Information technology investment and firm performance in developing economies:The relationship between management practices and performance

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Abstract: Over the last two decades, organizations In Namibia and Zambia have been increasingly investing in information technology (IT) largely due to prospects of IT enabled organisational performance improvements. However, despite these assumptions, insufficient validations have been done in the context of these two countries due to limited local research on this topic. The aim of this study is to investigate the performance of local IT investments and the determinants of value creation. A basic premise of this paper is that IT enabled firm performance is influenced by how effective the firm is in using IT resources to support and enhance its core competencies. In accordance with literature the findings indicate that firms in the two countries consider IT investments as vital for superior firm performance. However, IT management practices employed are considerably different from the recommended best practices of IT governance, nevertheless IT investments still performed significantly well partly due to prevalent use of off-the-shelf IT solutions and IT investments leadership and championship by IT and/or line managers. There are also issues with effectiveness of IT deployment and Information system and information quality.

Keywords: IT Investments, Firm Performance, IT Impact, IT in Namibia, IT in Zambia, IT firm performance in Developing countries, IT Value creation

1. Introduction

During the last two decades there has been a steady diffusion of information and communication technologies (ICT) in firms from all sectors in Namibia and Zambia. In his research in Namibia in the late 1990s Lubbe Sam (Lubbe, 2000)

notes that a number of reasons have motivated the trend. He cited among them the increasing intensity of domestic and global competition and ever increasing demand and quest for improved product quality and service delivery. On the part of governments, e-governance is seen as having the potential to improve public service delivery by public institutions towards transparency, accountability, fighting detrimental vices like corruption and responsiveness which is necessary to promote collaborative and joint-up administrations with other stakeholders in the government business (Bwalya, 2009). This has led organizations to adopt IT as a means for more efficient and effective ways to achieve their goals. Actually for some organisation IT is an unavoidable necessity for them to continue operating and for most business firms in a possible means for expansion and meaningful participation in international markets.

For developing countries Like Namibia and Zambia the current socioeconomic differences from developed economies combine with other complex factors most of which are non-technical to present challenges in IT implementation and exploration. These socioeconomic differences implies that IT implementation and exploration models developed, tested and validated in developed countries cannot be directly replicated to developing countries without further investigation and validation. Per-haps Freeman and Lou çã (Freeman, & Lou çã 2001) Succinctly puts it better that "successful catch-up has historically been associated not merely with adoption of existing technologies and techniques in established industries but also with innovation, particularly of the organizational kind". Moreover there are remarkable differences in the objectives of firms studied in developed countries and most of those being investigated in the local context.

The organisation of this paper is as follows. The next section elaborates the theoretical framework, and discussion on the research methods followed by presentation of the results and a discussion of the results. Finally the conclusion provides suggestions for considerations by firms and possible further research directions.

2. Theoretical Framework

In recent years, scholars in many fields have sought to rationalize and explain how investments in IT resources and IT capabilities[1] by firms can affect performance or rather create value and potentially serve as sources of

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[1] The firm's capacity to exploit IT resources to improve operational efficiency and effectiveness as well as to explore using IT resources in order to create novel solutions by pursuing new possibilities.

sustainable growth and competitive advantage. However, defining what IT value really means has been challenging and a source of contention. There are diverse perspectives on the nature of the benefits from IT to organizations as demonstrated by a meta-analysis of IT payoff variables provided by Kohli and Devaraj (Kohli & Devaraj, 2003). Melville et al (Melville, Kraemer, & Gurbaxani, 2004) define IT business value (ITBV) as: "the organizational performance impacts of information technology at both the intermediate process level and the organizational-wide level comprising both efficiency impacts and competitive impacts". Other researchers have argued that this description is not comprehensive and should be extended to include other dimensions like organizational transformation which should also be seen as a component of the business value resulting from IT and also a driver of further change (Gregor, et al., 2006). It will however take a while and more studies before a comprehensives definition is agreed upon, but for now the definition by Melville et al. (Melville, et al., 2004) with consideration of proposed extensions captures salient characteristics of IT value. We also believe it suffices to define IT value for firms in the two countries being investigated.

2.1. IT productivity Paradox and it's implication on this study

Failure by research to show IT enabled productivity gains has been a recurring theme in literature. IT value researchers have for long and continues to struggle with contra-diction between remarkable advances in computer power and its usage and the relatively slow growth of productivity at the level of the whole economy, industry and individual firms leading to coining of the term "IT Productivity paradox" (Brynjolfsson, 1993; Kohli & Devaraj, 2003). Early empirical studies found that there was either no relationship, or a slightly negative relationship, between firm performance and IT investments (Barua & Lee, 1997; Brynjolfsson, 1993). Some studies found mixed results for the impact IT investment on ITBV (Barua, Kriebel, & Mukhopadhyay, 1995; Francalanci & Galal, 1998).

