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## Virtual Bazaar: A Means of Supporting Microtrade in the Least Developed Countries

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# Virtual Bazaar: A Means of Supporting Microtrade in the Least Developed Countries

Fraid Shirazi

## Abstract

This empirical study investigates the impacts of Information and Communication Technology (ICT), educational attainment, the rule of law and other determinantal variables on the growth of Gross Domestic Products (GDP) among 35 Least Developed Countries (LDCs) in Africa and Asia. The results of this empirical analysis on archival data from 1997 to 2007 show that while ICT expansion in LDCs has many positive impacts on GDP growth in these countries, the differences between countries in terms of the level of citizens' educational attainment, the rule of law, governmental intervention in economic activities and the level of Foreign Direct Investment (FDI) can both enhance and restrict the relationship between ICT and GDP growth. This study proposes an e-commerce model called Virtual Bazaar. The model is adapted to the existing level of ICT infrastructure in LDCs in order to enable the micro-trade owners to sell their products directly to potential customers across the globe, hence increasing their level of incomes.

**KEYWORDS:** microtrade, ICT, law, digital divide, Virtual Bazaar, economic intervention, FDI, institutional resistance, Web 2.0

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## I. INTRODUCTION

The 2005 declaration of the World Summit on the Information Society (WSIS) reaffirmed the 2003 WSIS Geneva summit in that Information and Commercial Technology (ICT) applications can support sustainable development in areas such as public administration, business, education and training, health, employment, environment, agriculture and science. WSIS also emphasized that the governments of developing countries “should take action, in the framework of national development policies, in order to support an enabling and competitive environment for the necessary investment in ICT infrastructure and for the development of new services”<sup>1</sup>. According to UNCTAD<sup>2</sup> ICTs provide opportunities for people in developing countries to promote development and economic growth by fostering innovation and improved productivity. In this context developing countries—and particularly small, medium and micro sized enterprises (SMMEs)—can gain development through the use of ICTs to bring impressive gains in employment, gender equality, and standards of living.

However, in today’s networked society and information economy, developing countries face the challenge of establishing affordable information and communication network infrastructure and applications for building and participating in the information economy<sup>3</sup>. As such, ICTs provide new opportunities to achieve sustainable development to a level that has never been offered before<sup>4</sup>. These opportunities include but are not limited to creating, accessing, utilizing and sharing information and knowledge with others as principles of achieving the full potentials in promoting sustainable development and improving the quality of life. According to Brown et al.<sup>5</sup>, it is expected that ICTs, and particularly the Internet, will have positive educational benefits for the disadvantaged sectors of South African society, where a large portion of the

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<sup>1</sup> WSIS, *World Summit on the Information Society* [2005]. Available at: <<http://www.itu.int/wsis/tunis/index.html>>

<sup>2</sup> UNCTAD, *South-South Investment Flows—A Potential for Developing Country Governments to tap for Supply Capacity Building*, Background Paper No. 3 prepared by the UNCTAD secretariat, (Doha, Qatar, 5-6, December 2004).

<sup>3</sup> UNCTAD, *Information Economy Report 2006: The development Perspective* [2006]. Available at: <[http://www.unctad.org/en/docs/sdteecb20061\\_en.pdf](http://www.unctad.org/en/docs/sdteecb20061_en.pdf)>

<sup>4</sup> UNDP, *National ICT Strategy for Socio-Economic Development in Syria* [2004], Available at: <[http://www.undp.org.sy/publications/national/E-Strategy/ICT\\_Strategy\\_en.pdf](http://www.undp.org.sy/publications/national/E-Strategy/ICT_Strategy_en.pdf)>

<sup>5</sup> Irwin Brown et al. *Global Diffusion of the Internet XI: Internet Diffusion and Its Determinants in South Africa: The First Decade of Democracy (1994-2004) and Beyond*, 19 Communications of the Association for Information Systems (2007), 142-182.

population lives in high density areas where there is poverty, a lack of resources, and a lack of educational facilities.

Many developing countries have had to make significant efforts to invest in their ICT infrastructure so that they may reap the many benefits that ICTs can provide<sup>6</sup>. From 1997 to 2007, ICT expansion in 35 LDCs of this study has increased on average by 13 fold. This increase in the use of ICT tools and services is mainly due to ICT investment in these countries during the above period.

Many scholars in Information Systems (IS)<sup>7</sup> research<sup>8</sup> and international organizations<sup>9</sup> shed light on the importance of ICT adoption in developing countries from the perspective of knowledge acquisition, knowledge management and institutes.

This paper investigates the extent to which ICTs can help citizens in 35 LDCs in Africa and Asia to improve their living condition by introducing an e-commerce model called Virtual Bazaar. This study investigates three prominent and interrelated issues in these countries: (1) the extent of the contribution of ICTs to GDP growth; (2) to what extent do other development parameters such as the rule of law, education, FDI inflow and institutional resistance impact such growth; and (3) to what extent can Internet application such as Web 2.0 be used to improve the living conditions of citizens in LDCs.

To investigate these issues, a robust regression method was applied to the panel data for the period of 1997-2007.

## **II. ICTS AND ECONOMIC GROWTH: EMPIRICAL ANALYSIS**

A growing number of scholars argue that investment in ICT, particularly in machinery, equipment, infrastructure and software, will contribute to economic

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<sup>6</sup> Chrisanthi Avgerou, *Information systems in developing countries: a critical research review*. 23 *Journal of Information Technology*, no. 3 (2008). 133-147.

<sup>7</sup> In the context of business organizations, this study views ICTs as the infrastructure of Information Systems and a subset of it. Therefore, scholarly research in IS is applicable to ICT issues as well.

