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## Self-interest in innovation diffusion decision process : the case of extending broadband Internet services to rural areas of Ghana

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## SELF-INTEREST IN INNOVATION DIFFUSION DECISION PROCESS: THE CASE OF EXTENDING BROADBAND INTERNET SERVICES TO RURAL AREAS OF GHANA

### Introduction

Governments in developing countries supported by their development partners are seeking effective strategies to increase the accessibility of the rural population to quality Internet connectivity. Most notable development model of such partnerships has led to the establishment of Community Information centers and Telecenters<sup>1</sup>. However these public initiated and supported tele-centers and community information centers continue to face sustainability, maintenance and poor quality of services thereby dimming the initial interests generated<sup>2</sup>.

Internet cafés has been a successful business model in the cities especially in Africa providing innovative tools for the diffusion and the adoption of the internet

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<sup>1</sup> Y. Kim, T. Kelly and S. Raja: *Building broadband: Strategies and policies for the developing world*, Global Information and Communication department of the World Bank, 2003; D. Townsend, P.A. Stern: *New Models for Universal Access in Latin America*, Regulatel/World Bank (PPIAF)/ECLAC Project on Universal Access for Telecommunications in Latin America, 2006.

<sup>2</sup> S. Madon, N. Reinhard and D. Roode: *Digital Inclusion Projects in Developing Countries: Processes of Institutionalisation*, Proceedings of the 9<sup>th</sup> International Conference on Social Implications of Computers in Developing Countries, Sao Paulo, Brazil, May 2007; E. Gould, R. Gomez: *Community Engagement & Infomediaries: challenges facing libraries, telecentres and cybercafes in developing countries*, IConference Feb 3-6, 2012, Urbana-Champaign, Illinois, 2010; M.L. Best, R. Kumar: *Sustainability Failures of Rural Telecenter: Challenges from the Sustainable Access in Rural India SARI Project*, MIT Press, Vol. 4, No. 4, Fall/Winter, 31-45, 2008.

services<sup>3</sup>. Individuals who cannot afford Internet subscription either at home or with mobile modems, can access the internet at the café for a limited period of time at an affordable price.

Although this business model has been successful in the cities but not the rural areas<sup>4</sup>, due to technology pull factors such as the need, utilization and commercialization of information. The presence of network infrastructure and Internet connectivity makes possible for the Internet café operators to respond such technology pull with such business model. The result of this phenomenon is the low or non-existent supply for broadband Internet services in rural areas of developing countries. It is therefore critical to identify demand and supply side factors that would stimulate private sector participation in the provisioning of broadband internet Services in the rural areas through the internet café business model. Using Diffusion of Innovation theory<sup>5</sup>, this study explores demand and supply side factors that would facilitate diffusion of broadband internet services in rural areas using the Internet café business model in Ghana as a case study. The absence of Internet cafes in the rural areas indicates a breakdown between the concepts of ‘Persuasion’ and ‘Decision’. The ‘Decision’ factor in the Diffusion of Innovation theory have no specific constructs, unlike the ‘Knowledge’ factor and the ‘Persuasion’ factor due to the difficult process of obtaining empirical evidence. But in diffusing technological innovations, what really constitutes the ‘Decision’ process is vital before Implementation and Confirmation.

Self- Interest Decision Assessment (SIDA) construct is proposed and validated from the data collected as factors facilitating decision to use the Internet café model for the provisioning of broadband Internet services in the rural areas. The findings provide better strategy in ensuring private sector led process of innovative Broadband Internet service delivery using Internet cafés.

## 1. Significance of Rural Connectivity

Access to quality telecommunication infrastructure and services by rural dwellers are critical to their participation in the emerging information economy<sup>6</sup>

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<sup>3</sup> I. Williams, P. Gyasse and M. Falch: *Extending Rural Connectivity through an Extended Internet Café Business Models in Ghana*, The 19<sup>th</sup> ITS Biennial Conference, Nov 18-21, 2012, Plaza Athenee Bangkok, A Royal Meridian Hotel, 2012.

