

**Organisational Performance and IT investment intensity in RSA e-Commerce
Organizations – a pilot study**

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International Business Information Management Conference 2003, December 16-18, 2003,
Cairo, Egypt

ABSTRACT

This article reports on a pilot study in the Republic of South Africa (RSA) to consider if a link exists between organisational performance and intensity of Information Technology(IT) investment found in organisations conducting e-Commerce during 2001/2002. The answers to the research questions indicate that in top performing organisations; (i) IT costs as a proportion of operating costs are higher; (ii) IT costs as a proportion of turnover is lower, than in weak performing organisations; and (iii) that a positive correlation exists between the Computerisation Index (CI) and the Operating Costs ratio. The investigation also reveals that Chief Executive Officers (CEO)'s expect additional output when planning e-Commerce operations, but maintaining IT budgets constant. Evidence is presented that company performance is linked to the level of IT investment intensity in the sample of organisations investigated, even though more output was expected from IT departments.

1. Introduction

Achieving business value from Information Technology (IT) and e-Commerce investment is one of the more common organisational concerns facing CEOs [5]. IT and e-Commerce are investment growth-areas in most organisations; in fact many organisations will not be able to function without IT or digital commerce. The role of IT has also been redefined by some organisations to include attempts to embark on e-Commerce operations. The role of IT in organisations is not merely a tool for processing and communication, but a strategic weapon that can affect an organisation's competitive position [10;5].

Some variables that will be discussed, includes IT, e-Commerce, investment and achieving value from this investment. This article gives significant results as it contributes to the understanding of managers that IT and e-Commerce may change the way IT investment is considered. Only South African organisations is used and aims to improve the understanding off IT and digital investment by managers and academics.

1. Review of Past research

It is found that Management Information Systems (MIS) as a discipline, has not yet developed a tradition of historical research [6]. This historical analysis clarifies the understanding of the processes in which IT is being introduced into organisations as well as the associated forces that shape its use. They argue that a dominant design could emerge in several new ways; organisational infrastructure, functionality, products, services, production functions or new cost structures. The challenge using historical analysis lies in discovering the reasons why some organisations lead their industries using and applying IT, and why other organisations, having spent millions of dollars achieves modest success rates.

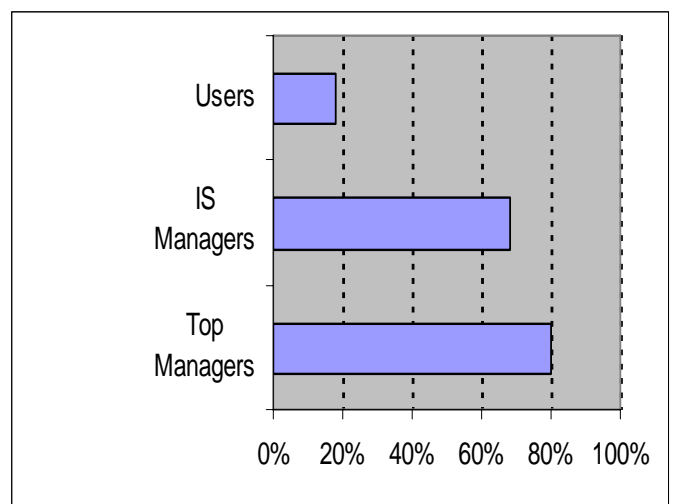
The perception (or promise) of increased advantage was the driving force behind large-scale IT investment since the 1970's [2]. Current debate continues amongst managers and academics with reference to the measurable benefits of IT investment. Return on Investment (ROI) and other performance measures in academic literature, indicates conflicting empirical findings. They also conjure

that it would be convincing to infer causality if IT investment in the preceding years that correlate significantly to the performance of the organisation in the subsequent years. Researchers have used the Granger causality model with three samples of organisations and discovered that there was no increase in the level of financial performance.[2] Rather, it is the other way round – increased financial performance lead to increased IT investment.

A manager can use the framework considering the appropriateness of using real options theory in strategic IT investment by systematically justifying the use thereof [11]. The authors classify IT costs and provide some insight of the relationship between technology standardisation and IT investment decisions. Research also reflects that managers of organisations are concerned whether their organisations are achieving IT and e-Commerce value from their organisation's IT investment [5].

Figure 1: Top managers and IT managers are most concerned about achieving value from IT and e-Commerce

Technology and societal changes are moving the global market rapidly towards a new economic order rooted in e-Commerce [1]. The authors investigate some factors including macro economy, ability to invest, access to skilled workforce, cost of living and pricing. The authors also state that many organisations face a chronic shortage of resources (including funding). Management should be aware that e-Business is part of the complex and general economic structure and the success of organisations depend on structures as well as the optimum allocation of resources.



