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ICT Operational Risk Management (ORM) and Performances of a Financial SME

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This paper investigates the relationship between ICT operational risk management (ORM) and the performance of an SME. To achieve this, this research investigated five specific elements, namely: the principal causes of ICT ORM failure in an SME; change management requirements; characteristic(s) of business information; challenges posed by new ORM solutions; and evaluation models for understanding the value of ICT ORM in SMEs. Following a literature review, an electronic survey consisting of closed ended questions was developed. This was distributed at a financial company in the Eastern Cape and 107 responses were gathered. Factor analysis was used as a data reduction technique to reduce the large number of related variables to a more manageable number. The empirical evidence presented indicated that a significant proportion of the aforementioned variables have impact on the performance of an SME. Therefore, this paper indicates that there is a strategic impact of ICT ORM on SME performance.

Keywords: SME Performance, Operational Risk Management, Information Communication Technology

1. INTRODUCTION

The need for ICT Operational Risk Management (ORM) in Small and Medium Enterprises (SMEs) has been described substantially in existing literature [ITGI (2013)]. Additionally, a few empirical studies have shown the association between ICT ORM and performance in an SME [ITGI (2013)]. Those studies found that good ICT ORM in SMEs can generally improve performance. However, there are other studies which empirically suggest the existence of indirect relationships between ICT ORM and SME performance [Anderson and Choobineh (2008)].

This paper investigates the relationship between ICT ORM and the performance of an SME by considering five elements, namely: the principal causes of ICT ORM failure in an SME; change management requirements; characteristic(s) of business information; challenges posed by new ORM solutions; and evaluation models for understanding the value of ICT ORM in SMEs. Therefore, it investigates ORM adoption in an Eastern Cape SME. The objective is to examine one Eastern Cape business to study the ORM impact on the SME.

It is important to note that the study adopted a common industry definition of operational risk, namely "the risk of direct or indirect loss resulting from inadequate or

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failed internal processes, people and systems or from external events" [Basel Committee on Banking Supervision (2004:2)]. Noting that several categorisations of IT risk have been proposed, for the purpose of this study, the researcher adopts and adapts those made by the IT Governance Institute [Basel Committee on Banking Supervision (2004)]. IT risk has been categorised as the solution delivery/benefit realisation risk, associated with the contribution of IT to new or improved business solutions, usually in the form of projects and programmes [ITGI (2009:11)]. It is important to note that this categorisation "focuses on the causes of operational risk which is appropriate for both risk management and, ultimately measurement" [Basel Committee on Banking Supervision (2004:2)]. Consequently, this study sets out further details on the effects of operational related IT risk.

Before investigating the impact of ICT ORM on SME performance, it is prudent to provide a definition of an SME to ensure common understanding of this research context. "SME" stands for small and medium-sized enterprises—as defined in EU law. The main factors determining whether a company is an SME are (1) number of employees, and (2) either turnover or balance sheet total [Verheugen (2003)]. Table 1 (below) shows the thresholds (in terms of employees and turnover) for the classification of a company as medium, small or micro.

Table 1

The New Thresholds[1] *(24:14)*

Company Category	Employees	Turnover
Medium-sized	<250	≤ € 50 m
Small	<50	≤ € 10 m
Micro	<10	≤ € 2 m

It has been argued that for competition and merger analysis of SMEs, it is important to know the effects of market concentration and past merger on an institution's efficiency [National Credit Regulator (2008)]. Additionally, the National Credit Regulator (2008) found that ICT ORM activities contribute significantly to enhancing the efficiency of SMEs. Here, they argue that ICT ORM are activities that may be used to improve SMEs efficiency.

Furthermore, efficiency is seen to have positive effects on interest rate risk capitalisation but a mixed result on the effect of ICT operational risk in SMEs [National Credit Regulator (2008)]. Standing, Guilfoyle, Lin and Love (2007) indicate that profit efficiency is sensitive to ICT operational and insolvency risks, but not to liquidity risk or to a mix of loan products in SMEs. Hence, it is expected that by managing these risks, the institution's efficiency can be improved. Thus, from the literature, it is expected that ICT operational risk in SMEs' practices is associated with the level of efficiency and performance of SMEs.