The picture changed however, as subsequent studies incorporated more sophisticated models and extensive analysis of prior studies in testing the relationship between IT and productivity. Generally it was concluded that data, methodological and analytical problems hid "Productivity-revenues" and that Performance output is sometimes difficult to measure, especially in the service sector. This implication is cardinal when investigating IT enabled productivity gains in Zambia and Namibia to ensure no repeat of initial mistakes.

2.2. Research Conceptual model overview

Due to lack of research and IT investment and exploration frameworks verified and tested in Zambia and Namibia we have relied on models used in other Developing countries and drawn ideas from those developed and verified in developed countries as well. We identified a number of variables that are critical success antecedents of IT enabled firm performance enhancement. The antecedents variables basically fall in three categories; 1) Leadership: degree of top management support, investment championship & involvement, 2) IS/IT success: actual appropriate IT Usage, System and Information quality, change management and 3) IT/Business strategy alignment: IT/Business function collaboration, training and IT implementation structures and processes.

3. Hypothesis Development

Firstly we acknowledge that there has been numerous scholarly works which have concluded that IT creates positive value (Barua & Lee**,** 1997; Brynjolfsson & Hitt, 1996; Dewan & Min, 1997; Soh & Markus, 1995). The specifics and the determinants may still be debatable but there is considerable literature emphasizing the innovative capabilities that IT offer as catalysts and enabler of big improvements of existing business processes and work practices, which, in turn under certain conditions can lead to superior firm performance (Bresnahan, Brynjolfsson, & Hitt, 2002; Brynjolfsson & Hitt, 1998; Ravichandrasn & Lertwongsatien, 2005). The surge in IT investments in Zambia and Namibia can also justifiably be regarded as an indication of IT value creation capabilities. This leads to our first hypothesis which.

Hypothesis 1: There is a positive relation between IT investment and firm performance.

In contrast to past studies that have implicitly assumed that IT capabilities have direct effects on firm performance, most recent understanding is that IT can generate value only if deployed so that it leverages pre-existing business and human resources in the firm via co-presence or complementarity. It is assumed that the impact of IT on organizational performance depends not only on IT as such but rather on the alignment or ''fit'' of IT with other dimensions of the organization such as its strategy, structure, and business processes (Mata, Fuerst, & Barney, 1995). Therefore maximizing the value of IT investments requires that these investments link directly to organisational strategic objectives. Hence our second Hypothesis:

Hypothesis 2: Alignment of IT resources with organisational objectives will

positively affect performance.

From the foregoing, it is apparent that the delivery of value from IT is dependent on aligning IT with business strategy which requires prudent IT management. Critical success factors for management of IT for success cited in literature include top management support. Basically, researchers have argued that a top management teams that promotes, supports, and guides the IT function is perceived to enhance IT enabled performance impact (Armstrong & Sambamurthy, 1999; Ross, Beath, & Goodhue, 1996; Wade & Hulland**,** 2004). For example, Armstrong and Sambamurthy (1999) found that "the use of strategic information technologies could lead to strategic advantage subject to management vision and support. When such support is lacking, IT resources will have little effect on performance, even when substantial investments are made…" Thus our third hypothesis posits that:

Hypothesis 3: Strong top management commitment to IT will interact with IT re-sources to positively affect performance.

IT can provide value not only based on how-much is actually deployed but also how successful IS/IT is. According to the DeLone and McLean Model (2003) of Information System success, "an Information System is created, containing various features, which can be characterized as exhibiting various degrees of system and information quality. Next, users and managers experience these features by using the system and are either satisfied or dissatisfied with the system or its information products. As a result of this "use" and "user satisfaction," certain "net benefits" will occur, positive net benefits influences and reinforces subsequent "use" and "user satisfaction." (DeLone & McLean, 2003). This implies that higher levels of appropriate use as a proxy of success of information systems are necessary for IT to impact performance of a firm. Thus our fourth hypothesis posits that:

Hypothesis 4: High level of appropriate use of IT resources and capabilities will positively affect performance.

4. Research Model

4.1. Firm Performance Indicators

Previous researches have used a number of indicators to measure firm performance. Basically these are performance indicators relate to an organisation's capacity to exploit IT resources (IT capabilities) to achieve factors that are important for superior firm performance. In a comprehensive review, Hulland et al (2007) categorises these IT capabilities into internal and

external.