<sup>4</sup> G. Naik, S. Joshi and K. Basavaraj: *Making E-Government Centers Financially Sustainable in Rural India: A Conceptual Design for Action Research*, Indian Institute of Management Bangalore Working Paper No. 317, 2012; M.L. Best and R. Kumar: *Sustainability Failures of Rural Telecenter...*

<sup>5</sup> E.M. Rogers: *Diffusion of innovations* (5<sup>th</sup> ed.), New York, NY: Free Press 2003.

<sup>6</sup> S. Strover: *Rural Internet Connectivity*, The Telecommunications Research and Policy Conference, 1999.

with the evidence of the link between economic development and access to telecommunication services<sup>7</sup>. Broadband Internet services provide a lot of opportunities<sup>8</sup> in broad area such as E-commerce, E-government, E-learning. In the developing countries, mobile broadband Internet services provides potential opportunity for faster diffusion of Internet access<sup>9</sup>. Access to quality information is regarded as a critical value-addition essential for giving meaning to rural lives<sup>10</sup>. Broadband Internet connectivity lays the foundation for increasing productivity and stimulates economic development by attracting knowledge workers and businesses that need large bandwidth, like call centers and engineering companies<sup>11</sup>.

Broadband connectivity also provides the impetus for new, local, home-based business start-ups that operate over the Internet creating local technical jobs. Investment in broadband infrastructure prospers local economies thereby reducing the rural urban drift with its attendant problems<sup>12</sup>. Broadband Internet today confirms the prediction of reduced information inequality as result of reduced cost of information access<sup>13</sup> and the gaining of human capital by low income people to enhance their status as result of the information age<sup>14</sup>. Internet penetration globally published by Neilson Online and cited by Internet World Statistics indicates that 34% of the world population has access to Internet services in the year 2012<sup>15</sup>.

Africa has the lowest penetration of broadband Internet and the region where the formulation of ICT strategies has taken place at the slowest pace<sup>16</sup>. Access to broadband Internet connectivity in Ghana as in many African countries is very low.

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<sup>7</sup> E. Parker, D. Hudson, S. Dillman, S. Strover and F. Williams: *Electronic Byways: State Policies for Rural Development through Telecommunications*, Washington: The Aspen Institute 1995.

<sup>8</sup> C. Blackman and L. Srivastava (eds): *Telecommunications Regulation Handbook Tenth Anniversary Edition*, The International Bank for Reconstruction and Development/ The World Bank, InfoDev, and The International Telecommunication Union, 2011.

<sup>9</sup> S. Strover: *Rural Internet Connectivity*, "Telecommunications Policy" 25, 331-347 2001.

<sup>10</sup> S.E. Sebusang and S. Masupe: *ICT Development in Botswana: Connectivity for Rural Communities*, "The Southern African Journal of Information and Communication", 4 (2) 2003.

<sup>11</sup> C. Qiang: *Broadband Infrastructure Investment in Stimulus Packages: Relevance for Developing Countries*. Info, 2. 2010; C. Qiang and C. Rossotto: *Economic Impacts of Broadband, In Information and Communications for Development 2009, Extending Reach and Increasing Impact*, Washington: World Bank. 2009.

<sup>12</sup> I. Williams and Y. Botwe: *Analysis of the Proposed Ghana Broadband Strategy*, Munich, GRIN Publishing GmbH, 2010.

<sup>13</sup> R.H. Anderson, T.K. Bikson and B.M. Mitchell: *Universal Access to E-Mail Feasibility and Societal Implications*, Santa Monica, CA: RAND, 1995.

<sup>14</sup> M. Castells: *The Rise of the Network Society*, Vol. 1 of *The Information Age: Economy Society and Culture*, Oxford, UK: Blackwell's, 1996.

<sup>15</sup> <http://www.internetworldstats.com/stats.htm>

<sup>16</sup> E.K. Shih: *IT Diffusion in Developing Countries*, Communications of the ACM, 43, 2008; A. Jagun: *Regional Report, Africa*, Global Information Society Watch, 63-67, 2008.

