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A Contextual Perspective on E-Commerce Across Industries in Singapore and Lagos: Implications of Local Imperatives

Uchenna Eze
Nanyang Technological University

A. Lee Gilbert
Nanyang Technological University

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Uchenna C. Eze
National Institute of Education
Nanyang Technological University
uc_chinwe@hotmail.com

A. Lee Gilbert
Nanyang Business School
Nanyang Technological University
algilbert@ntu.edu.sg

Abstract

Globalization of production and the increasing competitive pace spurs greater business use of online networks. As economic globalization extends its reach over cities and regions, the positions of regional economies within the emerging global paradigm is changing. Only those regions and cities that can mobilize assets for local advantage are expected to succeed. This research examines the role of electronic commerce (EC) and the implications of location for industrial operations through the lens of management. A resource-based perspective and Porter's (1990) frameworks provide the theoretical underpinning for this work. Our findings reveal varying results between industries and across cities. Industries with well-configured inputs are more likely to experience efficiency in EC activities and outputs, given conducive operational conditions. However firm-specific feature was not linked to improved output, a finding inconsistent with prior studies. Finally, EC business models that focus on operational efficiency strongly complement the historically relevant location variable in industrial undertakings.

Keywords: E-commerce, business environment, output, resource-nased view, Singapore, Lagos, regional clustering

Introduction

The relentless processes of economic globalization rest on increasing interdependence and interconnectedness in matters of markets, management, technology, information, production, and distribution activities. Our globe "shrinks" with each increase in the capacity and speed of physical and virtual communications, challenging our models of economic geography. As globalization extends its reach over communities, cities and regions, Plummer and Taylor (2001) note that the positioning of those places within the emerging global patterns of regional economies are shifting. The conventional wisdom is that only those industries, nations and regions that mobilize assets for local advantage will succeed (Amin and Thrift 1997, p. 155). This model prescribes that local firms must achieve internationally competitive productivity levels to be effective (Plummer and Taylor 2001). Yet, economic globalization processes may be locally determined and place-specific as well as global (see Plummer and Taylor 2001; Porter 1990, 1998; Sheppard 2000).

This paper applies the resource-based view and Porter's (1990) model of industrial competitiveness to explore the role of electronic commerce (EC) in industrial and regional development. However, as Porter's study of industrial structure and globalization predates the emergence of electronic commerce (EC), it is not surprising that his model does not identify the type of industries that may benefit from the global diffusion of access and use of EC, nor does it suggests whether location plays a role in the potential benefits to be derived from this recent phenomenon. Yet, his concepts provide a strong background and structural guide to our analysis. This research examines the influence of EC inputs on outputs and business activities performed by firms in relation to financial industry and city. Specifically, a conceptual framework was developed to examine management perceptions on the interplay among six constructs, namely; input (EC systems), output, business environment, firm-specific feature, regional clustering (geographic feature), and EC activity. Against this backdrop, this paper advocates the use of EC as a complementary

tool that may enable regions to weather the growing regional competition intensity and adapt to structural changes in the economic and geographic landscapes.

The discussions in this paper draw from field experiences with EC applications in firms operating in two divergent geographic contexts: the equatorial city-state of Singapore and the African city of Lagos. There are both similarities and differences among these two sites. The deep geographic and economic divergences illuminate the underlying forces this paper explores. The choice of city and industry is also informed by the regional hub status of the two cities in local and international financial operations. The financial industry in Singapore contributes about 11% (MAS 2001/2002) of Singapore's GDP, while the industry in Nigeria contributes 38% of the GDP (Ajakaiye and Akinbinu 2000). Consequently, the results are relevant for policy as well as research and practice. This paper explores two main questions:

- Are there significant structural (input, output, business environment, EC activity, and Firm-specific feature) differences and/or similarities between the financial industries in Singapore and Lagos?
- What sort of relationships exist among input, output, EC activity and firm-specific features of firms given the city and industry contexts?

The next sections present the conceptual framework, methodology, data analysis and findings, followed by our conclusions.

Brief EC Development in Singapore and Lagos

Singapore is a small nation-state in Southeast Asia that is recognized for the quality of its infrastructure for supporting regional operations of multinational firms and more recently as a regional center for international EC operations (Debreceny et al. 2002). This robust EC infrastructure, together with the nation's connected links to major networks in international cities and strengths as a trading hub make Singapore a favorable site for regional EC ventures (Eze and Kam 2001). Singapore's EC infrastructure includes e-Payment, Security, e-Fulfillment, Portals – including new generation portals – and EC Application Services. The revenue generated by firms from EC infrastructure and supporting services is growing. Also, an increasing amount of revenue is generated through EC transactions (Tham 2002). According to the Infocom Development Authority of Singapore (IDA), business-to-business revenues among firms in Singapore rose to USD15.9 billion in the third quarter of 2001 up 20.75%, from USD12.6 billion in the first quarter (IDA 2001; Tham 2002). The Singapore government actively boosts the rapid development of EC, encouraging firms to adopt online business models. The government agenda hopes to move most business dealings with firms island-wide to the web by the end of 2003.

