Organizational, Environmental and Technological Determinants of E-Commerce Adoption in Botswana

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ABSTRACT
A number of studies have applied the technology innovation models to the adoption of ecommerce. However, it is observed that no singular model fits the contextual situations of developing countries due to country specific factors such as culture, technology competency, government policy, and educational level. This study proposes an interactionist model termed technology readiness model (TRM) in the study of factors negatively affecting the ability of businesses in Botswana to adopt e-commerce. The findings show that organizational, internet marketing and customer/logistic factors have significant influences on e-commerce adoption. Security factor was however not identified to impact significantly on the decision to adopt e-commerce. The second phase of the study determines the impact of each organizational variable on e-commerce adoption.

Keywords: E-commerce, e-readiness, developing countries, technology adoption, technology readiness model

1.0 INTRODUCTION
Majority of studies on e-commerce adoption were in developed nations (Hawk 2004), while predictions point to a significant growth in e-commerce in developing countries in the first decade of the twenty first century (McConnel 2000). Recent studies have attempted to identify factors that affect organizations in the decision to adopt e-commerce in developing countries (Aghaunor and Fotoh 2006, Uzoka *et al.* 2006). However, most of these studies have emphasized the influence of contextual impediments related to economic, technological, legal, and financial infrastructure as major determinants of e-commerce adoption

Botswana is one of the countries in the Southern African Development Community (SADC) with a good degree of e-readiness (World Development Report 2003), and one of Africa's best performing economies (World Economic Forum, 2003). A report by Ifinedo (2005) shows Botswana as having an e-readiness value of 2.47 (on a five point scale), only after South Africa with an e-readiness value

2.78, and an African mean of 2.2. A previous study (Uzoka and Seleka, 2006) identifies Botswana as having a low level of e-commerce adoption. This study seeks to identify the factors militating against the adoption of e-commerce in Botswana, and determine the effects (if any) of organizational factors on e-commerce adoption in Botswana.

2.0 THEORETICAL FRAMEWORK AND METHODOLOGY
Most innovation adoptions promote several dominant perspectives: managerial imperative, organizational imperative, technological imperative, and environmental imperative (Molla and Licker 2005). Technological imperative models include the diffusion of innovation [DOI] (Rogers 1995), technology acceptance model [TAM] (Davis 1989), and the theory of planned behavior [TPB] (Ajzen, 1991). This study leans towards the interactionism as the theoretical framework for the adoption model.
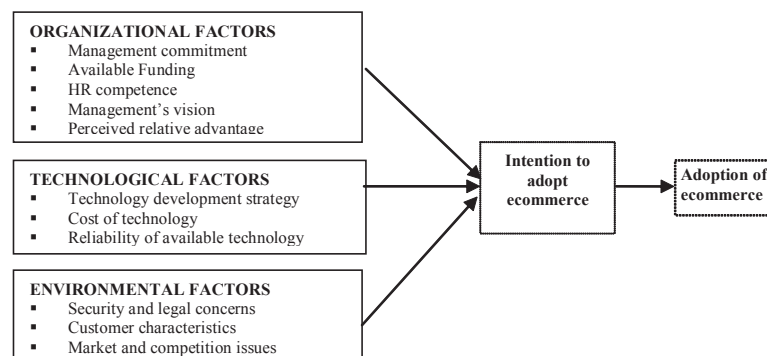
Some literature have adopted the interactionist models, which attempt to fuse the features of the managerial, organizational, technological, and environmental imperatives to technology adoption (Nelson and Shaw 2001, Molla and Licker 2005, Aghaunor and Fotoh 2006). This study leans towards the interactionism as the theoretical framework of adoption model. We posit that organizational, technological, and environmental factors can provide meaningful predictors of e-commerce adoption in Botswana. We refer to the model as *technology readiness model* (TRM) depicted in Figure 1.

Based on the TRM model, the following initial hypotheses were formulated:

H^1: There is a positive relationship between organizational characteristics and ability to adopt e-commerce.