<sup>8</sup> Chrisanthi Avegerou, *Discourse on ICT and information*, 6 *Information Technologies and International Development*, no. 3 (2010). 1-18. See also: Geoff Walsham and Sundeep Sahay, *Research on Information Systems in Developing Countries: Current Landscape and Future Prospects*, 12 *Information Technology for Development*, no. 1 (2006). 7-24.

<sup>9</sup> UNCTAD, *The Digital Divide Report: ICT Diffusion Index 2005*, (New York and Geneva, 2006). See also: UNCTAD, *Information Economy Report 2006*. See also: UNCTAD *The Development Perspective and World Investment Report 2006: FDI from Developing and Transition Economies: Implications for Development*. See also: UNDP, *Human Development Reports, Statistics of the Human Development Report*. [2006]

Available at: <<http://hdr.undp.org/en/statistics>>

growth<sup>10</sup> as measured by GDP. For example, Hamilton<sup>11</sup> shows that investment in basic telecommunication in Africa had a positive impact on economic, political and institutional development.

### **A. Empirical analysis of panel data**

How does ICT expansion contribute to GDP growth in these countries and to what extent do the rule of law, education, FDI inflow and institutional resistance impact such growth? To investigate the above questions the following hypotheses have been applied to panel data to test the relationship between these variables.

*H1: ICT positively impacts the growth of GDP in LDCs. As the level of ICT expansion increases it will provide opportunities for citizens in LDCs to promote development and economic growth by fostering innovation and improved productivity.*

ICTs in the form of Web 2.0 applications, mobile cell phone networks, e-mail services and so on have provided SMMEs the opportunity to effectively and efficiently participate in business activities across the globe in a cheaper, faster and more efficient manner. Scholarly research has argued that investment in ICTs is positively correlated with growth in economic and labor productivity and in the demand for skilled workers. For example, ICT has played a vital role in advancing economic growth at regional, national, and global levels, and that there is enormous promise for the future<sup>12</sup>.

While earlier studies on developing countries do not show the significance of ICT investment on economic growth, the results from recent empirical studies are rather mixed and inconclusive<sup>13</sup>. While in the last two decades, ICT investment has played a significant role in economic growth by increasing

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<sup>10</sup> J. Bradford DeLong and Lawrence H. Summers, *Equipment Investment and Economic Growth*, 106 Quarterly Journal of Economics, no. 2 (1991). 445-502. See also: Lisa Correa, *The Economic Impact of Telecommunications Diffusion on UK Productivity Growth*, Working Paper no. 492 (Department of Economics at Queen Mary, University of London, 2003).

<sup>11</sup> Sanford V. Berg and Jacqueline Hamilton, *Institutions, Competition and the Performance of Telecommunications Infrastructure in Africa*, PURC working paper (University of Florida, Gainesville, 2000).

<sup>12</sup> Pierre Guislain et al. *Information and Communication for Development*, Global Trends and Policies, The World Bank (2006).

<sup>13</sup> Myung Ko and Kweku-Muata Osei-Bryson, *An Exploration of The Impact of Information Technology Investments in the Healthcare Industry: A Regression Splines Based Analysis*, In Proceedings of 8<sup>th</sup> Americas Conference on Information Systems, (Dallas, TX, 9-11 August 2002).

productivity in emerging economies in the Asia-Pacific region, such as China, Malaysia, Thailand, Vietnam, and the Philippines, due to these countries' political and economic reforms<sup>14</sup>. Its impacts, however, in other developing countries are rather mixed and a matter of debate in the literature<sup>15</sup>. For example, the empirical study by Osei-Bryson and Ko<sup>16</sup> (2004) shows that ICT investments have a positive impact on productivity and growth and this impact is statistically significant, but only when it exceeds a threshold value. In other words, ICT investment must surpass some minimum value before it can be expected to have a statistically significant impact on productivity. In another study, the empirical analysis of Ko and Osei-Bryson<sup>17</sup> shows that investment in ICTs can maximize productivity when such an investment is integrated with investments in non-IT labor and non-IT capital.

*H2: The level of populace educational attainment is positively correlated with ICTs. The more educated the population in each country, the more demand for ICTs will increase, in turn having a positive impact on economic development and growth.*

According to UNCTAD<sup>18</sup>, a higher level of education tends to be associated with higher labor productivity, greater ease in finding formal sector employment,

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<sup>14</sup> G.R. Pipe, *Vietnam Promotes ICT to Accelerate Development, I-WAYS*, 26 *The Journal of E-Government Policy and Regulation*, no. 1 (2003). See also: N. Quynh, *Digital Review of Asia-Pacific 2005/2006: Vietnam*, [2006] Available at: <<http://www.digital-review.org>> See also: Z. Tan, *Evolution of China's Telecommunications Manufacturing Industry: Competition, Strategy and Government Policy*, *Communication & Strategies*, No. 53, [2004].

<sup>15</sup> Geoff Walsham and Sundeep Sahay, *Research on Information Systems in Developing Countries: Current Landscape and Future Prospects*, 12 *Information Technology for Development*, no. 1 (2006), 7–24. See also: Olga Morawczynski and Ojelanki Ngwenyama *Unraveling the Impact of Investments in ICT, Education and Health on Development: An Analysis of Archival Data of Five West African Countries Using Regression Splines*, 29 *Electronic Journal of Information Systems in Developing Countries*, no. 5 (2007), 1-15. See also: E.W. Nwagwu, *Integrating ICTs into the Globalization of the Poor Developing Countries*, 22 *Information Development*, no. 3 (2006), 167-179.

<sup>16</sup> Kweku-Muata Osei-Bryson and Myung Ko, *Exploring the relationship between information technology investments and firm performance using regression splines analysis*, 42 *Information & Management* (2004), 1-13.