Lagos is the industrial and commercial capital of Nigeria in the equatorial region of West Africa regionally known as the growth pole and center for local/international financial institutions headquarters (Ujah 1999). It is estimated to account for 60% of Nigeria's financial and industrial establishments, 90% of foreign trade and controlling about 80% of the total value of imports of the country. Also, about 70% of the national industrial investment is in the Metropolitan Lagos (Ajakaiye and Akinbinu 2000). Unlike Singapore, EC deployment in Lagos is driven mainly by the private sector. Firms – particularly banks, oil, and telecommunication players – are very active in EC operations. These are supported by quasi-governmental agencies such as the National Communication Commission (NCC) and the Nigeria Internet Group (NIG). Nigeria is gradually developing a solid EC infrastructure to enhance business operations among firms. Many manufacturing and trading firms in Lagos use private networks such as Electronic Data Interchange (EDI) platform. With the rapid diffusion of the Internet, firms are beginning to shift their operations from proprietary networks to the Internet. As in Singapore, revenue generated from EC support services grows at a rapid rate. With the liberalization of the telecommunication sector and the introduction of GSM services, experts predict a boom for EC activities in Lagos. EC value was USD14.9 billion in 2001 up 40.27% from USD8.9 billion in 2000. Projections for the 2002 EC value stand at USD25b (Ujah 2001). The Lagos corporate sector, especially, the financial, Information and Communication Technologies (ICT) and oil, are all expected to experience increased growth in their EC dealings in the near future.

Conceptual Framework and Hypotheses

The resource- or input-based view of the firm responded to the limitations of the structure-conduct-performance paradigm of the industrial organization (IO) view of the firm (Bain 1959; Grant 1991a). The early input-based theories found the IO view – that a firm's success was determined by its external environment – to be unrealistic, and turned to the seminal work of Penrose (1959) for inspiration. To counter the IO view, Wenerfelt (1984), Dierickx and Cool (1989), and Pranhald and Hamel (1990) built input-

based theory around the internal competencies of a firm. In these contributions to input-based theory, competitive advantage is rooted inside a firm, in assets that are valuable and inimitable. A firm's capabilities or competencies and its managerial abilities to marshal these assets to produce superior performance are the source of its competitive advantage (Grant 1991a). In the drive to add depth and breadth to this internal view, these theorists noted but left rather vague the role of linkages to a firm's external environment. Barney (1986) addressed this issue by pinpointing the conditions under which a firm's inputs become valuable by bringing the external environment into the input-based picture. In developing the notion of external environment, he noted that external factors alone do not generate value. However, by nurturing internal competencies and applying them appropriately to the external environment, a firm can create new value. Thus, for a firm's resource to become valuable, it must allow the firm to "exploit opportunities and neutralize threats" in the firm's environment (Barney 1991: p.106).

Table 1. Variables, Descriptions, Sources and Items

Variables	Descriptions	Sources	Items
Input:			
EC System Functionality	The richness and navigation functions of the web-page in terms of Interactivity/Interface, Catalog/commercial application.	Zhuang (2000), Gebauer and Scharl (1999), Powell & Deny-Micallef (1997).	9
Expertise in EC Applications	Availability of requisite skills for managing EC systems and operations.	Zhu et al. (2002) Zhuang (2000), Gatian et al. (1994)	1
Business Environment:			
Perceived Stability	Extent of predictability of political, economic and business situations in the location.	Zaheer and Zaheer (1997) Sundell (1999).	3
Technology Change	Extent of change in firm and external network systems.	Zaheer and Zaheer (1997).	2
Output:			
Responsiveness	The seriousness & quickness with which customers are attended to.	Zaheer and Zaheer (1997).	2
Customer Retention	Expectation of decrease/increase in the share of customer in the marketplace.	Gatian et al. (1995).	2
Overall Market Growth	General improvement in service provision to customers.	Chan (1992).	1
EC Activity:	Routine and core business activities performed via EC systems.	Zhuang (2000), Gebauer and Scharl (1999).	11
Firm-Specific Feature:			
Annual Revenue	Annual revenue of the firm for the fiscal year 2000.	Chan (1992).	1
EC Expenditure	Expenditure on EC and related information systems	Chan (1992).	1
EC Usage	Duration of EC usage in the firm.	Gatian et al. (1995).	1
Geographic Feature	Sophistication in local assets which enables agglomeration of foreign firms and value systems.	Plummer and Taylor (2001), Porter (1990).	2

Collis and Montgomery (1995) declare that "Resources cannot be evaluated in isolation, because their value is determined in the interplay with market forces and importantly so a resource that is valuable in an industry or time period may not yield the same value in a different industry or chronological context" (loc cit, p.120). For the purpose of this paper, EC system deployment is a resource – while EC management is a feature, differentiating the capability of a firm to use EC and the operational EC strategy existing in a firm, respectively. When a firm competes in any industry, it performs discrete but interconnected value-creating activities such as operating a sales force, or delivering products, and these activities have points of connection with the activities of suppliers and customers. As noted earlier, this paper considers EC as a complementary attribute to these activities as opposed to the view characterizing EC as a cannibal that destroys all conventional business models and as such this research focuses on the value activities performed by integrated networks of firms spatially located across cities and regions. Porter's (1980, 1990, 1980) view on industrial and national development provided further theoretical underpinning for this paper. The conceptual model, with deep roots in the resource-based model, integrates much of earlier works in IT and enterprise, and incorporates the strategic forces unleashed by the rapid diffusion of the Internet (Porter 2001). He argued that two sets of determinants affect the industrial

