
Manager IT	11
Head of ICT	12
Head of Finance, IS and Administration, or Operations	2
Total	**25**

APPRAISAL APPROACH AND FIRM SIZE

Preliminary χ^2 tests indicated that there was a significant association between the appraisal approach and firm size, with a p-value of 0.000 at the 0.05 level of confidence. To further

analyse and explain this relationship, χ^2 tests were conducted for each of the appraisal approaches independently.

In addition, the appraisal techniques were cross-tabulated against the firm size. The row percentages, marked with @ were calculated from the total number of institutions that use a particular technique, to determine the utilisation of the technique among banks of different sizes. For instance, in Table 4, of the 15 firms that use the Payback Period, 26.7% are large sized, 20% are medium sized, and 53.3% are small banks. The column percentages marked with * determine the usage of each of the techniques among banks of the same size. For instance, among the 6 large banks, 66.7% use Payback Period, 100% use CBA, while 66.7% use ROI, etc. Following is an analysis of the results.

The economic approach

Previous researchers have found that economic justification is a key component in the decision process for making IS investments. Ratio-based techniques are utilised the most among all bank categories, as shown in Table 4. Further, Payback Period and CBA are most popular among small banks than in large and medium sized banks. These are ratio-based techniques may be common among banking institutions, particularly smaller banks because they are relatively easier to compute. However, the proportion of large banks that use these techniques is low (26.7% and 26.1% for PP and CBA respectively). These results corroborate Gitman and Forrester's (1977) findings and inference that few large firms (9%) tend to use ratio-based techniques, usually for secondary analysis.

However, unlike the findings in this research, large firms in previous studies tend to focus more on using DCF techniques for investment appraisal, when compared to small firms. Pike (1992, 1996) found that large firms continue to increase their level of usage of IRR and NPV, as compared to small firms. Arnold and Hatzopoulos (2000) also found that DCF techniques were used by 100% of the large firms in their survey, with about 90% of small and medium-sized firms using DCF techniques. In contrast, DCF techniques are not used by large and medium-sized banks in Kenya. NPV is used in one large and small bank, while IRR is not used at all.

This phenomenon may be attributed to the complexity of the appraisal techniques which require the computation of future cash flows, discount rates and rates of return. Since IS

investments have intangible returns, researchers have found that it is difficult to quantify and discount these returns.

Table 4. Cross tabulation statistics for Economic Appraisal Techniques and Firm Size

Economic Appraisal Techniques	***Firm Size***			
	Large	***Medium***	***Small***	***Total***
Payback Period	(66.7)* 4 (26.7)@	(33.3) 3 (20.0)@	(80.0) 8 (53.3)@	(60.0) ***15*** (100.0)@
Cost Benefit Analysis	(100.0)* 6 (26.1)	(88.9) 8 (34.8)	(90.0) 9 (39.1)	(92.0) ***23*** (100.0)
Return on Investment	(66.7)* 4 (26.7)	(77.8) 7 (46.7)	(40.0) 4 (26.7)	(60.0) ***15*** (100.0)
Net Present Value	(16.7)* 1 (50.0)	(0.0) 0 (0.0)	(10.0) 1 (50.0)	(8.0) ***2*** (100.0)
Internal Rate of Return	(0)* 0 (0)	(0) 0 (0)	(0) 0 (0)	(0) ***0*** (100)
Totals	(100)* ***6***	(100) ***9***	(100) ***10***	(100) ***25***

Chi-Sq = 43.153, DF = 6, P-Value = 0.000 (from column percentages)
Chi-Sq = 68.177, DF = 6, P-Value = 0.000 (from row percentages)

* = Column percentage; @ = Row percentage

The strategic approach

Strategic approaches have been found to be more popular economic approaches for appraising potential IS projects in Kenyan banks. These results indicate that, besides the financial costs and benefits of a project, the technical fit of the project is considered the most important criteria when evaluating potential IS projects.

Among the strategic techniques, the utilisation of technical arguments is highest among small (90%) and medium sized banks (100%). This technique focuses on the internal operational efficiencies that would result from acquiring information technology, neglecting strategic implications of the acquisition.