<sup>17</sup> Myung Ko and Kweku-Muata Osei-Bryson, *Analyzing the impact of information technology investments using regression and data mining techniques*, 19 *Journal of Enterprise Information Management*, no.4 (2006), 403-417. The results of their empirical analysis show that investments in the IT Stock has a positive impact on productivity only under certain conditions, and that this impact is not uniform but is conditioned both by the amount invested in the IT Stock and the investments in Non-IT Capital.

<sup>18</sup> UNCTAD, *The Digital Divide Report: ICT Diffusion Index 2005*, (New York and Geneva, 2006).

and higher income. As such, we can expect that there is a strong correlation between ICT expansion in a country and the level of its income as measured by GDP per capita and the level of education of its citizens. In today's information economy, education is a core component of the transition of each country towards participation in the global information society according to ITU<sup>19</sup> 2007 report. According to Brown, ICTs and particularly the Internet, will have positive educational benefits for the disadvantaged sectors of South African society living in high density urban and rural areas where there is poverty, a lack of resources, and a lack of educational facilities. Also, the results of an empirical study<sup>20</sup> with regard to ICT access and poverty in Uganda show that a combination of ICTs with improved citizens' educational attainment is associated with a lower incidence of poverty.

*H3: The rule of law in which agents have confidence in and abide by the rules of society is positively correlated with ICT development which in turn positively impacts the growth of GDP.*

The rule of law and the existence of independent judiciary are relevant to ICT expansion and the growth of GDP per capita (GDPP) because national policies can either enhance or slow the diffusion of a technology, depending on the nation's approach to regulating mechanisms, privatization, and free competition outlined in such policies<sup>21</sup>. The rule of law in which agents have confidence in and abide by the rules of society is the cornerstone of any business activities. It is clear that citizens living in countries with a progressive rule of law have better opportunities to engage in business activities based on the quality of the rules of society including contract enforcement, property rights, law enforcement and the courts and without fear of corruption in state agencies, elites in power, or in private interests. Corruption, including that which may occur in judiciary systems, has acquired the status of a continental emergency in Africa<sup>22</sup>.

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<sup>19</sup> ITU, *Measuring The Information Society 2007: ICT Opportunity Index and World Telecommunication/ICT Indicators* (Geneva: ITU Publication, 2007).

<sup>20</sup> Joseph Ssewanyana, *ICT Access and Poverty in Uganda*, 1 International Journal of Computing and ICT Research, no. 2 (2007), 10-19. See also Cheryll Ruth R Soriano, *Exploring the ICT and Rural Poverty Reduction Link: Community Telecenters and Rural Livelihood in Wu' An, China*, 32 The Electronic Journal on Information Systems in Developing Countries, no.1 (2007). 1-15. The author argues that ICTs and in particular telecenters in rural areas can be useful tools for not only improving livelihoods of households but also access to information may help people in rural area to overcome their fear of technology.

<sup>21</sup> Farid Shirazi et al. *Do FDI and Trade Openness Explain the Digital Divide between Asia Pacific and Middle East*, 18 Journal of Global Information Management, no. 3 (2010).

<sup>22</sup> Moses E. Ochonu, *Corruption and Political Culture in Africa: History, Meaning, and the Problem of Naming*, 4 The Law and Development Review no. 3 (2011). Article 3. Available at: < <http://www.degruyter.com/view/j/ldr.2011.4.issue-3/1943-3867.1115/1943-3867.1115.xml?>>

Ochonu views corruption in Africa from a historical perspective rooted in the colonial era while Ugochukwu<sup>23</sup> argues that corruption in courts takes place in part because of the influence of politics in the judiciary system, or the so-called “judicialization of politics”.

*H4: FDI flow in LDCs and investment in ICT infrastructure has a positive impact on economic growth as measured by GDP.*

There is a mutual and positive correlation between ICT expansion and the level of FDI inflow in developing countries. Those developing nations that successfully invested in their ICT infrastructure were also able to attract more FDI flow into their economies. On the other hand, ICTs require not only heavy investment but also the necessary skills and knowledge to implement and maintain such an infrastructure, therefore foreign direct investment is considered a major source of ICT financing, R&D resources and other knowledge-based services.

FDI flow into LDCs has always been small compared to other countries including the developing nations. A review of UNCTAD dataset shows that even this small value was subject to further decrease from 1987 to 2007. For example, in 1987 the FDI flow into LDCs (Africa, Asia and Haiti) was estimated to be 0.644% of the total global FDI flow (see Table 1 in Appendix A). This value decreased to 0.550% in 1997 and continued to decrease to 0.539% in 2007. This decrease is notable considering the growth of the population in these countries during this twenty-year period. The population of the least developed nations in Africa, Asia and Haiti was estimated to be 9.3% of the total world’s population in 1987. This value increased to 10.4% of the total global population in 1997 and then increased to 11.7% by 2007 (see Table 2 in Appendix A).

According to Shirazi et al.<sup>24</sup>, there has been a significant amount of FDI flow from developed nations into other developed countries (North-North investment), or into developing countries (North-South investment). In recent years a new tendency has emerged regarding FDI, namely the South-North investment, where some of the developing and transitional economies are

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<sup>23</sup> Basil Ugochukwu, *The Pathology of Judicialization: Politics, Corruption and the Courts in Nigeria*, 4 *The Law and Development Review*, no. 3 (2011). Article 4. Available at: <<http://www.degruyter.com/view/j/ldr.2011.4.issue-3/1943-3867.1116/1943-3867.1116.xml?>>

The author defines judicialization of politics as the practice whereby judicial power is expanded well beyond adjudication in purely orthodox terms to embrace the core of politics and governmental policy is becoming a global phenomenon.