H^2: Customer characteristics and logistics exert a significant influence on the organization's ability to adopt e-commerce.

Figure 1. Technology readiness model (TRM)

H³: Internet marketing variables exert an influence on the adoption of e-commerce.

H⁴: Security concerns significantly affect an organization's decision to adopt e-commerce.

Table 1. Results of exploratory factor analysis

	Factor			
	ORGANIZ	**CUSTLOG**	**INTERMKT**	**SECURIT**
lfd	.650			
smc	.658			
ids	.504			
hrs	.493			
wds	.551			
mvs	.629			
csa				.962
cll				.621
cbe	.473			
cli		.557		
cai		.692		
ccl		.714		
gcc		.635		
acc		.613		
mim			.677	
ora			.722	
ccp			.561	
tri			.444	
wdp			.577	
mrp			.475	
Eigen values	3.053	2.794	2.670	1.706
% Variance explained	26.937	14.042	6.137	3.999
Cronbach's Alpha if Item Deleted	.706	.706	.706	.706

Extraction Method: Maximum Likelihood.
Rotation Method: Varimax with Kaiser Normalization.

Two hundred questionnaires were administered to product/service organizations in both public and private sectors of Botswana. Twenty four variables relating to ecommerce adoption were identified through literature search and utilized for the purpose of analysis (Appendix A). The first part of the analysis involves the use exploratory factor analysis to reduce the variables into few factors that could affect the adoption of e-commerce in Botswana. Following the factor analysis was the use of K-means cluster analysis in grouping the respondents into two clusters relating to the effects of the identified variables on the adoption of e-commerce. The reliability of the resulting data was measured using the Chronbach's alpha. Multiple regression analysis was further carried out in order to test the hypotheses relating to the effects of the factors obtained in the exploratory factor analysis.

3.0 INTERMEDIATE RESULTS
The exploratory factor analysis (Table 1) produced four extracted factors which were considered interpretable.

The following factors were extracted:

a. *Organizational factor (ORGANIZ)*, which relates to organizational influence on the adoption of e-commerce.
b. *Customer/Logistic factor (CUSTLOG)*, which represents the influence of customer characteristics and logistics on the adoption of e-commerce
c. *Internet marketing factor (INTERMKT)*, which represents issues relating to internet marketing as they affect developing countries (such as Botswana). Such issues include credit card penetration, internet access, and technical reliability.
d. *Security factor (SECURIT)* relates to security concerns.

The cluster analysis shows that 69.84% of the respondents agree that the variables under consideration exert an aggregate influence on their ability to adopt e-commerce, while 30.16% do not. The regression analysis shows an adjusted R^2 of 3.02, which indicates the predictive capability of the model. The model has a low predictive capability because other behavioral variables were excluded from the model [having been previously tested in (Uzoka *et al.* 2006)].The regression analysis (Table 2) shows that ORGANIZ, CUSTLOG and INTERMKT exert a significant influence on the firm's decision to adopt e-commerce, while the security factor (SECURIT) is not significant in a firm's decision to adopt e-commerce.

4.0 DISCUSSION AND FURTHER WORK
The findings show that organizational, internet marketing and customer/logistic factors have significant influences on e-commerce adoption, thus *H¹, H², H³* are supported. Security factor was however not identified to impact significantly on the decision to adopt e-commerce, thus *H⁴* is not supported.