Table 5. Cross tabulation statistics for Strategic Appraisal Techniques and Firm Size

Strategic Appraisal Techniques	*Firm Size*			
	Large	***Medium***	***Small***	***Total***
Technical arguments	(83.33)* 5 (21.74) @	(100.00) 9 (39.13) @	(90.00) 9 (39.13) @	(92.00) ***23*** (100.00) @
Competition	(50.00)* 3 (18.75)	(77.78) 7 (43.75)	(60.00) 6 (37.50)	(64.00) ***16*** (100.00)
Critical Success Factors	(50.00)* 3 (23.08)	(77.78) 7 (53.85)	(30.00) 3 (23.08)	(52.00) ***13*** (100.00)
SWOT Analysis	(50.00)* 3 (23.08)	(66.67) 6 (46.15)	(40.00) 4 (30.77)	(52.00) ***13*** (100.00)
Application Portfolio	(50.00)* 3 (30.00)	(55.56) 5 (50.00)	(20.00) 2 (20.00)	(40.00) ***10*** (100.00)
Totals	(100.00)* ***6***	(100.00) ***9***	(100.00) ***10***	(100.00) ***25***

Chi-Square = 23.480, DF = 8, P-Value = 0.003 (from column percentages)
Chi-Square = 15.357, DF = 8, P-Value = 0.053 (from row percentages)

* = Column percentage; @ = Row percentage

Over 80% of the banks that consider the impact of the potential IS investment on the competitive positioning of the institution are medium and small sized, while for large firms, competition appears not to be a priority. Medium-sized banks have also been found to use Critical Success Factors (CSF) and SWOT analysis more than large and small banks, reinforcing the importance they place on the strategic positioning of the firm. Interestingly, small banks have not focused their IS investment decisions on strategic considerations as much as medium-sized banks. It was expected that both these categories would be focusing on expansion and strategic positioning of their firms.

Generally, medium-sized banks rank the highest in usage of the five strategic techniques to appraise potential IS investment projects, as shown in Table 5.

Applications Portfolio technique is used the least among all bank size categories. This technique adopts a portfolio management approach to evaluate how potential IS investments can be fitted into the existing collection of information systems. Executives have only

recently begun to apply the portfolio approach to IS investment management in developed economies.

The analytical and integrated approaches

Techniques classified under this approach adopt weighted scoring models that factor tangible and intangible costs and benefits of potential projects (Locher et al., 2004). Both the analytical and integrated approaches are used the least during IS investment appraisal among Kenyan banking institutions.

As shown on Table 6, the most prevalent technique is Risk Analysis, which is being used by 76% of the respondents. Ballantine and Stray (1998) in their survey also found that risk analysis was prevalent among UK organisations. However, while 100% of large banks incorporate Risk Analysis when appraising IS investments, only 60% of small banks incorporate it. The results indicate that value analysis is not used pervasively in Kenyan banks. Similarly, the use of scoring models and computer-based techniques is limited among large and medium sized banks, and absent among small banks. The least used techniques are the computer based techniques (4%).

The integrated approach combines financial and non-financial dimensions through the acknowledgement and assignment of weighting factors to the intangible implications of the project, usually incorporating project risk (Stewart and Mohamed, 2002). Among the techniques that adopt the integrated approach to appraising potential IS projects, the Balanced Scorecard is the most popular, being used by 56% of respondents, and 100% of large banks. From the analysis, large banks are more likely to use integrated techniques than small and medium-sized banks.

Table 6. Cross tabulation statistics for Analytical Appraisal Techniques and Firm Size

Analytical Appraisal Techniques	***Firm Size***			
	Large	***Medium***	***Small***	***Total***
Risk analysis	(100.00)* 6 (31.58) @	(77.78) 7 (36.84) @	(60.00) 6 (31.58) @	(76.00) ***19*** (100.00) @
Value analysis	(33.33)* 2 (28.57)	(33.33) 3 (42.86)	(20.00) 2 (28.57)	(28.00) ***7*** (100.00)

	(50.00)*	(11.11)	-	(16.00)
Scoring models	3	1	0	***4***
	(75.00)	(25.00)	-	(100.00)
	(16.67)*	-	-	(4.00)
Computer based techniques	1	0	0	***1***
	(100.00)	-	-	(100.00)
	(100.00)*	(100.00)	(100.00)	(100.00)
Totals	***6***	***9***	***10***	***25***