<sup>24</sup> Farid Shirazi et al., “ICT diffusion and Foreign Direct Investment: A Comparative study between Asia-Pacific and the Middle Eastern Economies”, in Tan, B. F. (ed.) *International Comparisons of Information Communication Technologies: Advancing Applications*. (Hershey, PA: IGI Publication, 2011).

investing in developed countries and/or in other developing countries including LDCs (South-South investment). This is particularly noticeable with regards to ICT investments. For example, some of the well developed ICT nations in the Middle East (e.g., UAE, Qatar, Kuwait) are actively engaged in telecom investment in mobile telephone systems in some of the Sub-Saharan African countries.

*H5: Institutional resistance in the economy will negatively impact the expansion of ICT.*

Institutional resistance in the form of governmental involvement and heavy control of business activities through the imposed regulations and licensing mechanisms on businesses is considered a barrier which impedes the private sector and individuals from participating in fair and transparent business activities. According to Miles et al.<sup>25</sup>, the degree of freedom required to operate a business is strongly related to the low regulatory burden imposed by governments. They argue that countries must maintain an open environment for business activities since extensive burdensome regulations provide an environment in which private sectors cannot operate without the fear of bureaucracy and corruption in the political establishment. The private sector should not only be able to invest in an ICT infrastructure but also use ICTs as a means of competitive advantage to conduct business.

While much of the empirical literature on economic growth in developing countries is focused on the impact of ICT investment or on the degree of such an investment in conjunction with other infrastructure investments on economic growth, less focus has been paid to view economic freedom as a fundamental human rights matter, as outlined in the United Nations' *Universal Declaration of Human Rights (UDHR)*. For example, the second column of UDHR (Articles 12-17) has paid close attention to the rights of the individuals in civil and political society. In particular, Article 17 emphasizes the property rights of individuals and/or in association with others. As such, heavy governmental control in business activities and/or elites presents not only obstacles to economic growth and development but such activities may lead to a violation of UDHR declaration.

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<sup>25</sup> A.M. Miles et al. *The 2006 Index of Economic Freedom* (Washington, DC: The Heritage Foundation, 2006).

## **B. Data collection**

The index of rule of law (variable *law*) was collected from the World Bank's database and the Freedom House. The World Bank rates each country's adherence to the rule of law on a scale of -2.5 to 2.5 where -2.5 represents the worst legal environment and 2.5 represents the most progressive. Freedom House<sup>26</sup> ranks each country's adherence to the rule of law by analyzing the following five components: 1) Independent judiciary, 2) Primacy of rule of law in civil and criminal matters, 3) Accountability of security forces and military to civilian authorities, 4) Protection of property rights, and 5) Equal treatment under the law. This institute scores each country's adherence to the rule of law based on a scaling score of zero to seven where zero represents the weakest and seven represents the strongest performance of rule of law. The index of rule of law is a composite index of the above two indices. For the purposes of this study, a rescaling and conversion of this index was performed to indicate one as the lowest legal environment and 100 as the highest.

The ICT index is composed of four main indicators including main telephone lines, mobile cellular phones, Internet users and the number of personal computers per 100 inhabitants. These were collected from International Telecommunication Union (ITU) data.

The education index was collected from UNDP, The World Bank and ITU. To emphasize higher education as a means of accessing ICT tools and services, the education index introduced by ITU-Orbicom<sup>27</sup>, was used in this study. This index (variable *edu*) scores each country's educational performance for the period of 1997 to 2007.

The government intervention index (variable *resist*) by Heritage Foundation and the Wall Street Journal is composed of variables such as government consumption as a percentage of the economy, government ownership of businesses and industries, share of government revenues from state owned enterprises and government ownership of property and economic output produced by the government. A score of one indicates the least institutional resistance and a score of 100 indicates the highest level of resistance.

The Gross Domestic Product per capita (variable *GDPP*) is used as a means of measuring each country's level of economic development.

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<sup>26</sup> Freedom House, Survey Methodology, available at:

<http://www.freedomhouse.org/template.cfm?page=140&edition=8&ccrpage=38>

<sup>27</sup> Orbicom, *From The Digital Divide To Digital Opportunities: Measuring Infostates for Development*, (Montreal: Claude-Yves Charron, 2006). ITU-Orbicom introduced the following formula for calculating the index of education for each country: Education= (primary + 2 x secondary + 3 x tertiary) /6

### C. Regression analysis

Drawing from the literature review, the author constructed a regression model, as shown in equation (1)<sup>28</sup>.

The dependent variable  $gdpp_{it}$  denotes the growth of per capita GDP in each country, while independent variables such as  $ict_{it}$ ,  $edu_{it}$ ,  $law_{it}$ ,  $fdi_{it}$  and  $resist_{it}$  represent the level of ICT expansion, educational attainment, the existence level of legal institute, the flow of FDI flow and the intensity of institutional resistance in business activities.

To better understand the mutual relationships among variables and in particular the relationship between ICT as a dependent variable and per capita GDP growth, education and FDI flow, the index of law and institutional resistance a regression model as depicted in equation (2) was constructed<sup>29</sup>.

To identify the eventual linear relationships among dependent and independent variables the model was tested for issues such as multicollinearity and heteroskedasticity. The first problem was identifying the multicollinearity issue among variables. This problem is linked to a high level of correlation among independent variables that may cause a swing in parameter estimation due to small changes in the data. To test for multicollinearity, the model's Variance Inflation Factor (VIF) was estimated. As depicted in table 1, the models' VIF values for equations 1 and 2 are reported as 1.16 and 1.23 respectively which are far from the VIF critical value of 30 (server multicollinearity).

To handle the issue of heteroskedasticity, a robust regression analysis was applied to the panel data. Generally speaking, the heteroskedastic error occurs when the error term  $\varepsilon_{it}$  appears to be a function of independent variables, according to White<sup>30</sup>.