Broadband Internet connectivity has enabled ubiquitous delivery of information and services in converging telecommunication channels. Social network applications such as Facebook, Twitter and MySpace would facilitate social interactions between rural dweller and their partners in the urban areas in addition to the utilization of services such as email chat services and Voice over Internet (VoIP) communications.

## 2. Framework for Investigation

Diffusion of innovation theory explains how new ideas and innovation spreads through cultures. It was propounded by Everett Rogers in 1962<sup>17</sup>. The theory posits that an innovation is likely to be adopted if has relative advantage, compatible simple, triable and observable to the potential user. These factors influence the innovation decision process. Sufficient information is therefore required for the decision process. This information provides the knowledge which persuades the diffusion of such innovation. Persuasion is influenced by the advantages and the disadvantages of the innovation leading to decision. An affirmative decision leads to the implementation and confirmation. The confirmation phase either validates or invalidates the information gathered at the knowledge phase and the Persuasion phase. The construct of 'Knowledge', 'Persuasion', 'Decision', 'Implementation' and 'Confirmation' makes up the five stages of adoption.

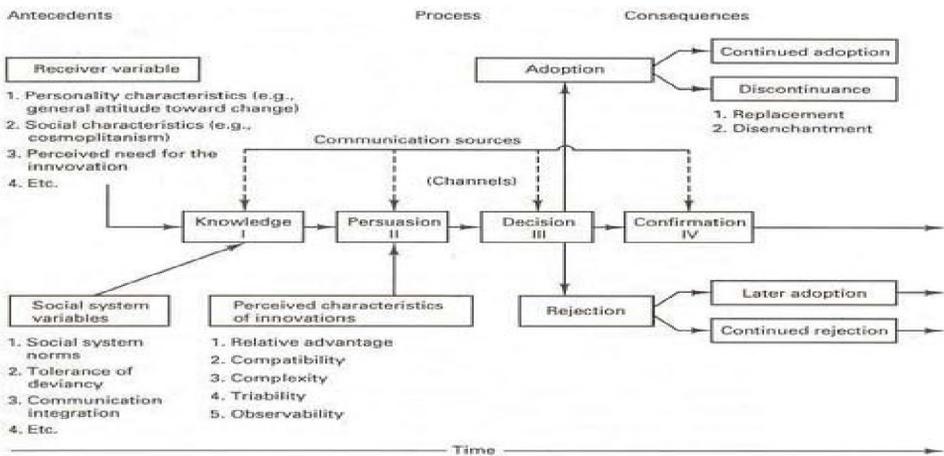


Fig. 1. Diffusion of innovation model

Source: E.M. Rogers: *Diffusion of innovations* (4<sup>th</sup> ed.), The Free Press, New York 1995.

<sup>17</sup> E.M. Rogers: *Diffusion of innovations* (5<sup>th</sup> ed.), Glencoe, NY: Free Press 1962.

The diffusion of innovation theory has been used to study different innovations diffusions<sup>18</sup>. However there is still no universal constructs of the decision making process since each adopter has heterogeneous influencing innovation adoption. Richerson et al (2001)<sup>19</sup> identifies individual attributes such as financial status, social system attributes (Ethics, religion etc.) and perceived attributes of the innovation as possible impediments to adopting innovations.

This research views the Internet café entrepreneurs as users who utilize the existing infrastructure to provide services to final consumers who are referred to as subscribers. The study identifies the factors that contributed to the adoption of the business model in the urban areas and why the same cannot be said of the rural areas.

They have relevant knowledge about the Internet café business model which persuaded them to an affirmative decision adopt and implement the model in the urban areas. The same persuasion when applied in the rural has resulted negative decision to adopt the model as indicated below.