competitive advantage and, despite the rushing tide of strong globalization, the importance of these factors in determining national competitive advantage has not diminished, but in fact has become more definite. Among the set of fundamental determinants are factors of production, including human resources, physical resources, knowledge resources, capital resources, and infrastructure (Sheppard 2000). Although no single theoretical study can be cited to support the specified hypotheses, prior studies have applied the conceptual approach (Zhuang 2000; Sheppard 2000).
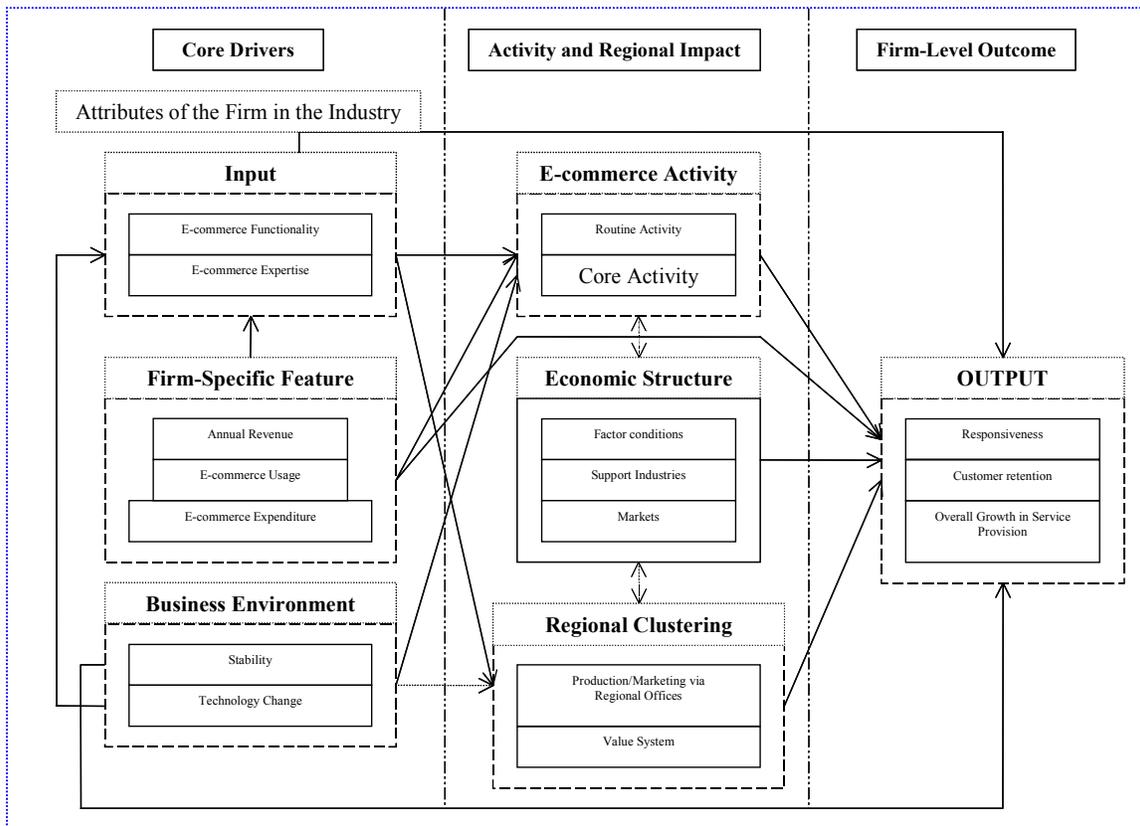

Figure 1. Conceptual Model of this Research

Figure 1 illustrates the relationships that this research examines. The highlighted arrows are the relationships considered in this research. Hypotheses 2, 3, and 4 relate directly to the conceptual model. Hypotheses 1 addresses any differences/similarities between the industries in the sites of study, which may have some inferential bearings on the relationships among the variables. There is extensive evidence (Sundell 1999; Zhuang 2000) that the direction of information systems influences on output are mixed. Nevertheless, the conceptual framework illustrates that a firm's adoption of well-configured EC strategy in terms of adequate and EC functionality and expertise, may experience improvements in outputs (responsiveness, customer retention and overall growth). Hence, the hypotheses:

H1.   There would be significant structural (in terms of Input, Output, EC Activity, Firm-Specific Feature and Business Environment) differences for Singapore and Lagos financial industries.

H2.   Efficiency in Input, EC Activity, Firm-Specific Feature, and Business Environment factors would likely have positive influence on Output.

H3.   Efficiency in Firm-Specific Feature and Business Environment factors would likely have positive influence on the firm's Input.

H4.   Efficiency in Inputs, Firm-Specific Feature and Business Environment factors would likely have positive influence on the firm's EC Activity.

H5. Lack of sophisticated factor conditions in an industry such as expertise, capital and infrastructure would have a negative effect on firm output.

Methodology

The authors took several steps to ensure data validity and reliability. First, 4 professionals whose areas of expertise include EC and industrial development reviewed the instrument. The instrument was then revised for any potentially confusing items. Before the administration of the final survey, the authors called a random subset of 10 respondents for pilot testing to verify if any issues with the instrument persisted. Six instruments were returned indicating a response rate of 60%. Suggestions made were incorporated into the questionnaire before the primary mailing. In the instrument itself, the authors used previously validated measurements items (Zhuang 2000; Sundell 1999; Gebauer and Scharl 1999) wherever possible to help ensure the validity of the measures. Also, multiple-item measures were used for some constructs to enhance content coverage. Cronbach's alpha test for the overall internal reliability and consistency was computed on the Likert scale questions in the instrument pertaining to input, business environment, EC activity, regional clustering, and output, resulting in alpha scores of 0.71 or higher, which indicates strong internal consistency (Anderson and Gerbing 1988).