Over the years, Information Systems (IS) represents a significant investment for many organisations [12]. Managers need to know that the decision made to spend money on IS should be analysed like any other major purchase. She argues that general management often gives in to the expert power of the technologists, both internal and external to the organisation. The return on investment on an IS acquisition may not be quite as simple, or straightforward as other capital expenditure.

The author also states that it is still possible to do the financial analysis.

Research has shown that it would be of great benefit if there is a general recipe that could ensure success. Strategies (e-Commerce, IT and organisation) including the framing of all IS investments could ideally be aligned around business requirements, rather than on technology requirements [12]. The author states that it needs a workhouse of a system to facilitate the operations of the form as it works to realise its strategic vision. She further argues that managers should be measured against the accuracy of their tangible financial projections. Every investment should be justified with concrete revenue (benefits) and expense commitments. Managers should aim to do better by assessing the benefits associated in a proposed IS investment in tangible and financial terms. Executives demand this when evaluating the approval, or denial, of any other capital expenditure. IS investment decisions are

business decisions and not technology decisions [12].

It is reported that e-Commerce technologies are becoming increasingly important to South African apparel producers as they are integrated into global value chains [7]. The author suggests that the empirical evidence emanating, appears that e-Commerce is still in its infancy but there is potential for growth. The problem is to ensure that there is sufficient financial support to sustain success. He argues that South African organisations should increase their investment in e-Commerce.

The awareness and level of implementation of e-Business in European Small and Medium Enterprises (SME)'s differ in some aspects from larger organisations. The issues of highest importance at site are; leadership, time to market, marketing and financial management and a narrow vision of business survival [8]. He further states that small firm's perception of quality, price, production reliability, service reliability and capability to provide support are normal buyer's demands. The aspect of value obtained from IT investments is not reflected. The main idea is that cost execute transactions be reduced. He states that developing e-Business expertise is essential to sustain the competitive advantage. The problem SME's face are to be aware that some aspects such as financial management could impact on their future plans.

It is also argued [9] that the resource-based view can be used to investigate the impacts of IT investment on organisational performance. A strong IT capability can support improved organisational performance. Furthermore, their results indicate that organisations with superior IT capability, exhibit current and sustained organisational performance. They note however, that previous performance must be taken into account when doing these calculations.

A research study reveals that while IT investment has the potential of providing competitive advantage, actual returns on such investment vary widely and a majority of CEO's rank past IT investment disappointing [3]. There are many methods for investment evaluation, but traditional methods do not adequately account for the intangible benefits that characterises strategic investments. They also lack other features of portfolio selection. He describes a model based on the analytic hierarchy process that could possibly overcome the deficiencies associated with traditional approaches to economic evaluation of IT investment. This approach reflects both on tangible and intangible methods and links IT investment to business strategies.

2. The Research questions and Research Methodology

2.1 Research Questions

2.1.1 *The relationship between profitability (Operating Expense Ratio) and IT investment (IT Ratio)*

Research was conducted considering profitability and IT expenditure in South African e-Commerce organisations [5]. Research finds that no relationship exists between organisational performance and the relative portion of resources allocated to IT [8]. The author argues that the measure of performance will not capture all factors that contribute to the organisation. Using a case study, the research findings reveal the importance of converting IT investment into productive inputs with different levels of effectiveness, depending on the organisation [10]. There is empirical evidence that the use of IT results in lower cost in an organisation's operation [9].

The first question can thus be formulated as:

Is there a negative correlation between IT investment with profitability in e-Commerce intense organisations?

2.1.2 *The relationship between profitability (Financial Ratios) and Computerisation Index (CI)*¹

Two key factors are emerging; determining the return on investments (ROI) on IT is difficult; investment in IT alone is not sufficient to be profitable [10]. However, IT investment reduces the cost of revenue generation [12]. Evidence indicates that organisational performance is linked to the level of IT investment intensity [9].

The second research question (based on a research study [9]) is stated as:

Is there a positive correlation between IT investment intensity and organisational performance?

2.1.3 *The relationship between Profitability (Return on Assets and Return on Equity) and IT/e-Commerce strategic management integration with organisational strategic management (Business management processes)*

¹ Computerisation Index was discussed in detail in a previous paper by Lubbe, Hoard and Parker: *The Profit Impact of IT* (JIT, March, vol. 1, no 10, pp.44 – 51)

The third research question is formulated as:

Is there a positive correlation between IT investment and strategic management of IT and e-Commerce operations?