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$$^{28} \text{ The equation: } gdpp_{it} = \alpha_0 + \alpha_1 ict_{it} + \alpha_2 edu_{it} + \alpha_3 law_{it} + \alpha_4 fdi_{it} + \alpha_5 resist_{it} + \varepsilon_{it} \quad (1)$$

denotes that parameters such as ICT, education, the existing level of rule of law, the flow of FDI and the institutional resistance have direct impacts on the growth on economic development as measured by GDP per capita; where  $i$  indexes the 35 countries in this study, and  $t$  is a reference to the time period (1997-2007),  $\alpha_0$  is a constant,  $\alpha_1$  through  $\alpha_5$  are variable coefficients and  $\varepsilon_{it}$  is the error term.

$$^{29} \text{ Equation (2) is defined as: } ict_{it} = \beta_0 + \beta_1 gdpp_{it} + \beta_2 edu_{it} + \beta_3 law_{it} + \beta_4 fdi_{it} + \beta_5 resist_{it} + \gamma_{it} \quad (2)$$

which measures the impact of other variables on ICTs.

<sup>30</sup> Halbert White, *A Heteroskedastic-consistent Covariance Matrix Estimator and a Direct Test of Heteroskedasticity*, 48 *Econometrica* (1980), 817-838.

### III. REGRESSION ANALYSIS

Table 1 below shows the results of regressions on panel data for equations 1 and 2 with a confidence interval of 95%. Also, Figure 1 reports correlation matrix among variables as depicted in equations 1. The conditions for analyzing the results of the regression analysis of the panel data was to reject the hypothesis if  $P > |t| > 0.05$ <sup>31</sup> otherwise accept the claim.

Table 1: Regression results for equations 1 and 2

Equation (1)					Equation (2)				
Number of obs = 385 F( 5, 379) = 44.73 Prob > F = 0.0000 R-squared = 0.3902 Root MSE = .1764					Number of obs = 385 F( 5, 379) = 36.06 Prob > F = 0.0000 R-squared = 0.2951 Root MSE = 6.5415				
<i>gdpp</i>	Coef.	Robust Std. Err.	t	P> t	<i>Ict</i>	Coef.	Robust Std. Err.	t	P> t
<i>Ict</i>	0.0117	0.0014	8.31	0.000	<i>gdpp</i>	16.0711	1.7699	9.08	0.000
<i>edu</i>	0.0034	0.0009	3.86	0.000	<i>edu</i>	0.0626	0.0301	2.08	0.038
<i>law</i>	-0.0068	0.0009	-7.77	0.000	<i>law</i>	0.1722	0.0418	4.12	0.000
<i>resist</i>	-0.0003	0.0007	-0.44	0.660	<i>resist</i>	-0.0492	0.0288	-1.71	0.089
<i>fdi</i>	0.0432	0.0111	3.91	0.000	<i>Fdi</i>	0.6500	0.3130	2.08	0.039
cons	2.5595	0.0924	27.69	0.000	cons	-38.4012	5.4801	-7.01	0.000
VIF	1.16				VIF	1.23			

Table 1 indicates the following results:

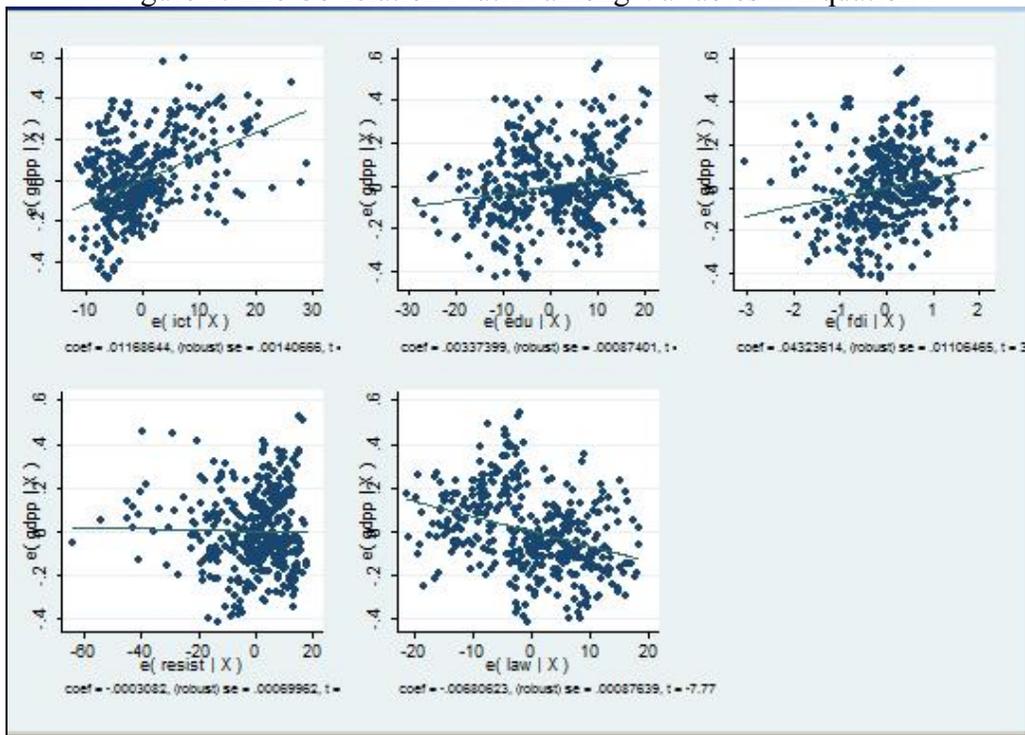
- 1) The regression results for equation 1 show a *p*-value lower than 0.05 for all variables except for *resist*. Therefore, the hypothetical condition to reject the hypotheses if  $(H=P > |t| > 0.05)$  is fulfilled. Furthermore, the *t*-values indicate that all variables are statistically significant at a level of 95%. However, the impact of institutional resistance on the dependent variable GDPP is reported as statistically insignificant.
- 2) The coefficients of variables *ict*, *edu* and *fdi* show positive values in regards to variable *GDPP* indicating their positive impact on GDPP in LDCs. Thus the results of our regression support the claims described in hypotheses H1, H2, and

<sup>31</sup> This term is used to determine the significance of our model test for each variable. In other words it indicates that any value lower than 0.05 is said to be statistically significant result (see for example the forth column of table 1 related to Equation1) otherwise it is considered as insignificant.