We selected a sample of 289 (160 from Singapore and 129 from Lagos) for this research. The participants were mainly, large firms randomly selected from financial service industry. We selected these firms based on evidence that firms likely to be successful at obtaining advantages from the use of information systems were those that exhibit evidence of growth (Lee and Adams 1990). The population frame for the financial firms in Lagos were the List of Registered Businesses of the Lagos Stock Exchange and the Industry Classification provided by Nigeria Statistics Office. The Directory of Financial Institutions in Singapore provided by Monetary Authority of Singapore (MAS) served as the population frame for the firms in Singapore. The instruments were then mailed to Chief Information Officers of the 160 and 129 firms in Singapore and Lagos, respectively. The questions/statements were based, mainly, on a five-point (1-5) Likert point scale. Of the 289 firms surveyed, 106 useable responses were collected (i.e., a response rate of 36.67%). There were 58 valid responses from Singapore, (i.e., a response rate of 36.25%), while there were 48 useable responses from Lagos (i.e., a response rate of 37.21%). Our total response rate of 36.67% compares favorably with similar mail surveys of firms: e.g., McDougall et al. (1994) had 11% response rate in a study of new technology-based enterprises; Chandler and Hanks (1994) had a 19% response rate in a study of manufacturing firms. It is pertinent to note that although individuals representing the firms provided responses to the questionnaire, the unit of analysis was the firm (see Chan 1992).

Descriptive Analysis

Table 2 reveals that 62.10% and 64.4% of the respondents from Singapore and Lagos, respectively, have worked with the firm for more than 5 years and thus can be considered well-informed on the firm/industry and issues this paper addresses (Uma 1996). Also, the table depicts that 58.62% and 56.25% of the firms in Singapore and Lagos financial industry, respectively, invest 6% and over annually on EC systems, which is relatively high. An approximately equal proportion indicated that they have used EC for more than 8 years, which is a relatively high level of experience.

Table 2. Profile of Respondents

Item	Value	Singapore	Lagos
		Percent of Respondents	Percent of Respondents
Number of years with Firm	Over 5 years	62.10%	64.40%
Number of Employees	Over 500	58.30%	56.0%
Annual Revenue	Over S$500m	62.11%	49%
EC Usage Period	Over 8 years	46.55%	48%
Annual Expenditure on EC	6% & over	58.62%	56.25%

Number of cases: Singapore = 58; Lagos = 48

As Table 3 reveals, perceptions of respondents from Singapore on the factors were, generally, positive and stronger compared with perceptions among respondents in Lagos. However, while the percentage of respondents' who perceive government's policies on the specific issues to be encouraging were mostly lower for Lagos sample compared to Singapore sample, competition policy

and R&D subsidies emerged weak for Singapore despite the robust information infrastructure and the high awareness programs the city commands. The government agency NCC in Lagos responsible for injecting competition in the ICT sector respond to these concerns by adopting policies aimed at reducing the adverse impact of the national carrier's monopolistic power by issuing ICT operating licenses to investors including awareness programs via private sector. Regarding Singapore, IDA has been able to develop solid competitive conditions in the sector which is presently yielding dividends.

Table 3. Descriptive Statistics on Telecommunication Infrastructure, Regulatory and Policy Issues in Singapore and Lagos

Factors	No Effect	Discouraged	Encouraged
Telecom Infrastructure:			
Communication cost	10.3(20.8)	24.1(35.2)	65.5(44.0)
Network reliability	0(20.8)	20.7(41.6)	79.3(57.6)
Competition between operators	6.9(28.0)	25.9(47.2)	67.2(36.8)
Interoperability of networks	1.7(24.0)	17.2(47.2)	81.0(36.8)
Regulatory Factors:			
Transaction security	0(21.2)	25.9(30.0)	74.1(58.8)
Certification of payment	0(15.6)	0(15.6)	91.4(59.6)
Regulation of e-transactions	8.6(10.8)	3.4(36.0)	87.9(53.2)
Protection of intellectual property	15.5(34.8)	15.5(38.0)	69.0(27.2)
Policy Issues:			
R&D subsidies	1.7(27.6)	50.0(47.6)	48.3(24.8)
Awareness programs	0(34.0)	20.7(42.4)	79.3(37.6)
Competition policy	13.8(19.2)	32.8(42.4)	53.4(38.4)
Electronic Government models	0(27.6)	17.2(34.8)	82.8(37.6)

*Percentages in parenthesis are for Lagos

Table 4. Means for Variables by Industry/City

Singapore Financial Industry	Mean	Lagos Financial Industry	Mean
Business Environment	*3.96*	*Business Environment*	*2.90*
Perceived stability	4.06	Perceived stability	2.66
Technology change	3.87	Technology change	3.20
Input	*2.97*	*Input*	*2.92*
EC Functionality	3.01	EC functionality	2.89
EC Expertise	2.92	EC Expertise	2.96
Output	*3.72*	*Output*	*3.56*
Responsiveness	3.74	Responsiveness	3.31
Number of customers	3.35	Number of customers	3.27
Overall Growth	4.09	Overall Growth	4.17
EC Activity	*3.64*	*EC Activity*	*3.52*
Routine activities	4.28	Routine activities	4.18
Core activities	2.98	Core activities	2.85

Table 4 depicts the composite mean values for business environment, EC activity, input, and output. Respondents' perspectives on Singapore and Lagos industries reveal some similarities between composite means, particularly, with regard to input. The perspectives also reveal differences for business environment, output, and EC activity (see Table 4). These results highlight the varying contextual features and underlying characteristics of the variables within Singapore and Lagos financial industries, particularly, on environmental factors. Input factors for the industries in Singapore and Lagos emerged with relatively less disparity as in overall growth and core activities.