The next section of this paper reviews related research in terms of ICT Trends in Financial SMEs. This is followed by a discussion of Information Technology Risk Management (ITRM) leading to the description of the main research objective of this

[1]Verheugen (2003).

paper. The key areas of the paper, namely the method followed for data collection, description and analysis of the findings and recommendations based on the findings form the concluding sections of the paper.

2. RELATED RESEARCH: ICT TRENDS IN FINANCIAL SMEs

Although ICT operational risk in SMEs is one of the key functions of financial institutions, very little has been done to date to link ICT operational risk in SMEs with performance [Basel II (2004)]. As discussed previously, efficiency and ICT operational risk have been linked in previous studies, thus it is prudent to consider the link between ICT ORM and performance in an SME.

However, conceptually, the objectives of ICT operational risk in SMEs that provide relationships between ICT ORM and SME performance have been amply discussed [Basel II (2004)]. While directors see ICT operational risk in SMEs as critical, there is real concern that ICT ORM in SMEs is less focused, thus detracting from business performance. Furthermore, Liebenberg and Hoyt (2003) researched a sample of firms[2] that signalled their use of ICT ORM in SMEs by appointing a Chief Information Officer (CIO) and found that firms with greater financial leverage are more likely to appoint a CIO.

These findings are consistent with the hypothesis that firms appoint CIOs in order to reduce information asymmetry with regard to the firm's current and expected risk profile, noting that this is particularly true for large firms. Liebenberg and Hoyt (2003) provide further evidence that financial institutional investment in ICT ORM in SMEs during the 1990s helped reduce earnings and loss volatility during the 2001 recession.

A recent study by Sholes (2007) used a hazard model to examine the factors that influence the SME level of ICT use. They found that firms which were more levered, had more volatile earnings and poorer stock performance, were more likely to initiate an ICT programme [Sholes (2007)]. The author for this reason believes that firms facing greater risk of financial distress may benefit from ICT when it reduces the chance of costly outcomes [Sholes (2007)]. Also, it turns out that firms having greater risk of financial distress, that is those with more leverage and less financial slack, are more likely to adopt ICT [Layton (2007)]. In addition, there are many studies looking at profitability and its various determinants including operational risk factors [Layton (2007)].

A number of empirical studies show that ICT operational risk in SMEs is part of the profitability determinants [King III Report (2009); Curley (2004); Yeo (2002)]. Hence, it is expected that by managing these risks well, SME profitability is likely to increase. As the survival and success of SMEs depends on their efficiency to manage risks, ICT operational risk in SMEs is one of the critical factors in providing better returns to shareholders. Related to ICT operational risk, the next section describes Information Technology Risk Management.

3. INFORMATION TECHNOLOGY RISK MANAGEMENT

Recent studies on information technology risk management (ITRM) in large organisations have witnessed ideal benefits. Research suggests that ITRM can be used to

[2]In this study the words firms organisation, institution and business are used interchangeably.

understand organisational operations and change management [Smith and Kruger (2010)]. One study suggests that information technology (IT) risk is business risk, which is defined and operationalised as:

> "…business risk associated with the use, ownership, operation, involvement, influence and adoption of IT within an enterprise. It consists of IT-related events that can potentially impact the business. It includes both uncertain frequency and magnitude, and it creates challenges in meeting strategic goals and objectives as well as uncertainty in the pursuit of opportunities" [ITGI (2009:11)].

In contrast, the success of ITRM models and theories in large organisations has shifted focus towards small business enterprises (SMEs) [Basel Committee on Banking Supervision (2004)]. Smith and Kruger (2010:1) point out that "…… despite these theoretical explanations there is still a shortage of reliable quantitative models that can provide enough information to analyze IT security investments," particularly in SMEs.