H4. Figure 1 shows the correlation matrix among these variables. The results of the regression analysis for equation 2 supports the claim that educational attainment is positively correlated (H2) with the expansion of ICTs.

3) The coefficient of variable *law* shows a negative value with regards to dependent variable GDPP indicating that the existing level of rule of law in these countries persists as the main barrier toward economic development and growth, as measured by GDPP.

Figure 1: The Correlation Matrix among Variables in Equation 1



4) Despite the fact that FDI flow in LDCs constitutes a very small amount of the total global FDI flows, its impact on both GDPP growth and ICT expansion is reported to be positive and this impact is statistically significant. In particular, investment in ICT infrastructure as described in equation 2 can positively impact the future expansion of ICTs and as a consequence it can contribute to the growth of GDPP in these countries. Thus we can conclude that the hypothesis H4 is supported by both regressions.

5) As mentioned earlier, the variable *resist* shows a value larger than 0.05 indicating its insignificant impact of independent variable GDPP. Therefore, the claim presented in hypothesis H5 is rejected. Two main reasons for such an insignificance report may be explained as: 1) the important role that governments

in these countries can play in investing in infrastructure (e.g., investments in roads and bridges, water system, education, healthcare and so on) as a foundation for development and economic growth; and 2) the lack of strong local private enterprises in these countries.

As mentioned above, the results of this regression analysis on the panel data show that ICT has a positive impact of GDPP growth and the increase in GDPP will ultimately increase the demand for ICT products and services. However, the differences between countries in terms of the level of citizens' educational attainment, the rule of law, governmental intervention in economic activities and the level of FDI flows in these countries can both enhance and restrict the relationship between ICT and GDPP growth. An e-commerce model based on the existing level of ICT infrastructure in LDCs will be discussed in the following section.

#### **IV. VIRTUAL BAZAAR AN E-COMMERCE MODEL FOR MICROTRADE IN LDCs**

According to Lee<sup>32</sup>, trade based micro-based economic development can break the cycle of poverty in LDCs. It is an alternative way to overcome supply constraints that LDCs typically suffer such as insufficient capital and low levels of production technology; allowing residents in LDCs to export local products<sup>33</sup>. By trading small units of material to international customers—this system of trade produces financial success for LDCs because it permits small business owners from these countries to sell their products directly to retailers, NGOs, and private individuals without using a third party or a middleman. One way to achieve this goal is through the pricing of products in an open global market. The e-commerce model introduced in this section is called Virtual Bazaar (VB) which is adapted to the level of ICT infrastructure in LDCs. VB enables the microtrade owners to sell their products directly to the end consumer internationally. The model as depicted in figure 2 provides a reduction in transaction costs by advertising and selling the end product directly to customers and other businesses across the globe. As a result, business owners are able to bring in extra income, pour money into the economy and ultimately contribute to the country's GDP growth.

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<sup>32</sup> Yong-Shik Lee, *Theoretical Basis and Regulatory Framework for Microtrade: Combining Volunteerism with International Trade Towards Poverty Elimination*. 2 *Law and Development Review*, no.1 (2009), 367-399. Available at SSRN: <http://ssrn.com/abstract=1524185> or < <http://www.degruyter.com/view/j/ldr.2009.2.1/ldr.2009.2.1.1044/ldr.2009.2.1.1044.xml?>>

<sup>33</sup> *Ibid.*, p. 370.

As discussed, the high cost of access to ICT services in LDCs presents a barrier to the design of an effective customer-to-customer (C2C) e-commerce model for microtrade owners in these countries. The high cost of broadband access required for e-commerce application in these countries makes the implementation of the C2C model at the micro-level a very costly solution. For example, according to ITU 2009<sup>34</sup>, the cost of broadband access in some of the least developed nations is too high making it impossible for microtrade owners to apply for such a service. Consequently, these countries experience a widened digital divide. In recent years the digital divide between the most developed ICT nations and LDC countries increased drastically. One way to measure this gap is to consider the cost of ICT access among citizens in these countries. For example, according to the ITU 2009 and 2010<sup>35</sup> dataset, the ICT price basket between 35 LDCs and 25 well developed ICT increased from 42 fold in 2008 to almost 70 fold in 2010. According to ITU, the price basket index is calculated as the average price of three main ICT components: the fixed telephone lines, mobile cellular phones and fixed broadband Internet access as percentage of each country's Gross National Income (GNI) per capita. Therefore, it is important to consider the cost of ICT access in LDCs.