Findings

This section presents correlation analysis to establish any relationship among the dimensions of the constructs. This analysis uncovers any underlying strength and orientation among the dimensions. It also provides evidence significant for determining the applicability of regression analysis. The results in Table 5 reveal that firm-specific features, input, output and EC activity correlate positively. *Annual expenditure on EC* correlates with *technology change* which implies that an enterprise would not favor investment in EC systems if it is not receptive to changes information systems.

Table 5. Correlation Matrix of Firm-Specific Feature, Business Environment Input,
EC Activities and Output for Singapore

Variables	1	2	3	4	5	6	7	8	9	10
1. Size										
2. Duration of EC	0.756									
3. Expenditure on EC	0.835	0.722								
4. EC Activity	0.669	0.565	0.659							
5. Perceived Stability	n. s	0.456	0.697	0.697						
6. Technology Change	n. s	0.261	0.598	0.766	0.889					
7. Customer Retention	n. s	0.863	0.491	0.783	0.641	0.656				
8. Responsiveness	n. s	0.769	0.754	0.811	0.738	0.578	0.714			
9. Overall Growth	n. s	0.784	0.689	0.644	0.772	0.717	0.622	0.599		
10. EC Functionality	0.761	0.822	0.887	0.564	0.692	0.687	0.659	0.676	0.748	
11. EC Expertise	0.896	0.799	0.703	0.630	0.745	0.705	0.504	0.729	0.561	0.649

All correlations are significant at p< 0.05, unless otherwise noted as not significant. Number of cases = 58

Table 6. Correlation Matrix of Firm-Specific Features, Input, Business Environment
EC Activities and Output for Lagos

Variable	1	2	3	4	5	6	7	8	9	10
1. Size										
2. Duration of EC	0.343									
3. Expenditure on EC	0.676	0.211								
4. EC Activity	0.321	0.197	0.321							
5. Perceived Stability	n. s	0.103	0.429	0.345						
6. Technology Change	n. s	0.021	0.328	0.467	0.324					
7. Customer Retention	n. s	0.511	0.467	0.625	0.425	0.329				
8. Responsiveness	n. s	0.612	0.679	0.522	0.326	0.317	0.211			
9. Overall Growth	n. s	0.421	0.662	0.456	0.446	0.226	0.450	0.345		
10. EC Functionality	0.451	0.674	0.712	0.345	0.302	0.428	0.477	0.476	0.435	
11. EC Expertise	0.567	0.347	0.511	0.424	0.221	0.529	0.502	0.395	0.341	0.512

All correlations are significant at p< 0.05, unless otherwise noted as not significant. Number of cases = 48

The results in Table 6 reveal that the variables, generally, correlate weakly. For instance, *responsiveness* correlates weakly with *EC activity* at $R = 0.522$. This result indicates that a firm's responsiveness to customers', suppliers request and orders is marginally influenced by the extent and number of activities performed via EC. Although there were significant positive relationships among the variables at both survey sites, the correlation coefficients for Lagos industry were, generally, weak compared to those for Singapore industry. Also, results of Singapore sample reveal stronger relationships between the factors compared to Lagos sample.

Table 7. Test Summary for Hypothesis 1

Hypothesis	Parts of Hypotheses	*T*	*p*-value
H1. There would be significant positive structural differences for Singapore and Lagos financial industries.	Output for LAG - Output for SIN	4.434**	0.000
	Input for LAG - Input for SIN	2.442*	0.018
	BE for LAG - BE for SIN	11.428***	0.000
	FSF for LAG - FSF for SIN	1.617	0.109
	ECA for LAG - ECA for SIN	2.321*	0.027

LAG= Lagos; SIN= Singapore; FSF= Firm-specific feature; ECA= EC Activity; BE= Business environment

Table 7 reveals that, compared across borders, the structural difference between Singapore and Lagos sample is significant with respect to output, EC activity, and business environment and, to a lesser degree, input. On the other hand, there was no significant difference between the two industries on firm-specific feature which supports the descriptive result in Table 4. What we draw from the results in Table 7 is a confirmation of the structural patterns and contexts which is not only determined by firm and industry characteristics, but also the specific distinct backgrounds and trajectories of Singapore and Lagos economic development processes.