Organizational factor is a major determinant in a firm's decision to adopt e-commerce. Variables such as level of funding available for retail development on the Internet, senior management's level of commitment to e-commerce, company's Internet development strategy, level of human resources available, web design skills of company personnel, management vision of the usefulness of the Internet and conviction about the benefits of e-commerce are key organizational issues

Table 2. Regression statistics

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.824	.080		35.293	.000		
	ORGANIZ	.513	.092	.449	5.588	.000	1.000	1.000
2	(Constant)	2.824	.076		37.009	.000		
	ORGANIZ	.478	.088	.418	5.429	.000	.988	1.012
	INTERMKT	.325	.089	.281	3.654	.000	.988	1.012
3	(Constant)	2.824	.075		37.902	.000		
	ORGANIZ	.464	.086	.405	5.375	.000	.984	1.016
	INTERMKT	.295	.087	.256	3.377	.001	.972	1.028
	CUSTLOG	.229	.087	.200	2.647	.009	.978	1.023

identified to affect e-commerce adoption. This agrees with the postulations of the DOI model (Rogers 1995) and the results obtained by (Aghaunor and Fotoh 2006). A key issue here is the negative attitude of management towards e-commerce (Orlikowski 1993). This attitude could be attributed to a number of factors, including the level of information systems (IS) literacy of top management. Until recently, IS courses have not been prominent in the syllabi of tertiary institutions, and when they were, at best, they were theoretical, leaving the students with no good level of appreciation of IS. Organizational culture is another factor, which could be influenced by xenophobia (Campbell 2003) that hinders innovations.

Internet marketing factor exerts some good level of influence on the ability to adopt e-commerce. This in line with the findings by (Aghaunor and Fotoh 2006) and is supported by the 'facilitating conditions' component of the theory of planned behavior (Ajzen 1991). In most developing countries, the internet market is not well developed with low credit card penetration (Hawk 2004). Often times, the costs associated with telecommunications and courier services to Africa and some parts of Asia are enormous. Some credit card companies even refuse credit card payments from Africa. This tends to alienate African countries from the digital market, thereby expanding the digital divide between the developed and developing countries. Customer characteristics also impact significantly on the firm's decision to adopt e-commerce. Key issues here are: customers' levels of access to the Internet, levels of computer literacy and internet awareness, gender of company's target customers, and age of company's target customers. Customer's characteristics are particularly instructive in developing countries where the access to internet is low and the level of IS awareness is equally low (Swami and Seleka 2005). Interestingly, the study reveals that security concerns does not significantly affect the firms decision to adopt e-commerce. This is in consonance with the results obtained in (Lawson *et al.* 2003), and could be explained by the reasoning that security only becomes an issue when the infrastructure and the enabling environment are in place.

Botswana is identified as one of the countries in Africa with a good e-readiness score. However, there is a low level of e-commerce adoption due to organizational and socio-economic structures. This study identified organizational, internet marketing and customer characteristics factors as impacting on the ability of organizations to adopt e-commerce. We have distributed questionnaires on the effects of the organizational variable on e-commerce adoption. We are currently analyzing the data using the method adopted in the preceding study, which is reported in the 'research in progress' paper.

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APPENDIX A: E-COMMERCE ADOPTION VARIABLES

a. Level of funding available for retail development on the Internet (LFD)
b. Senior management's level of commitment to e-commerce (SMC)
c. The company's Internet development strategy (IDS)
d. Level of human resources available (HRS)
e. Web design skills of company personnel. (WDS)
f. The management vision of the usefulness of the Internet (MVS)
g. Suitability of product range for Internet retailing (SPR)
h. Concerns about security aspects (CSA)
i. Concerns about legal and liability aspects (CLL)
j. Costs of development and computer networking technologies (CDN)
k. Limited knowledge of e-commerce models and methodologies (LKE)
l. Conviction about the benefits of e-commerce (CBE)
m. Company's logistical infrastructure (CLI)
n. Company's target customers' levels of access to the Internet (CAI)
o. Company's target customers' levels of computer literacy and internet awareness (CCL)
p. Gender of company's target customers (GCC)
q. Age of company's target customers (ACC)
r. The current size of on-line market place (CSM)
s. The maturity of Internet market (MIM)
t. Other retailers' on-line retail activities (ORA)
u. Credit card penetration (CCP)
v. Technical reliability of the Internet (TRI)
w. Web developer's promotional offers (WDP)
x. Media reporting about the positive and negative aspects of the Internet (MRP)

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