One of the reasons attributable to the shift in paradigm as suggested by researchers and practitioners of ITRM is that it serves as a new venue of improved services and potential benefits for SMEs [Gerber and Von Solms (2005)]. Additionally, Standing, Guilfoyle, Lin, and Love (2007:1156) identified no main effects "…using project outcome (success and failure) as the repeated measure and job responsibility (IT support, line and executive managers) as the independent factor…". However, a significant interaction effect for outcome by responsibility, $F(2, 102)= 4.45$, $p< .05$ was determined. When a post hoc analysis (Tukeys HSD and single degree of freedom F ANOVA) was conducted, it revealed that "… IT support workers attributed themselves significantly more to IT project success (mean=0.34) than to IT project failure (mean= 0.33), $F(1, 28)= 5.10$, $p< .05$)" [Standing, Guilfoyle, Lin, and Love (2007:1156)]. The reverse was true for executive managers, who took more responsibility for their project failure than their project successes ($p= 0.08$) [Standing, Guilfoyle, Lin, and Love (2007:1156)].

Yet, a number of studies have suggested that small businesses have not shown much interest in ITRM, particularly ORM [Lam (2006)]. A review of literature indicates that ORM, a variation of ITRM, provides a structural form of activities and has become a popular vehicle for risk management of information in the financial and manufacturing industries [ITGI (2007)]. In addition, Standing, Guilfoyle, Lin, and Love (2007) highlighted that as a rising management discipline, interest and current development of institutional risk management (IRM) varied across industries and institutions. This suggests that ORM is a tool that can be used to evaluate models for understanding the value of IT and for streamlining a company's operations. In support of this view, another study acknowledged that "operational procedures and responsibilities are required to ensure the correct and secure operation of information processing facilities" [Owen (2009:32)].

ORM emerged in the late 1960s when manufacturing companies started looking for ways to alleviate delivery delays that resulted from large volumes of products and services. The use of ORM, however, became popular in the late 1980s and early 1990s [Sholes (2007)]. Currently, many large organisations in the United States of America, Canada, and Europe use ORM to support their IT financial and trading activities. The adoption of ORM has also progressed rapidly in Australia [Lam (2006)].

There is an indication that the growing use of ORM has garnered attention in academic literature. A number of success stories published in recent years claim to have received a variety of benefits by adopting ORM, while several other studies also confirmed benefitting to some extent [Calder (2006)].

Nonetheless, in the past, considerable research on ORM was conducted for large businesses; whereas, studies on SMEs in this respect is more or less a recent phenomenon [ITGI (2009)]. Additionally, the majority of these studies are confined to the USA, Canada and Europe. Research on ORM adoption in developing countries like South Africa (SA) remains marginal. Only a limited number of empirical studies have been undertaken in the Eastern Cape, South Africa (SA). Recently, studies have investigated the use of information technology (IT) among SMEs, but their objectives deviate from Eastern Cape SMEs [Owen (2009)]. With this background in mind, the next section describes the research objective of this paper.

4. RESEARCH OBJECTIVE

Building on prior research related to: (1) impact of information communication technology (ICT) and (2) operational risk management (ORM) in the context of SMEs, the focus of this study was to investigate the relationship between: (1) ICT operational risk management (ORM) and (2) performances of SMEs. To remain focussed, the research investigated five specific objectives which were:

(1) Analysing the principal causes of ICT ORM failure in an SME.
(2) Assessing the change management requirements for building successful ICT systems in SMEs.
(3) Identifying characteristic(s) of business information which play a major role in supporting an organisation's business operations.
(4) Identifying the challenges posed by ICT ORM new solutions and finally.
(5) Evaluating models for understanding the value of ICT ORM in SMEs.

The following section describes the research design used to achieve these objectives.

5. RESEARCH DESIGN

In view of these objectives this research adopted a positivist paradigm which enabled the researcher to adopt a survey design for the unit of analysis, using a case study as the site. The research paradigm refers to the philosophy of the research process [Pallant (2005)]. This includes the assumption and values that serve as a rationale for research and the criteria the researcher uses for interpreting data and reaching conclusions [Pallant (2005)].