Table 8. Test Summary for Hypotheses 2-4

Source	R^2	*b*, *t*-ratio	*p*-value (a)	Std. Coef.
Hypothesis 2a: Output on Input				
Output contingent on Input – SIN	0.819	0.494 (15.893)***	0.000	0.905
Output contingent on Input – LAG	0.689	0.401 (16.494)***	0.000	0.767
Hypothesis 2b: Output on Business Environment				
Output contingent on BE – SIN	0.822	0.830 (16.092)***	0.000	0.907
Output contingent on BE – LAG	0.681	0.750 (16.204)***	0.000	0.855
Hypothesis 2c: Output on EC Activity				
Output contingent on ECA – SIN	0.890	0.257 (21.332)***	0.000	0.944
Output contingent on ECA – LAG	0.785	0.245 (21.178)***	0.000	0.881
Hypothesis 2d: Output on Firm Specific Feature				
Output contingent on FSF – SIN	0.067	0.442 (1.023)	0.254	0.076
Output contingent on FSF – LAG	0.075	0.054 (1.296)	0.121	0.117
Hypothesis 3a: Input on Business Environment				
Input contingent on BE – SIN	0.838	1.536 (17.047)***	0.000	0.816
Input contingent on BE – LAG	0.742	1.619 (18.787)***	0.000	0.818
Hypothesis 3b: Input on Firm Specific Feature				
Input contingent on FSF – SIN	0.501	1.356 (15.226)***	0.000	0.510
Input contingent on FSF – LAG	0.642	1.459 (16.080)***	0.000	0.472
Hypothesis 4a: EC Activity on Business Environment				
ECA contingent on BE – SIN	0.852	3.096 (17.939)***	0.000	0.923
ECA contingent on BE – LAG	0.716	2.782 (17.613)***	0.000	0.846
Hypothesis 4b: EC Activity on Input				
ECA contingent on Input – SIN	0.329	0.427 (2.702)*	0.019	0.410
ECA contingent on Input – LAG	0.309	0.329 (2.309)*	0.020	0.297
Hypothesis 4c: EC Activity on Firm Specific Feature				
ECA contingent on FSF – SIN	0.532	1.411 (11.101)***	0.000	0.449
ECA contingent on FSF – LAG	0.385	1.209 (9.311)**	0.001	0.334

AG= Lagos; SIN= Singapore; FSF= Firm-specific feature; ECA= EC Activity; BE= Business environment

The results of bivariate step-wise regression analysis reveals that the perceived relationships among output, business environment, input and EC activity for Singapore and Lagos are mix (see Table 8). Eight of the nine path coefficients for hypotheses 2, 3 and 4 for Singapore and Lagos industries were significantly different from zero, based upon a 0.05% significance level (see Table 8). The paths, except for hypothesis 3b, 4a and 4c, had meaningfully large coefficients with the expected signs. The hypothesized relationship depicting output as a function of firm-specific feature was not supported by data from the two sites. Hypothesis 5 emerged significant for both Singapore and Lagos with R^2 of 0.450 and 0.371, respectively, indicating that developments of factor conditions in a locality influences industrial activities and may have bearing on related developments in the city. Results on the impact of EC systems on regional clustering reveal that Singapore sample had high R^2 (0.86) while that for Lagos reveal weak R^2 (0.53). These results indicate that the agglomeration ability of an industry in a city would be greatly enhanced with the deployment of e-commerce systems. The result implies, therefore, that the differences in regional networking structure of Singapore and Lagos may have been as a result of decades of strong commitment by the Singapore government to promote the island as a regional hub for financial and ICT industrial operations. Also, result of the impact of regional clustering on output reveals that Singapore had high R^2 (0.79) while that for Lagos was weak with $R^2 = 0.34$. These results indicate that for industries that operate in a city that has regional networking capabilities the possibilities of high output levels are greater than otherwise.

The total implications of these results may still be subject to further research. Yet, this research reveals that while firm-specific feature directly influence output in both study areas, firm-specific feature could not predict output, though both variables correlated. The financial industry has a strong history of information systems deployment given its task requirement and would require concrete and strategic investment and use of advances in information systems to be able to establish significant impacts on operational and strategic efficiency.

Discussion

This paper examined the dynamics and patterns that may emerge when two development processes in distinct cities were compared based on management perception of structural characteristics in terms of EC systems, output, EC activity and environment of financial industry. Clearly, the patterns of relationships that exist between the constructs for Singapore and Lagos industries demonstrate strong influence of the environment the industries operate evident from the strength of the relationships among the variables and the varying results between the two cities. In theory, location should no longer be a source of competitive advantage as open global markets, rapid transportation, and high-speed communications systems should level any differences. But in practice, location and to a great extent, regional imperatives remain central to city and industrial competitive strength. This research highlights the growing contemporary geographic dynamics and their spatial interdependence with e-commerce and related networks regarding enterprise's and city's dispersed and trans-border economic activities. This research reveals that business activity efficiencies via EC systems are strongly related to output, consistent with the study by Gebauer and Scharl (1999). Hence, with a sophisticated EC strategy there is the tendency that firms would respond to their customers and partners in business dealings in a quickly and timely manner. It is important to note, however, that technological factors were the key inputs considered in this paper. The complementary nature of this input, as the study of Zhuang (2000) demonstrates, would not be sufficient to explain all the possible outcomes in this comparison.

Evidence in this paper established a strong relationship between business environment and output, especially, in the case of Singapore. The case of Lagos was generally related but not as strongly as that of Singapore. This result corroborates findings of Sundell (1999) that link favorable environment with improved business output. In this case, with a sophisticated EC strategy there is the likelihood that a firm in a stable environment would achieve efficiency in business activities. While firm resources including technological opportunities are important determinants for industrial operations, related local imperatives are equally significant. The structural differences between the two industries demonstrate the distinct dynamics and trajectories of the cities and their respective influence on business operations and output. Consistent with Porter's (1990) view, our findings demonstrate the importance of sophisticated factor conditions in a city to enable accelerated developments process in the financial industry. In effect, sophistication in local demand and availability of quality expertise including enabling infrastructure are necessary conditions for industrial development. Finally, this research also revealed that, irrespective of differences between the cities firms in the same industry may be able to tap relative advantages from deploying e-commerce if there is supporting information infrastructure.