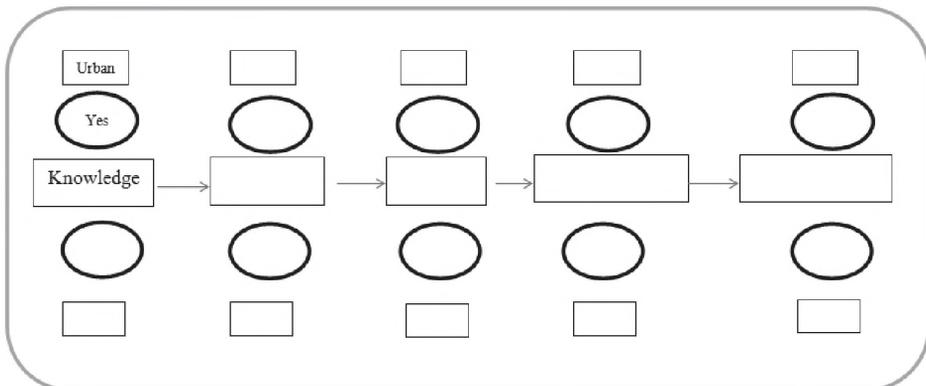


Fig. 2. Innovation Decision process for Urban and Rural private sector-led Internet diffusion  
Source: own elaboration.

The diffusion of broadband Internet services using the internet café business model in rural areas rests on the factors that could influence a decision change from negative to affirmative. Currently there is strong technical persuasion but very weak economic persuasion<sup>20</sup>. The cost of setting up an internet café in a rural area far

<sup>18</sup> P.J. Richerson, M.E. Katz, M.L. Levin and H. Hamilton: *Traditions of Research on the Diffusion of Innovation*, "American Sociological Review", Vol. 28, No. 2, Apr., 1963.

<sup>19</sup> P.J. Richerson, M.B. Mulder and B.J. Vila.: *Principles of Human Ecology*, Simon and Schuster Custom Publishing, 2001.

<sup>20</sup> I. Williams, P. Gyasse and M. Falch: *Extending Rural Connectivity through an Extended Internet Café Business Models in Ghana*, the 19<sup>th</sup> ITS Biennial Conference, Nov 18-21, 2012, Plaza Athenee Bangkok, A Royal Meridian Hotel, 2012.

higher than in the urban areas while knowledge and demand for the service is low in rural areas which discourages the adoption of the business model in such areas. The education level of the people living in the rural area is low; hence the likelihood of adopting broadband Internet services if delivered at market value is low. These goes on to affect the triability and observability of the innovation hence negative decision on adoption. There is therefore the need for both intrinsic and extrinsic intervention to persuade users for an affirmative decision to diffuse broadband Internet Services in the rural areas through the existing business model. This study identifies this persuasion gap as self Interest since the innovator stand to lose their investment if they adopt the Internet café business model in a hostile investment environment.

Physiologists have posited that persuasion can be affected by self-interest<sup>21</sup>. The Internet café operators as entrepreneurs are concerned with economic viability of their enterprise. Once convinced of meeting this self-interest and there is a possibility of affirmative decision, implementation and confirmation.

To validate this concept of self-interest the decision of to adopt the Internet café business model, Internet café operators in Ghanaian cities studied from which the significance of self-interest at the persuasion level diffusion of innovation is of theoretical significance.

### 3. Methodology

The Exploratory research approach was adopted using Internet Café Business models in Ghana. With similar socio-political, cultural and economic features as most sub-Saharan African countries the findings in Ghana could be applicable elsewhere. 25 Internet café operators accessing Internet connectivity from the Mobile Network Service providers and other Internet service providers were surveyed. Primary data was obtained through questionnaire and interviews purposively sampled while secondary data was obtained from desktop research for the study. The study utilized emailing and telephone as part of the survey. Some rural areas were visited for observation so as to be able to propose intrinsic and extrinsic interventions with the potential of positively affecting self-interest in persuading service for affirmative decision.

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<sup>21</sup> P.R. Darke and S. Chaiken: *The pursuit of self-interest: Self-interest bias in attitude judgment and persuasion*, "Journal of Personality and Social Psychology", Vol. 89(6), 864-883, Dec, 2005.