2.2 *Research Methodology*

In order to collect the data for the research questions, the authors used a structured questionnaire. The population consisted of all IT intensive organisations that had just started an e-Commerce operation. A number of companies were selected who indicated their willingness to cooperate in the research. A copy of the research instrument was mailed to them requesting to include financial statements for the period covered (2001/2002).

The completed questionnaires were collected and analysed to extract the data. The CI was calculated from data collected using the questionnaires. Financial Ratios were calculated using data from the statements and the questionnaires. Data showing the relationships between the CI and measure of financial performance were plotted on graphs using Microsoft Excel 2000.

3. The Results

In order to test the validity of aspects of the questionnaire, respondents may have had difficulty understanding the questions when answering. A pilot study was conducted using some of the companies in the sample. This was done to ensure that it was possible to collect all data required for the ratios. Ambiguities were removed in order to reflect a concise research instrument.

3.1 Assumptions

It was assumed that the organisation's financial figures supplied were accurate. In addition, it was assumed that respondents completing the questionnaires did so accurately. However, some data given by respondents in the questionnaire could not be verified. The study did not check the accounting method and it is acknowledged that this could influence the results.

Research Question 1: The relationship between profitability (Operating Expense Ratio) and IT investment (IT Ratio)

The data needed for this section was gathered from financial returns provided by the organisations. Figure 2 illustrates a profile of both, the turnover and operating expenses for the organisations in the sample (2001/2002). Turnover normally exceeds the operating expenses as can be seen in Figure 2. However, in 2001, the effects of a low growth-rate in South Africa was manifested in the turnover slumping to a low. One of the organisations acknowledged funding on expansion of their operations, which affected the overall picture.

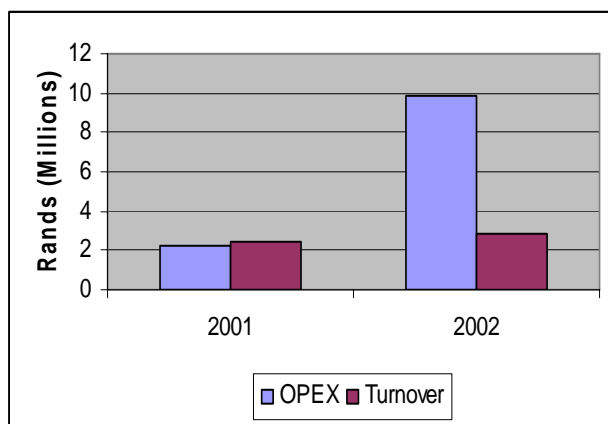


Figure 2: Turnover versus Operating Expense

Operating Expense Ratio (OPEX) and Information Technology expense ratio (ITEX) were the two ratios used in this case. These were calculated and presented in Table 1.

| Co | 2001 | | 2002 | |
|----|-------|-------|-------|-------|
| | OPEX | ITEX | OPEX | ITEX |
| 1 | 0.152 | 0.119 | 0.157 | 0.128 |
| 2 | 0.128 | 0.037 | 0.148 | 0.053 |
| 3 | 0.162 | 0.117 | 0.180 | 0.145 |
| 4 | 0.257 | 0.160 | 0.427 | 0.180 |
| 5 | 0.172 | 0.483 | 0.252 | 0.820 |
| 6 | 0.422 | 0.139 | 0.374 | 0.232 |
| 7 | 0.783 | 0.118 | 0.718 | 0.099 |
| 8 | 0.916 | 0.002 | 0.933 | 0.003 |
| 9 | 0.991 | 0.002 | 0.963 | 0.001 |
| 10 | 0.987 | 0.003 | 0.980 | 0.003 |
| 11 | 1.009 | 0.062 | 0.860 | 0.082 |
| 12 | 0.093 | 0.001 | 0.963 | 0.000 |

Table 1: Operating Expense Ratios and IT Expense Ratios

The ratios were calculated and averaged over the period under investigation, to negate the effects of seasonal and abnormal influences as indicated. Finally the organisations were sorted using the OPEX ratio as a primary key in ascending order and grouped in quartiles (Table 2). This was done partly to disguise the data and to neutralise the effect of seasonal and other influences.

| Quartile | OPEX | ITEX |
|----------|-------|-------|
| I | 0.155 | 0.100 |
| II | 0.317 | 0.336 |
| III | 0.734 | 0.037 |
| IV | 0.965 | 0.076 |

Table 2: Quartile groupings for organisations (2001/2002)

Table 2 is the result of sorting the organisations (OPEX is the primary key) in ascending order and

grouped together in quartiles; the first three companies were used for quartile I, the second three for quartile II, etc. Although all the above-mentioned operations were used to negate the effects of seasonal and economic fluctuations, the results of a loss could still be seen in the second quartile. There is a negative correlation of 0.5425 between the Operating expense ratio and the IT ratio. This provides further evidence that there is a link between the two ratios and supports statements by researchers [10;5].