The study was conducted in two phases: one phase followed a case study design, the other, a survey using a questionnaire. The 'case' in this study was a financial company in the Eastern Cape. All units within this case form part of the case (managers, implementers, directors, etc.). The motive for using a case study was to understand the complexity of such an organisation. This enriches experience and fortifies what is already known through previous research.

5.1. Instrumentation

The questionnaire was adapted and administered online electronically. This research instrument consisted of six sections. First, the research instrument sought information about basic demographics [Fidell (2009)]. In order to address the objective of this research, the sections that followed addressed each of the components described previously. Thus, one of the parts addressed the principal causes of ORM failure in SME; another addressed the change management requirements for building successful systems, risk monitoring and reporting of ORM in SME [Fidell (2009)]. Next were characteristic(s) of business information and this was followed by the challenges posed by new ORM solutions and evaluation models for understanding the value of ICT in SME. This was done by identifying the traditional and modern capital budgeting models and how their drivers affected business processes. At the outset, the ICT adoption was measured on a four-point Likert scale. For sample size calculation, Fidell (2009) recommended a formula which takes into account the number of independent variables that a researcher wishes to use; $N \geq 50 + 8m$(m= number of independent variables). Due to the objectives posed, questionnaires were sent to a minimum of N=90 respondents of the SME according to a simple random sampling plan. A total of 107 responses were received.

5.2. Data Analysis and Interpretation

The components of ORM ICT measuring the influence on SMEs were subjected to Factor Analysis i.e. (FA)—principal component analysis. This approach was used as it is a popular method of data reduction in social science research, and ICT research increasingly considered as belonging to this category of research [Osborne and Costello (2004)]. Five components were eventually retained in the analysis. The items that cluster on the same components[3] suggest that component 1 represents *X*, component 2 *Y*, component 3 *Z*, component 4 *K* and component 5 *L*. These components equate to the secondary objectives described previously.

Factor analysis was used as the data reduction technique [Fidell (2009)]. For this reason, it was used to reduce a large number of related variables (cf. Table 2: KMO and Bartlett's Test and Table 3: Factor loadings after rotation: Component Matrix) to a more manageable number, prior to using them in other analyses such as multiple regression or multivariate analysis of variance (MANOVA) [Fidell (2009)].

One of the objectives of this study was to find the factors that predict ICT operational risk within SMEs. Multi-item constructs were used to capture information about different variables to adopt ICT operational risk. A multi-item construct of the instrument was used. A construct was used to measure five main support items. The items were adapted to literature and research questions.

[3]X- principal causes of ORM failure related to ICT.
Y- change management requirements and ICT Risk.
Z- characteristic(s) of information influences ICT Risk.
K-challenges posed by ORM solutions.
L-evaluation models affecting ICT adoption within SMEs.

6. RESEARCH FINDINGS

6.1. Data Reduction Technique: Factor Analysis

Factor Analysis (FA) as a technique was designed not to test hypothesis(es) or tell whether a measure is significantly different from another. Instead, it was added as a data reduction technique. Consequently, FA sought to answer the question 'what is the underlying factor structure of ORM ICT measures that influence SMEs as proposed by the current study's instrument'? The items of ORM ICT measuring the influence of SME were subjected to FA—principal component analysis (PCA)—using SPSS version 18.

Prior to performing the PCA, the suitability of data for FA was assessed. The inspection of the correction matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer value was acceptable (cf. Table 2), exceeding the recommended value of .6 [Pallant (2005)] and the Barlett's test of sphericity [Pallant (2005)] reached statistical significance, supporting the factorability of the correlation of the matrix.

A PCA was conducted on 24 items with orthogonal rotation (varimax). The Kaiser-Meyer-Olkin (KMO) measure as aforementioned verified the sampling adequacy for the analysis, KMO = .61 [Fidell (2009)], and all KMO values for individual items were > .70, which is well above the acceptable limit of .5 [Fidell (2009)] (cf. Table 2: KMO and Bartlett's Test). As mentioned earlier, the Barlett's test of sphericity X2 (276) = 783.39, p = .000, indicated that correlations between items were significantly large for PCA, which was satisfactory (cf. Table 2: KMO and Bartlett's Test).