#### 4. Data Analysis and Discussion

The diagrams below summarize the responses of the 25 Internet café operators in Ghana indicating the persuasive factors for setting up in urban areas, factors affecting the diffusion the Internet café business model in the rural areas and then factor likely to influence the decision to diffuse the model in rural areas. The respondents were asked to indicate their agreement, indifference and disagreement with various factors influencing investment decisions in the questionnaire.

This proposes Self-Interest as persuasive tool contributing to affirmative decision to diffuse innovation for private entrepreneurs. Self-Interest Decision Assessment (SIDA) is done by evaluating the responses of the Internet Café entrepreneurs to the questions which contributes directly to profitability and hence higher returns on investments. To undertake the Self-Interest Decision Assessment, the entrepreneurs were asked about the factors that contributed to the adoption of the Internet Café Business models in the Cities.

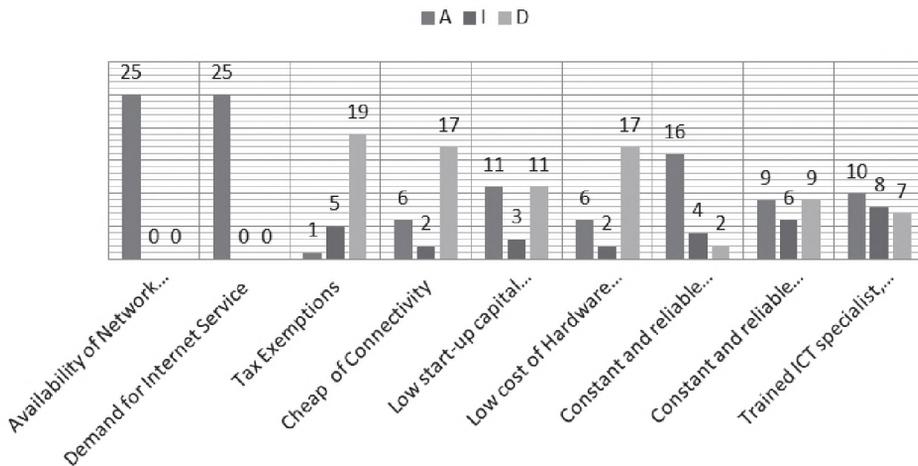


Fig. 3. Factors influencing decision to adopt the Internet café business model in the city  
Source: own elaboration.

Figure 3 above indicates that the availability of connectivity, demand for Internet services and constant and reliable Internet services are the overriding factors which persuaded the entrepreneurs to make affirmative decision to use the business model to diffuse Internet services in the urban areas. The presences of these factors means that entrepreneurs' required lower investment capital and the demand for services would ensure profitability and hence high return on lower investment capital. This satisfies the entrepreneurs' self-interest rather than meeting the needs of the society. This potential to meet the self-interest over rides the inhibition factors

identified such as high cost of hardware and cost of connectivity. Even absence of incentives such as tax exemption had less influence on the decision to adopt the business model.

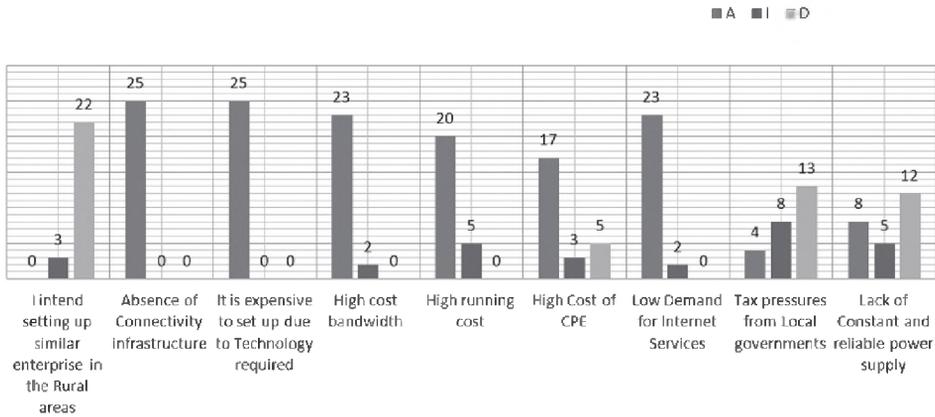


Fig. 4. Factors that affect Internet café investment in rural area

Source: own elaboration.