Chi-Square = 47.681, DF = 6, P-Value = 0.000 (from column percentages)
Chi-Square = 153.377, DF = 6, P-Value = 0.000 (from row percentages)

* = Column percentage; @ = Row percentage

Table 7. Cross tabulation statistics for Integrated Appraisal Techniques and Firm Size

Integrated Appraisal Techniques	***Firm Size***			
	Large	***Medium***	***Small***	***Total***
	(66.67)*	(22.22)	(20.00)	(32.00)
Scenario Planning	4	2	2	***8***
	(50.00) @	(25.00) @	(25.00) @	(100.00) @
	(33.33)*	(66.67)	(20.00)	(40.00)
Information Economics	2	6	2	***10***
	(20.00)	(60.00)	(20.00)	(100.00)
	(100.00)*	(44.44)	(40.00)	(56.00)
Balanced Scorecard	6	4	4	***14***
	(42.86)	(28.57)	(28.57)	(100.00)
	(100.00)*	(100.00)	(100.00)	(100.00)
Totals	***6***	***9***	***10***	***25***

Chi-Square = 46.681, DF = 4, P-Value = 0.000 (from column percentages)
Chi-Square = 34.115, DF = 4, P-Value = 0.000 (from row percentages)

* = Column percentage; @ = Row percentage

Therefore, survey findings support the hypothesis initially stated, i.e.

> There is a relationship between the approach a firm adopts when evaluating potential IS investments and the size of the firm. In particular, firms that use more complex evaluation techniques will tend to be larger than those that use simpler techniques

Small firms are likely to use simple appraisal techniques that adopt the economic or strategic approach, such as ROI, PP, CBA, technical arguments, SWOT analysis and CSF. On the

other hand, large firms are likely to use more complex techniques like risk analysis, value analysis, information economics and the balanced scorecard.

DISCUSSION AND CONCLUSIONS

The Usage of IS Investment Appraisal Techniques

Ratio-based techniques, especially the Payback Period and Cost Benefit Analysis are utilised heavily among small banks. The high usage of these techniques is probably best explained by their simplicity (Ashford, et al., 1988, Ballantine and Stray, 1998). However, IS executives should be cautioned about relying much on these techniques. Payback ignores medium- and long-term cash flows, and too much stress on their use can operate against proposals for new technology. CBA, on the other hand, entails the use of artificial surrogate measures for intangible benefits, whose subjective nature may affect the overall valuation of the potential project, leading to an unsound decision.

Due to the limitations of each technique, those responsible for appraising IS investments prefer to use a combination of techniques for decision-making. IS literature is fairly dismissive in it's rejection of financial techniques for appraisal. However, the results reported here do show that financial techniques are widely used by organizations to appraise IS/IT investments.

Besides the use of ratio-based techniques, strategic approaches have also been found to be very popular for appraising potential IS projects in Kenyan banks. Results from this survey indicate that, besides the financial costs and benefits of a project, the strategic fit of the project is considered the most important criteria when evaluating potential IS projects, more so by medium-sized banks, which have been found to focus more on strategic implications of potential IS investments than large and small banks.

The utilisation of technical arguments is highest among small and medium sized banks. Technical arguments focus on the internal operational efficiencies that would result from acquiring information technology. The degree of usage of technical arguments to justify an investment is not surprising as such requirements are a necessity in most IS projects. For example, a firm can invest in new upgraded computer hardware because the current hardware

cannot cope with increasing information processing needs. However, firms should be cautious when using technical requirements to approve an IS project by ensuring that overall, IS investment decisions are not driven by technical system requirements, but strategic objectives. Bacon (1992) refers to such a scenario as "the tail … wagging the dog", in which case, according to Parker and Benson (1988), IS investments are effectively decided by “technology managers" and not "business managers".

Interestingly, over 80% of the banks that consider the impact of the potential IS investment on the competitive positioning of the institution are medium and small sized, while for large firms, competition appears not to be a priority. This may indicate that large banks are first movers in IS investment and innovation, and other banks are clambering to upgrade their IS systems to catch up to trends being set by large banks in the market. Consequently, many of their investment decisions may be motivated by the fact that they “cannot afford not to invest” (Bacon, 1992, pp 346).