Table 2

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.612
Bartlett's Test of Sphericity	Approx. Chi-Square	783.393
	Df	276
	Sig.	.000

An initial analysis was run to obtain eigenvalues of each component in the data. Five components had eigenvalues over Kaiser's criterion of 1 and in combination explained 65.97 percent of the variance. The scree plot showed inflexions that would justify retaining the five components. Given the large sample size, and the convergence of the scree plot on five components, this was the number of components retained in the final analysis [Fidell (2009)]. Table 3 shows the factor loadings after rotation. The items that cluster on the same components suggest that component 1 represents X, component 2 Y, component 3 Z, component 4 K and component 5 L (cf. Table 3: Factor loadings after rotation: Component Matrix).

Table 3

Factor Loadings after Rotation: Component Matrix

	Component				
	1	2	3	4	5
Q7	.718				
Q8	.711				
Q9	.701				
Q10	.655				
Q11	.584				
Q12		.583			
Q13		.514			
Q14		.499			
Q15		.427			
Q16			.640		
Q17			–.519		
Q18			.327		
Q19			301		
Q20			.333		
Q21				.454	
Q22				–.402	
Q23				–525	
Q24				.400	
Q25					.460
Q26					.425
Q27					.402
Q28					.602
Q29					.505
Q30					.331

Extraction Method: Principal Component Analysis.

The next section addresses a discussion of the research findings presented above.

6.2. Analysis and Discussion of Findings

This section addresses factor analysis—data reduction, determining the factors for principal causes of ORM failure related to ICT, organisational factors related to change management requirements and ICT risk, characteristic(s) of information having influence on ICT risk, challenges posed by ORM solutions, and evaluation models affecting ICT adoption within SMEs, and ICT operational risk and SMEs performance.

6.2.1. *Factor Analysis—Data Reduction*

One hundred and seven questionnaires were received and analysed using SPSS version 18. The data showed that about 60.7 percent of the respondents were IT personnel, about 23.4 percent finance and 10.3 percent operations staff. The study identified various factors of ICT operational risk in SMEs adoption within the case organisation.

Under principal causes of IT failure, the current study revealed that A[4] was significant in determining the ICT operational risk in SMEs adoption. In other factors studied, A was the only significant ICT operational risk that affected SMEs. Thus, SMEs need to adopt A for ICT operational SMEs, since they would be provided with benefits that could be accomplished through ICT operation.

Although the principal causes of ORM failure related to ICT are important, so too are (1) change management requirements; (2) challenges posed by ORM solutions; and (3) evaluation models. Further emphasis on the relative importance of these variables over others showed that A[5] does have a significant impact on change management requirements. This further indicates that management of SMEs must focus on A for ICT operational risk benefits compared with the other factors, to gear up the adoption process.

Additionally, it explained around half of the percentages of ICT operational risk in SMEs adoption variance. Based upon the results, the current study proposes that in order to obtain the full benefits from ICT operational risk, SMEs must adopt a pro-active approach and focus more on the potential benefits as aforementioned.

Building on prior research on ICT operational risk in SMEs and performances of financial institutions, this study suggests the relationship between ICT operational risk in SMEs and performances of SMEs. Specifically, the model developed shows the relationship between ICT ORM and the performance of SMEs.

ICT operational risk in SMEs in financial institutions is not a new phenomenon [Anderson and Choobineh (2008)]. Dealing with risk has always been the raison d'etre of institutions [National Credit Regulator (2008)]. For instance, financial institutions (SMEs) are in the risk business [National Credit Regulator (2008)]. Yeo (2002) argues that an integrated, holistic approach to ICT operational risk in SMEs can create shareholder value. Therefore, the effective management of ICT risk in SMEs is crucial to any financial institution's performance. In support of this, Standing, Guilfoyle, Lin, and Love (2007) describe ICT operational risk activities that are designed to minimise possible losses. Standing, Guilfoyle, Lin, and Love (2007) reveal that the purpose of ICT operations is to maximise revenues and offer the most value to shareholders by offering a variety of financial services, and especially by administering risks. Accordingly, ICT operations are central to SMEs.