(1) *Internal capability:* emphasizes on utilizing IT resources to enhance internal control capabilities, strengthening cooperation among departments and supporting operations, including, automation, management decision support and enhancing IT experience (Hulland, Wade, & Antia, 2007). Internal capability also includes ability to facilitate development of new business options or aiding future technology adoption and innovation.

(2) *External capability:* concerned with the ability to adapt to the external environment, the ability to work with external partners (such as upstream and down-stream suppliers and clients) for cooperation and information sharing, the capacity of facing the market and customer needs promptly. They are mainly concerned with partnership management, market response and organizational agility (Hulland, Wade, & Antia, 2007).

Supported by the literature review described above, we have carefully selected four categories of performance variables as shown in Table 1. We believe the selected performance indicators represent key factors necessary for a firm to excel in the con-text of Namibia and Zambia.

Table 1: Firm performance indicators used in this study.

Category of Indicator	Indicator variable
Financial/Firm-level indicator	IT impact on improving firm profitability or enhanced service delivery.
Efficiency oriented indicators	IT impact on Productivity enhancements and cost reduction.
Internal oriented capability	IT impact on improving internal processes and controls.
External oriented capability	IT Impact on improving relations with customer (satisfaction), suppliers and Stakeholder Confidence.

4.2. Research conceptual Model

Guided by detailed review of the relevant literature and we propose an IT value conceptual model that consists of seven (7) compound-variables that reflect antecedents for IT enabled performance and metrics for actual performance outcome at intermediate process level and firm level. We derived a research model shown in Figure 1. The model includes hypothesized relations between IT resources and IT enabled performance antecedents (Top management support, IT-Strategy alignment and actual appropriate usage as a proxy for IS/IT success) and perceived intermediate and firm level IT enabled benefits. This model is hoped to provide a pertinent framework to investigate the intervening roles our selected IT value determinants.
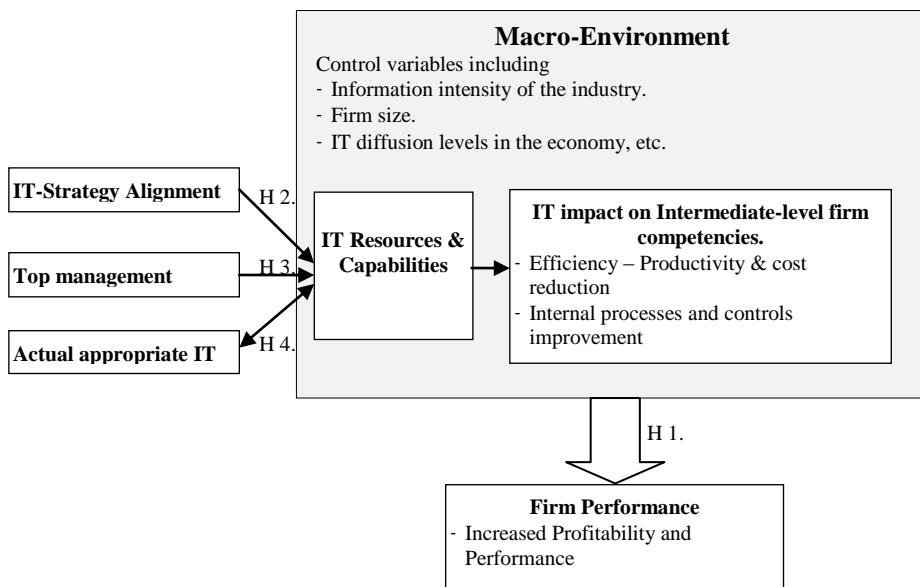
Fig. 1: Research Model.

It should be noted that all inputs and output variables here were regarded to have the same importance, no rating was used distinguish levels of contribution, Further-more simple average of the variables items was used to form single composite value pertaining to each respective input or output variable. The variables were calculated as follows.

5. Methodology and Data Collection

5.1. Overview of Data collection and field study

To collect data for this study we used a survey instrument that was developed after extensive literature review and subsequently verified and corrected with the help of local IT experts. Essentially most questions that were used required respondents to rate their perception of the impact of IT on different indicators or their rating of how much IT management effort their firm makes. We used 5-point likert scale, with 1 indicating not agreeing and 5 strongly agreeing or 1 indicating no benefits and 5 indicating excellent benefits depending on the questions. However, some open-ended and structured questions relating to details of participating organisations' IT investments (e.g. motivation, type of IT resources, cost, scope and pre and post investment evaluations used) and IT management practices were also used. After the initial data collection, case studies were conducted in four organisations that had participated in phase two.