Figure 2 below provides a simplified e-commerce model based on Lee's theoretical framework<sup>36</sup> in which volunteerism is combined with international trade to support microtrade in LDCs. The main objective of the following e-commerce model is to encourage local business activities by engaging people in LDCs in the chain of production instead of relying on foreign aid and donations. Lee argues that while aid and donations from other countries, international bodies, NGOs, and private individuals are an important source of temporary relief for impoverished populations in LDCs, they will not provide long-term relief from poverty. In many cases the aid and donations are linked to conditional terms or Tied Aid (TA). According to Serra<sup>37</sup>, TA ties development aid to the purchase of products from the donor country. The donor country grants funds to an LDC on

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<sup>34</sup> ITU. *Measuring the Information Society: The 2009 ICT Development Index*, (Geneva: ITU Publication, 2009). According to this report, the broadband access in Gambia is very limited particularly its cost is prohibitive. For example, an entry broadband plan is almost US\$ 400, corresponding to over 1000 PPP \$, or 1400% of monthly GNI per capita.

<sup>35</sup> ITU, *Measuring the Information Society: The 2010 ICT Development Index*, (Geneva: ITU Publication, 2010). See also note 28.

<sup>36</sup> Lee's framework is a proposed solution to the prevalent poverty problems in LDCs and for the sake of economic development in which it will provide the majority of LDC populations with the economic capacities to meet the material requirements of daily life above the poverty level.

<sup>37</sup> Gianluca Serra, *The Practice of Tying Development Aid: A Critical Appraisal from an International, WTO and EU Law Perspective*, 4 Law and Development Review, no. 1 (2011). Article 1. Available at:

<<http://www.degruyter.com/view/j/ldr.2011.4.issue-1/ldr.2011.4.1.1077/ldr.2011.4.1.1077.xml?>>

the condition that the donation is spent by the host country through tender procedures reserved for companies established by the donor country. A further restriction is sometimes imposed on the recipient: products and services must originate from the donor country which constitutes the term known as “double tying”<sup>38</sup>.

At the heart of the Virtual Bazaar model is an e-commerce website. The website contains multiple pages organized into different categories of products and countries. Each LDC has its own homepage for advertising local microtrade products. Figure 1 in Appendix B provides a snapshot of a proposed template for such a website. The website provides microtrade owners the opportunity to present their own products whether these products are arts (paintings, music etc), handworks (carpet, textile, cloths and so on), jewelry and accessories or any other non-perishable items they may desire to sell online.

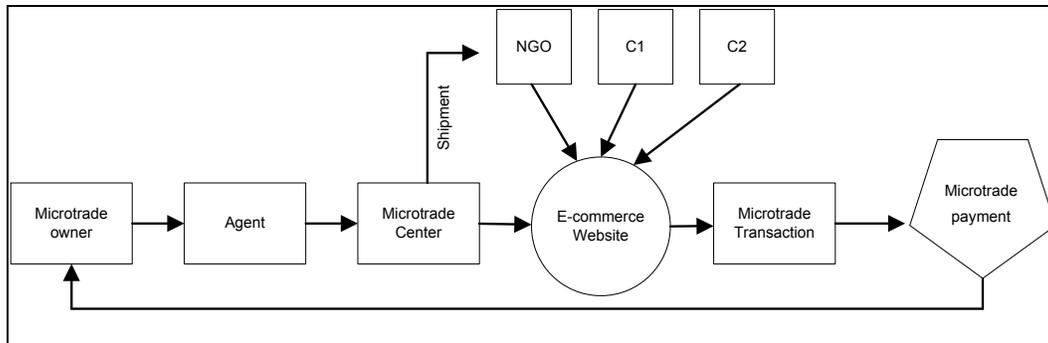
The site provides a shopping cart option for potential international customers who are interested in purchasing available items. These customers can be volunteer organizations similar to the Canadian “Ten Thousand Villages”, NGOs, or other individual interested in buying microtrade products. The customers pay for the selected items by initiating an electronic transaction to a centralized microtrade institute where microtrade owners have already established their accounts.

The next important component of this system is the microtrade center in each region or province within a country. The microtrade center provides web services to both local people and the centralized e-commerce web site. These centers are also the main link between microtrade owners and the international customers for shipping their purchased items, as depicted in Figure 2. Each center has its own employees who are in charge of providing services to microtrade owners. In addition, the microtrade centers are also the main body for shipping purchased items to customers. This will also boost the local postal system businesses.

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<sup>38</sup> *Ibid.*

Figure 2: A snapshot of Virtual Bazaar Model



The agents, as depicted in Figure 2, are actually the main contact with microtrade owners. The owners provide necessary information about the product including the materials used in their products and other related information in the form of pictures to be posted on the website. The agent however, does not necessarily need to have Internet access (as this is the case in many rural areas) for submitting the above information to the microtrade center. The agent can use any means of storing information offline to be uploaded to the website later. It is important that the agent has face-to-face contact with the trade owner for verifying the quality of the items and being the main contact person with the local trade center.

### A. Virtual bazaar and the legal support

One of the key issues in implementing the above model is the legal institutional support from both local and international community. The international trade agreements, laws and regulations should consider microtrade support as an opportunity for improving the living conditions of people in LDCs. Lee argues that during the last fifty years, for example, many countries in East Asia (e.g., South Korea, Taiwan, Singapore, China) emerged poverty through successful economic development plans. And in their quest for national development the international community and in world trading has been a crucial element in their success. In this context, world trade opened up affluent foreign markets for the goods and services produced in developing countries, and economic development has been achieved by taking advantage of those foreign markets through export the so-called “export-oriented development policy”. Unfortunately, this policy has not been replicated in most LDCs which typically do not have sufficient domestic

markets for goods and services to support economic development, due to the low purchasing power of the local population<sup>39</sup>.

In addition, the local governments should provide enough support to microtrade owners in their countries for promoting their citizens' products on a global scale. ICTs with their various applications including the Web 2.0 technology can provide opportunities to microtrade owners to sell their products on the global market. These products, which are mainly made through natural materials, have the potential to attract more international customers who seek culturally unique and environmentally conscious products.