The survival and success of financial organisations depend on the efficiency with which they can manage risks; hence, ICT operational risk in SMEs is one of the critical factors in providing better returns to the shareholders [Standing, Guilfoyle, Lin, and Love (2007)]. Also, it will depend to a large extent on how these institutions manage different risks arising from their operations [Standing, Guilfoyle, Lin, and Love (2007)]. This suggests that an effective and efficient ICT ORM in financial SMEs should have special importance as they have to cope with the challenges of globalisation. The findings and for that matter objectives of this current study are thus consistent with previous studies [King III Report (2009)]. The next section addresses individual factors of the five secondary objectives.

[4]One of the principal causes of information system failure is insufficient or improper user participation in the systems development process.

[5]There is a high failure rate among enterprise application projects because they require extensive organisational change that is often resisted by members of the organisation.

6.2.2. *IT Operational Risk and SMEs Performance*

Both the current findings and reviewed literature show that performance of SMEs has significant importance in the variables studied. In fact, a previous study by King III (2009) examined the relationship between ICT and performance of financial institutions (SMEs) and found the relationship between capital structure and profitability to be of a mixed nature.

From the current study's results, particular sub variables of the five main categories emerge that have impact on performance of SMEs. However, as suggested by literature [Lam (2006)] the major reason noted for not establishing such ICT was the non-IT literacy of customers or the prohibitive costs quoted by consultants for setting up an ICT site. Although the study had identified a slower uptake of ICT usage within HR personnel, it was evident from responses that ICT development was a significant feature in the thinking of most operations in terms of future innovations. This result indicates that such development for SMEs is still viewed as an innovative product yet to be fully exploited.

The current study, and comparative studies conducted by the Basel Committee on Banking Supervision (2004), largely supports suggestions to adopt ICT operations within SMEs business strategies. The belief that ICT provides a potential transformational impact or a solution to key business issues and challenges provides an explanation for the overall level of strategic commitment by respondents.

6.3. Ensuring Reliability and Validity

The correlation provided directional support for predicted relationships and showed that collinearity among the independent variables was sufficient. The researcher ensured that the validity and reliability aspects of the instrument were carefully developed. The face and construct validity were ensured by developing from a thorough analysis of the literature. Collegial validity was ensured by giving the instrument to specialists in the field of IT risk management to check whether the constructs were represented correctly.

7. RECOMMENDATIONS

For methodological use, further research is needed adopting the methodology used in this study, that is factor analysis, and to monitor these changes more closely, to measure the changing strategies and the associated factors such as insufficient or improper user participation in the systems development process, identified as potential barriers to the effective adoption and implementation of ICT strategies. The methodology used in this study, that is factor analysis, can also be applied in different sectors of SMEs, to study either similar factors or the emerging factors other than the current study's variables.

In terms of ICT ORM practices in SMEs, one of the key barriers to the pace and success of adopting ICT operational risk management is insufficient or improper user participation in the systems. Managers need to take notice of this. Thus ICT operations managers of SMEs should instead look for: principal causes of ORM failure related to ICT, change management requirements and ICT risk, characteristic(s) of information

influences on ICT risk, challenges posed by ORM solutions and evaluation models affecting ICT adoption within SMEs to leverage the institution's performance.

8. CONCLUSION

The findings support similar studies and thus increase the generalisability of previous research [Standing, Guilfoyle, Lin,and Love (2007)]. All five operational risk variables of SMEs of the current study provided evidence to support the notion that there was a relationship between ICT ORM and SME performance.

The empirical evidence presented indicated that a significant proportion of the aforementioned variables impacted on the performance of SMEs. Therefore, the premise of the model in the current study is that there is a strategic impact in terms of ICT operation and SME performance. The evidence was supportive of the strategic recognition or development by respondents of the wider implications of ICT operation.

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