The objective of the case studies were to verify the findings and get deeper understand specific IT value attributes as well as IT governance practices

6. Results and discussion

The results for the DEA runs and descriptive statistics on our database of 114 records are summarized as shown in Table 2. .

6.1. Limitations

Before discussing the results, it is important to note the limitations associated with this research. Perhaps the most important limitation is that the results can only be interpreted relative to the inputs and outputs included in this study and restricted to participating firms. Secondly, since we used user perceptions, it is possible some respondents could have misrepresented facts. Nonetheless, we believe we carefully attempted to address each of these limitations as explained in preceding discussions.

6.2. Analysis of results and discussion

Upon analysis of the results, a number of issues were observed; cardinal among them was that IT governance practices prevailing in Namibia and Zambia differ considerably from the recommended IT governance best practices as well as across different sectors and size of firms. Table 2 presents descriptive statistics for responses to the instrument used during interviews or distributed as a questionnaire. The associations within the research model were tested using Pearson correlations.

It was observed from DEA analysis that Government Departments and Small and Medium (Private) Enterprises (SME) recorded higher proportions of efficient firms compared to Banking/Insurance and Telecommunications/Utilities as indicated (Table 2). This may seem to contradict other empirical studies that have established Banking industry as one of the most efficient IT users compared to other industries (Shafer & Byrd, 2000). Nonetheless, since the DEA analysis we performed takes deliberate management efforts as input, it implies therefore that firms that did not do much in terms of management of their resources but recorded some positive impacts were returned as efficient. As seen from summary data in Table 2, most government departments and SMEs recorded significantly high performance impacts but recorded relatively low level of management efforts. For example all firms categorized in the study as SMEs despite making substantial IT

investments, performed poorly on measurements on management practices and level actual usage levels.

Table 2: Results summary.

Industry	No. of Firms	No. of Efficient Firms	Percentage of Efficient Firms	Avg. % IT-Strategy Fit	Avg. %-Top Mgt. support	Avg. %-Level of use	Avg. %-Overall perceived Impact
Banking/Insurance	21	3	14.3%	55.3%	65.0%	74.0%	75.8%
Telecommunication and Utilities	42	5	11.9%	61.1%	62.0%	69.6%	76.6%
Government Departments	28	11	39.3%	32.5%	35.1%	54.5%	65.0%
Private SME	23	9	39.1%	32.5%	9.7%	25.3%	76.3%

6.2.1. HYPOTHESIS 1: There is a positive relation between IT investment and firm performance.

With regard to the proposed research framework, and consistent with previous studies hypothesis 1 is supported by results. The findings indicate that almost all firms in Namibia and Zambia consider IT as having significant impact on overall firm performance and regard it as strategically essential for organisational survival and growth. As seen from Table 2 in almost all industries IT was perceived as having as high as 76.6% performance impact level on different performance indicators of different firms. Besides direct impact on internal operations, efficiency improvement, external relations and overall organisation performance respondents highlighted a number of other benefits realised from IT investments including:

- Initial investments in IT provided insights into capabilities of IT and most firms indicated that they invested either in further enhancements of initial capabilities or different other systems.
- Most respondents acknowledged that investment in systems supporting internal operations and controls contributed the most benefits.
- Most users acknowledged the strategic need to invest in IT despite lack of immediate payoffs, for the sake of remaining relevant in the new information era.

6.2.2. HYPOTHESIS 2: Good Alignment of IT resources with organisational objectives will positively affect performance.

Apart from establishing whether IT was generating any value the second objectives was to establish the determinants of the value. The results indicate significant (albeit weak) support for IT alignments impact at 0.01 significance

level ranging between 0.230 and 0.304 for the all the four output (performance) variables. This finding collaborate findings by other researchers like Chan and Reich (2007), Choe (2003), and Palmer and Markus (2000) who posits IT alignment as moderating factor of IT impact on performance. However, the weak correlation in the local context is somewhat interesting in view of the fact that most researchers have found high correlation between IT alignment and impact. Our observed possible explanation is that IT governance practices in most firms investigated do not meet recommended good practices which we used to operationalise the metrics for IT alignment. As already mentioned we adopted the assertion by Symons (2005) and IT Governance Institute (2003) that IT alignment results from implementation IT processes (e.g. CobiT framework), structures (e.g. IT Liaison Committees) and facilitation of communication (e.g. Training) as well as Top management participation as part of good IT governance practices. However, most firms did very little towards adopting recommended best practices for achieving IT alignment. Further it was noted that most firms lacked consolidated IT management frameworks and that investments are usually motivated, justified and championed only by IT managers or concerned line managers. In some cases, especially among government departments IT investments were justified outside the firm's management structures. These factors led to low scoring on the IT alignment construct.