Implications for Research

This paper re-enforces the significance of location for industrial and regional economic growth. Spatial differentiation means that some firms, because they occupy advantageous locations, will do better, making considerable gains in economic success. Also, because, the pool of knowledge differs over space, EC may be differentiated geographically, along with its characteristics and

determinants. The research instrument for this paper was evaluated in detail and provides researchers in this area with relevant reference point. The paths between constructs measured by the instrument have been empirically examined and received modest support. Findings in this paper are generally consistent with traditional academic models in new substantive areas – Singapore and Lagos. In this regard, it extends the field of IT, EC, and the input-based perspective of the firm including spatial and capability implications to geographic agglomeration of industries. The authors are optimistic that with developments in the subject area, further studies based on the procedures used in this paper would receive greater empirical support. The authors hope that since there are few studies in this area, the findings and methodology in this paper represent a modest contribution to research and would be useful for future work. Although this research was about firms in the financial industries in Lagos and Singapore, however, our findings highlight wider implications for financial institutions that share similar characterization as the samples studied in this research. Taking into account the effects of business tradition, including the extent of EC deployment, this research is replicable to financial industries in Hong Kong/Johannesburg and Kuala Lumpur in Malaysia. The heightened notion of digital economy and its pervasive influence on the structure of most industries makes a case for applicability in this research.

Implications for Practice

Firms could, based on the findings of this study, effectively configure available input in their firms for efficient activities and relationships between suppliers and customers. However, this paper demonstrates that with adequate mix of the required firm input factors, business activities would improve under a favorable market conditions and availability of support industries and infrastructure. Managers could use the procedure in this paper to assess the success of EC strategies in their firms by determining the relationships among the various constructs. They can also assess their success with each factor against their goals. Normalized data across many firms could be collected for managers to compare with data from their own firms; managers could also compare the scores for their firms with those of the industry. In addition, this paper provides an expanded understanding of Porter's (1990) and resource-based view of a firm using EC applications as key factors to address business operations, with specific reference to the sites and industries examined. This understanding would be useful to managers who may need to adopt input-based view in making similar analysis for instance, in identifying the strategic roles of EC in enhancing business activities and performance of a firm. Correlation is not causation. Yet, managers may still consider the quality of EC systems in their firms. Perhaps, by investigating the sub-dimension of the constructs in this paper and the effects of EC under distinct conditions, managers may be encouraged to improve their EC strategies which would possibly translate into better overall industrial performance.

Implications for Policy

Government policies in the two cities, particularly Lagos, could be better tailored to further encourage the private sectors by making it easier and cheaper for firms to deploy information system, especially, EC systems in their respective industries. Policies that would encourage competition among Internet Service Providers (ISPs) and related operators in the sector would consequently boost investment in the IT sector with spillover effects on industrial operations and overall economic development. This in turn would among other initiatives create dynamic and attractive sites for regional business including financial and industrial development. On subsidies and R&D, the evidence from Lagos suggests acute need for a change in attitude from the government with respect to supporting infrastructure. As Table 3 indicates, expenditure on R&D for EC is low. As globalization and competitive pressure grows forcing governments all over the globe to rethink traditional methods of public and private administration, there is no truer means for Lagos city to achieve operational effectiveness in delivering services but to effectively employ electronic systems in key activities, particularly in the area of tax filing and other public charges. Most importantly, Lagos would have to overcome the national stigma of public corruption in order to utilize funds in a responsible and accountable fashion for a consolidated effort towards local and international EC initiatives.

Agenda for Future Research

Longitudinal works designed to answer further questions of 'how' and 'why' engendered by this paper could be very useful because they would provide further insights regarding the conceptual model and an extended significance of the theories and frameworks adapted for this research. In addition, with the methodological procedure of this research, further studies based on larger sample would enable the development and testing of structural equations targeted at further explaining specific dynamics and patterns in the relationships among the constructs. Also, a case study that integrates qualitative methodology with the analytical perspective in this research would be useful for greater explanations for the interplay of constructs. It would provide additional managerial insights into the nature of EC system strategy and perspectives for the deployment of EC directed towards specific processes and operations among firms in the financial industry. Finally, further studies may consider dynamic capability

dimension in addition to the perspectives this paper addressed to enable firms evaluate in a more holistic manner their ability to build, integrate and reconfigure internal and external competencies to address rapidly changing business environment.

References

Ajakaiye, O., and Akinbinu, B. *Strategic Issues in Nigerian Development in a Globalizing and Liberalizing World*, Ibadan: NISER, 2000.

Amin, A., and Thrift, N. "Globalization, Socio-economics, Territoriality," in *Geographies of Economies*, R. Lee, and J. Wills (eds), London: Arnold, 1997.

Anderson, J. C., and Gerbing, D. W. "Structural Equation Modeling in Practice: A Review and Recommended two Step Approach," *Psychological Bulletin* (103), 1988, pp. 411-423.

Bain, J. S. *Industrial Organization*, New York: Wiley & Sons, 1959.

Barney, J. B. "Firm Resources and Sustained Competitive Advantage," *Journal of Management*, (17:1), 1991, pp. 99-120.

Barney, J. B. "Strategic Factor Markets: Expectations, Luck, and Business Strategy," *Management Science* (31), 1986, pp. 1231-1241.

Chan, Y. E. "Business Strategy, Information Systems Strategy, and Strategic Fit: Measurement and Performance Impacts," Ph.D. Dissertation, The University of Western Ontario, 1992.

Chandler, G. N., and Hanks, S. H. "Market Attractiveness, Resource-Based Capabilities, Venture Strategies and Venture Performance," *Journal of Business Venturing* (9), 1994, pp. 331-349.