Applications Portfolio technique is used the least among all bank size categories. This technique adopts a portfolio management approach to evaluate how potential IS investments can be fitted into the existing collection of information systems. Executives have only recently begun to apply the portfolio approach to IS investment management in developed economies. Thus, its limited use in Kenya may be attributed to its complexity, and lack of awareness.

While the adoption of a strategic approach to IS investment appraisal is beneficial for firms as illustrated in literature, there are downsides to the exclusive use of these methods. Powell (1992) argues that firms that adopt the strategic perspective to IS investments devote less effort in appraising projects due to competition or “perceived competition”. In a different survey of the use of Decision Support Systems in accounting, Powell (1992) found that firms adopted the new technology for the sake of corporate image, so as not to be seen as lagging behind their competition.

Generally, analytical techniques are not as widely used as either economic or strategic techniques. However, Risk Analysis is conducted in by 76% of responding banks, with the proportions of large, medium-sized and small banks being approximately equal. Therefore, IS executives in most banks, regardless of the the size of the bank acknowledge that conducting a risk analysis of IS investments is important.

Like analytical techniques, integrated techniques are not widely used. The integrated approach combines somewhat subjective strategic approaches with formal structure found in economic approaches, and is considered the most sophisticated approach to investment appraisal. The Balanced Scorecard is the most popular among these techniques, being used by all large banks. The Balanced Scorecard had been found to be more popular than Scenario Planning and Screening or Information Economics in large banks. This may be because many executives have been more exposed to it.

It is important to note that the limited use of integrated techniques does not imply that firms are not considering both tangible and intangible factors in their IS investment appraisal. Due to the limitations of each economic and strategic appraisal technique, firms are using various combinations of these techniques in their assessment, where management formally or informally assign weights to each tangible and intangible factor under consideration. In this survey, 100% of firms are using multiple techniques selected from both the economic and strategic classifications. The use of a hybrid of appraisal techniques may substitute for the use of integrated techniques like the balanced scorecard. However, the information generated from such analysis may not be as comprehensive or equivalent to that of analysis using the balanced scorecard or information economics, as according to Small (2006), weights assigned to tangible and intangible factors are generally not measured for consistency. Furthermore, the assumption of linear additivity of the weighted scores may not be accurate.

From this discussion, fundamental concerns exist with the appraisal process in the banking sector in Kenya. The first concerns the limited use of the more sophisticated techniques within the banking sector. Another concern is the general lack of rigor in the appraisal process in small banks. More research needs to be undertaken, to ascertain what barriers discourage the use of sophisticated techniques, and the laxity of the appraisal process in small banks.

CONCLUSION

In this paper, new empirical evidence has been presented on current practice of appraising potential IS investments. The findings of the survey demonstrate that there is an association between the size of a firm and the technique selected when evaluating potential investments in IT. In the commercial banking sector in Kenya, it is clear that there are differences in the approach selected to analyse investments banks based on their size.

Firstly, banks classified as 'medium-sized' have adopted both the strategic and analytical approaches to investment analysis more than large and small banks. Techniques evaluating the technical importance of new technologies, the competitive edge a new system would provide the firm, Critical Success Factors of implementing alternative systems and the strategic return of the existing portfolio of technologies when the new technology is incorporated were popularly used by medium sized banks. On the other hand, small banks have adopted relatively simple techniques such as payback period and cost-benefit analysis. Apart from the evaluation of the technical importance of new technologies, the strategic approach is not adopted among small banks. Similarly, the analytical and integrated approach are least used among small banks. Finally, large banks appear to have adopted the integrated approach to a small extent. Techniques such as the Balanced Scorecard, and Scenario Planning and Screening were most popular among large banks.

Several assumptions were made in conducting this study. Among them are those applicable to the statistical methodology used when attempting to establish a relationship between the choice of IS investment appraisal techniques and the size of the firm. The results are observations of the relationships between these two variables, and therefore no claims of cause and effect can be made. Further research can be conducted to statistically establish cause and effect between these variables, and their practical implications.

The findings in this thesis could be strengthened and expanded by replicating the study at a different point in time and in other industries. In addition, many of the subjective interpretations of the data made in this paper could be strengthened with formal data.

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