Our observation is that the pervasive use of carefully selected Off-the-shelf IT solutions usually chosen after some pre investment selection which in most cases involved vendors of different solution or consultants demonstrating their product is helping firms in developing countries to get away with fairly Aligned solutions even without employing antecedents of alignment. The other reason could be that only a few firms indicated having invested in integrated organisational-wide systems (e.g. ERPs) which usually need prudent management and cross function participation. In this case active involvement of line managers and/or IT managers and in most cases consultants was sufficient to steer IT investment projects.

6.2.3. HYPOTHESIS 3: Strong top management commitment to IT will interact with IT resources to positively affect performance.

Top management support did not produce significant correlation (considering the number of records) with any of the four output variables. However, results indicated higher significant correlation with the other input variables e.g. IT alignment and Level of use at r= 0.643 and r=0.777 at 1% significance level respectively. This could be an indication that top management support leads to

higher usage levels and good alignment. Our findings were that in most firms we investigated, IT investment project ownership and sponsorship was usually the responsibility of either IT managers or line managers. Firm executives especially in government departments did not participate actively in the initiations and subsequent project supervision to ensure successful implementation. Nonetheless, in most cases dedicated spearheading of the projects by IT managers or Line managers was found to be sufficient for the success of the investments. This highlights an important phenomenon, "when IT or Line managers take charge and act as leaders and champions of IT investments, there is chance they will succeed and deliver value even though very senior managers of firms are not themselves directly involved".

6.2.4. HYPOTHESIS 4: High level of actual appropriate usage of IT resources and capabilities will positively affect performance.

The results indicate no support for IT enabled positive impact on firms as a result of High levels of actual appropriate usage of IT resources. By the way actual IT usage was used as a proxy of IS/IT success. Our findings regarding actual use of IT re-sources were that in most firms investigated there are still a lot of issues regarding system quality, information quality and service quality as well as firms operating parallel system, both manual and automated which leads to lowered actual usage of IT systems. On system quality the problem is twofold; the prevalent vanilla implementation of off-the-shelf solutions implies no or limited contextualising of the solutions which in turn lowers user perception on usability, the second issue is the poor change management and limited trainings given to users which lead to users perceiving Information systems as not good enough. Regarding Information quality, the problem was most prominent among accounting systems were it was found that most systems did not have sufficient reports, whilst some of the reports were not tailor made to the local reporting formats which lead users to supplement what the systems could offer by requesting for ad-hoc reports queried direct from the databases. And finally service quality scored poorly because most organisations had overstretched IT departments in terms of offering user support and in most cases there were no dedicated IT specialist offering support to system users. Considering the limited amount of training and IT skills this led to poor perception of service quality as most users need extra support to work with Information systems.

Nonetheless, although indicators IS/IT success scored low, respondents generally appreciated IT systems impact on several performance indicators. There is how-ever need for more targeted research investigating IS/IT success in the local context. The results may have been inconsistent or showed no

correlation due different perceptions of IT systems which could have been influenced by technological readiness, economic and cultural differences with the setups where other studies have been conducted. There is also need to understand how IT is deployed. Taylor & Todd (1995) and DeLone & McLean, (2003) suggest that effective deployment of IT should help ensure high systems, services and information quality leading to high usage levels.

7. Conclusion

In spite of some limitations the findings of this study have significant implications for Namibia and Zambia and developing countries with similar situations in general. This study contributed to addressing the gap that exists between theoretical frameworks, prior empirical research in developed countries, and contemporary practices of IT investments in developing countries. Most importantly findings add to the evidence that IT business value creation is not a phenomenon idiosyncratic to developed countries only but also applicable to developing countries. The findings also established that IT governance, deployment and implementation practices are remarkably different from those recommended in best practices devised in developed countries illuminating areas that need further systematic research. Much as the results indicate almost unanimous recognition of IT performance impact and IT's diverse potential of adding value, there is need for prudent management of IT if the investments are to be optimised and sustained for longer periods. This does not necessarily mean adopting the standards or practices that have worked elsewhere but rather developing models most suitable to local environment which are well informed on the local value determinants.

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