Churchill, G. A. *Marketing Research: Methodological Foundations*. Chicago, IL: Dryden, 1991.

Collis, D. J., and Montegomery, C. A. "Competing on Resources: Strategy in the 1990s," *Harvard Business Review* (73:4), 1995, pp. 118-129.

Debreceny, R., Putterill, M., Tung, L. L., and Gilbert, A. L. "New Tools for the Determination of E-commerce Inhibitors," *Decision Support Systems* (34), 2002, pp. 177-195.

Dieckann, M., and Hilton, D. "Business on the Internet: Is this the Right Time?" *Managing Office Technology* (41:4), 1996, pp. 17-23.

Dierickx, I., and Cool, K. "Asset Stock Accumulation and Sustainability of Competitive Advantage," *Management Science* (35:12), 1989, pp. 1504-1414.

Dutta, S., Kwan, S., and Segev, A. "Transforming Business in the Marketplace: Strategic Marketing and Customer Relationships," Working Paper, Hass School of Business University of California Berkeley, May, 1996.

Eze, U. C., and Kam, T. S. "The Influence of Enterprise Structure and Strategy on the Level of E-commerce Deployment in Singapore," *Journal of Global Information Technology Management* (4:2), 2001, pp. 38-54.

Gatian, A. W., Brown, R. M., and Hicks, J. J. O. Jr. "Organizational Innovativeness, Competitive Strategy and Investment Success," *Journal of Strategic Information Systems* (4:1), 1995, pp. 43-59.

Gebauer, J., and Scharl, A. "Between Flexibility and Automation: An Evaluation of Web Technology from a Business Process Perspective,*" Journal of Computer-Mediated Communication* (5:2), December, 1999.

Grant, R. M. "The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation," *California Management Review*, Spring, 1991a, pp. 114-135.

IDA. Quarterly Report on E-commerce Development in Singapore, October, 2001.

Lee, M. C. S., and Adams, D. A. "A Manager's Guide to the Strategic Potential of Information Systems," *Information and Management* (19), 1990, pp. 169-182.

MAS. Annual Report, 2001/2002.

McDougall, P., Phillips, P., Covin, J.G., Robinson, R.B. Jr., and Herron, L. "The Effect of Industry Growth and Strategic Breadth on New Venture Performance and Strategy Content," *Strategic Management Journal* (15:7), 1994, pp. 537-554.

Penrose, E. *The Theory of Growth of the Firm,* New York: John Wiley & Sons, 1959.

Plummer, P., and Taylor, M. "Theories of Local Economic Growth: Concepts, Models, and Measurement," *Environmental Planning* (A:33), 2001, pp. 219-236.

Porter, M. E. *Competitive Strategy Techniques for Analyzing Industries and Competitors,* New York: Free Press, 1980.

Porter, M. E. *The Competitive Advantage of Nations*, New York: Free Press, 1990.

Porter, M. E. (1998, Nov/Dec). "Clusters and the New Economies of Competition," *Harvard Business Review*, Boston.

Porter, M. E. "Strategy and the Internet," *Harvard Business Review*, March, 2001, pp. 62-78.

Powell, T. C., and Dent-Micallef. "Information Technology as Competitive Advantage: The Role of Human, Business, and Technology Resources," *Strategic Management Journal* (18:5), 1997, pp. 375-405.

Prahalad, C. K., and Hamel, G. "The Core Competence of the Corporation," *Harvard Business Review* (68:3), 1990, pp. 79-91.

Sheppard, E. "Competition in Space and between Places," in *A Companion to Economic Geography*, E. Sheppard, T. J. Barnes, (eds.), Massachusetts: Blackwell, 2000, pp. 171-186.

Sundell, R. A. "Relationship among Types of Information Technology Structures, Business Environments, Electronic Commerce and Financial Performance," D.B.A. Dissertation, United States International University, San Diego, 1999.

Tham, I. "E-commerce Activities in Singapore are Bucking the Recession Trend, a Government Survey Revealed," 2002. (**http://news.com.com/2100-1017-853304.html**).

Ujah, E. "Electronic Commerce and Small Business Development in Nigeria," *Nigeria Business Times*, Monday 17th September, 2001, pp. 12.

Ujah, E. "Keeping up with the Growth in Nigeria IT Industry," *Nigeria Business Times*, Monday 2nd May, 1999, pp. 4.

Uma, S. *Research methods for business*, 2nd ED, New York: John Wiley & Sons, 1992.

Varney, S., and McCarthy, V. "E-commerce: Wired for Profits," *Datamation* (42:16), 1996, pp. 42-46.

Verhoest, P. "A Methodology for Assessing the Dynamics and Impacts of Electronic Commerce," Paper Presented at the Conference on the Measurement of Electronic Commerce, Singapore, December 6-8, 1999.

Wernerfelt, B. "A Resource-Based View of the Firm*," Strategic Management Journal* (5:2), 1984, pp. 171-180.

Zaheer, A., and Zaheer, S. "Catching the Wave: Alertness, Responsiveness, and Market Influence in Global Electronic Networks," *Management Science* (43:11), 1997, pp. 14931-509.

Zhu, K., Kraemer, K. L., and Xu, S. "A Cross-Country Study of Electronic Business Adoption Using the Technology-Organization-Environment Framework," presented to *the Twenty-Third International Conference on Information Systems*, Barcelona, pp. 337348.

Zhuang, Y. A Resource-Based View of Electronic Commerce, Ph.D. Dissertation, University of Kentucky, 2000.