The results of this empirical study show the importance of the legal environment in LDCs. As shown by our regression analysis, the local legal environment has direct impact on the success or failure of microtrade business activities. Unfortunately, the existing practices of the legal environments in LDCs do not favor fair and transparent trade activities; therefore, major reforms are required in order to successfully implement microtrade strategies. There are also other barriers and constraints that impede the development of microtrade business in LDCs including but not limited to literacy issues, political instability, monetary policy, restrictive trade barriers and the lack of effective entrepreneurship programs as part of countries strategic development plans that may directly and indirectly impact the success of microtrade programs in these countries.

## **V. CONCLUSION**

This study analyzed archival data on 35 Least Developed Countries from 1997-2007. The results of this empirical study show that there are strong relationships between ICTs and economic growth as measured by GDP, education, and FDI flow in LDCs. The results also show that the existing level of the legal environment is not favorable for economic development in the microtrade sector. The ICT price basket in LDCs is one of the main barriers to accessing ICT resources including access to the Internet. Following the results of regression analysis, the study proposes an e-commerce model for supporting microtrade activities in LDCs. The model was adapted to the existing level of ICT infrastructure as well as to the high price of ICT products and services in these countries. The success of this model or similar models is conditional to the improvement of the legal environment in LDCs, governmental support for microtrade as well as active international support for allowing microtrade owners to sell their products directly to their customers.

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<sup>39</sup> *Ibid.*

## APPENDIX A

Table 1: FDI inflow 1987-2007

FDI inflow (Millions \$US)	1987	1997	2007
World	1,337,186	4,456,951	1,7849,168
Developing economies	418,461	1,115,840	4,441,301
Developed economies	918,725	3,311,524	12,729,483
Developing economies: Asia	283,542	712,468	2,872,130
Eastern Asia	213,366	441,268	1,687,088
LDCs: Africa and Haiti	7,786	17,284	76,745
LDCs: Asia	821	7,243	19,513
LDCs Africa, Asia and Haiti	8,607	24,527	96,258
The share of FDI flow into LDCs as % of World	0.644	0.550	0.539
The share of FDI flow into LDCs as % of Developed	0.937	0.741	0.756
The share of FDI flow into LDCs as % of Developing	2.057	2.198	2.167

Source: UNCTAD

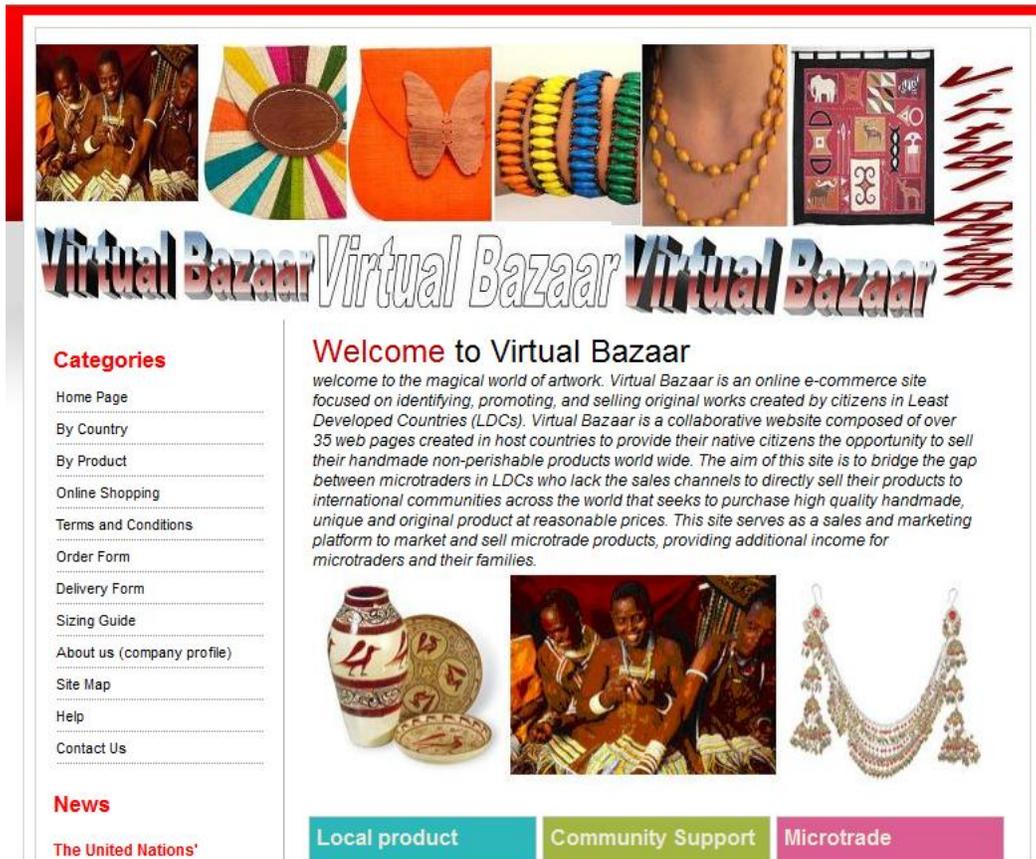
Table 2: Population growth 1987-2010

Population (Thousands)	1987	1997	2007
<b>World</b>	5,039,478	5,887,260	6,661,637
Developing economies	3,821,018	4,606,098	5,329,089
Developed economies	907,537	952,552	1,007,833
Least developed countries	470,622	614,789	779,273
LDCs: Africa and Haiti	280,808	370,101	485,740
LDCs: Asia	188,640	243,217	290,629
Total Population Africa, Asia and Haiti	469,448	613,317	776,369
<b>The share LDC population as % of the World</b>	9.315	10.418	11.654

Source: UNCTAD

## APPENDIX B

Figure 1: A snapshot of Virtual Bazaar website



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