Research Question 2: The relationship between profitability (Financial Ratios) and Computerisation Index (CI)

Table 3 compares the operating expense ratio, IT expense ratio and CI. The CI indicates and supports the second question noting that there is a link between computerisation and organisational performance. The better an organisation performs, the higher the CI. From a statistical point of view, the Spearman ranking indicates a high negative correlation of 0.8842 between the CI and the OPEX, while only a positive correlation of 0.4126 was measured between the OPEX and ITEX ratios. CI is a better measure for the intensity of computerisation in an organisation

| C | CI | OPEX | ITEX |
|----|----|-------|-------|
| 1 | 73 | 0.155 | 0.124 |
| 2 | 47 | 0.138 | 0.045 |
| 3 | 13 | 0.171 | 0.131 |
| 4 | 10 | 0.342 | 0.170 |
| 5 | 7 | 0.212 | 0.652 |
| 6 | 6 | 0.398 | 0.186 |
| 7 | 5 | 0.751 | 0.109 |
| 8 | 5 | .0925 | 0.003 |
| 9 | 5 | 0.977 | 0.002 |
| 10 | 5 | 0.983 | 0.003 |
| 11 | 8 | 0.934 | 0.072 |
| 12 | 6 | 0.528 | 0.000 |

Table 3: Relationship between CI and Operating and IT ratios

Research supports the fact that the CI applies to other industries as well further supporting these findings [4]. Further statistical analysis indicates an F-Ratio of 3.89 and squared mean deviation of 0.384485 between the CI, OPEX and ITEX ratios. The correlation matrix used to estimate the coefficients produced a correlation-coefficient of -0.8778 between the CI and OPEX ratio and a correlation-coefficient of -0.675 between the CI and ITEX ratio. The correlation was thus negative and high. There was weak correlation between the CI (the constant, level of computerisation) and the ITEX and OPEX ratios (the variables). It aims to assist in answering the second question that a relationship exists between profitability and computerisation. Figure 3 illustrates the findings in more detail.

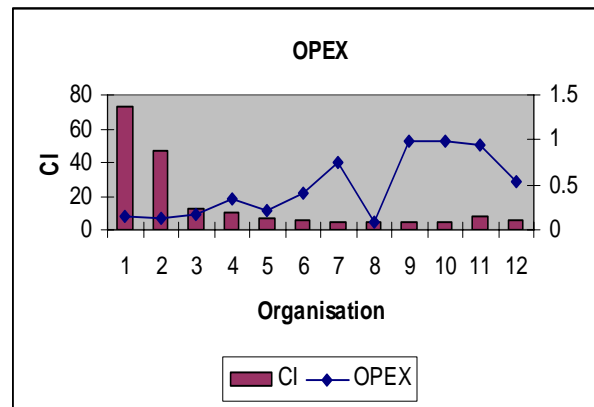


Figure 3: CI versus OPEX ratio

Research Question 3: The relationship between Profitability (Return on Assets and Return on Equity) and IT/e-Commerce strategic management integration with organisational strategic management (Business management processes)

A positive correlation of 0.54 was found which led to accept the fact that there is a relationship between profitability and IT/e-Commerce strategic

management integration at the 95% level. The main problem that most respondents highlighted is that they are still allocated the same funding, but that top management expects more from them. In real terms, this means that top management expects e-Commerce to stem naturally from the IT department. All the organisations placed e-Commerce in the IT department.

4. Conclusion

The relative high correlation that is evident from Figure 3 may be attributed to the strategy employed with IT investment decisions and supported by other research [12]. The strategic importance of IT investment needs to be emphasized and the importance of IT investment decisions needs to be considered by business managers. It may affect their e-Commerce and other commercial operations. Organisations need to ensure that e-Commerce is not part of the IT department but a department on its own with an own strategy.

It is important to note that the more IT and e-Commerce investment decisions are aligned with business strategies, the more IT and e-Commerce investments align with the overall organisation strategy.

This may help businesses in the long run. Although the study does not conclusively deliver proof of a positive or negative correlation, it shows that in the sample used, a strong tendency exists that:

Organisational performance is correlated with IT investment intensity.

IT investments will be correlated in IT and e-Commerce intensive organisations with their profitability.

It should be noted that to find organisations just embarking on e-Commerce is extremely difficult and therefore explains the reason for the small sample size.

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