Figure 4 above indicates most of the entrepreneurs’ reluctant to invest in the rural areas due factors affecting the self-interest of the entrepreneurs’ such as low demand, expensive set up cost, high cost bandwidth and high running cost associated with diffusing Internet in the rural areas. These factors would affect profitability and hence return on investment.

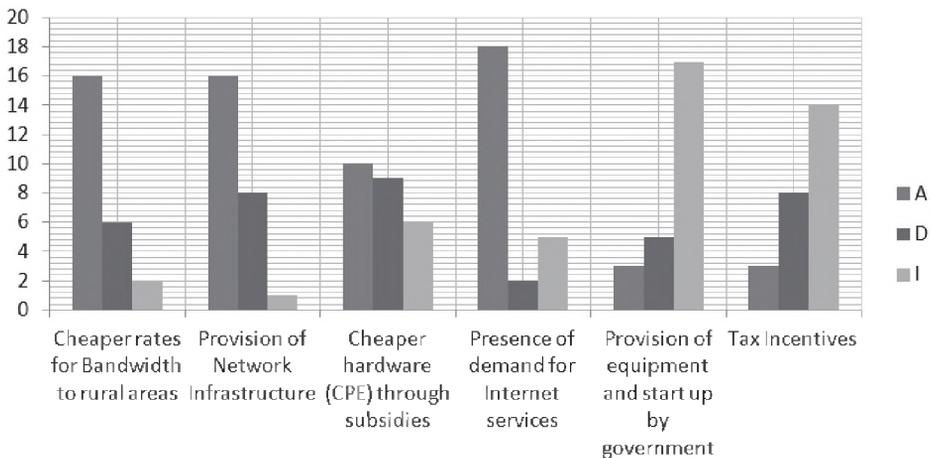


Fig. 5. Stimulating factors for the adoption the business model in rural areas

Source: own elaboration.

Figure 5 indicates that the respondents would invest in rural areas if the conditions that fulfill the entrepreneurs' self-interest are present. Among these conditions are availability of network infrastructure, presence of demand, cheaper cost of bandwidth, while tax incentives and provision of equipment and startup capital by government are not overriding factors that would influenced affirmative decision to adopt the business model. These would reduce the initial investments and increased potential for profit. It is evident from the analysis that self-interest plays a very crucial role in private sector led innovation decision process.

## **Conclusion**

Internet cafés have played a huge role in the penetration of Internet services in many cities in developing countries. However in rural areas the absence of demand, connectivity infrastructure and high cost equipment required for set up are disincentive to the self-interest of the entrepreneurs' who spearheaded the diffusion of Internet using the Internet café business model. There is therefore the need for both intrinsic and extrinsic intervention to create an environment that would contribute to the achievement of self-interest of these entrepreneurs to stimulate affirmative decision to diffuse Internet in the rural areas through the business model that has served the urban areas so well.

To bridge gap between persuasion and affirmative decision for diffusion of innovation process to adopt the business model in the rural areas requires Self-Interest Decision Assessment (SIDA). The Responses indicate that entrepreneurs' affirmative decision would largely be based on what benefit they would derive from the diffusion process and the Internet as a public good. The economic benefits to the society as whole is not the driving force behind the Business model adopted by the private sector in diffusing Internet services but the overriding factors leading to affirmative decision is self-interest validating a philosophical view from Charles S. Peirce<sup>22</sup>.

Based on the above discussions, Self-Interest Decision Assessment framework was crafted from the findings to guide policy towards attracting the private sectors to drive Internet diffusion in rural areas.

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<sup>22</sup> L. Brodersen: *Geo-Communication and Information Design*, Self-Published, www.tankegang.dk, 2008.

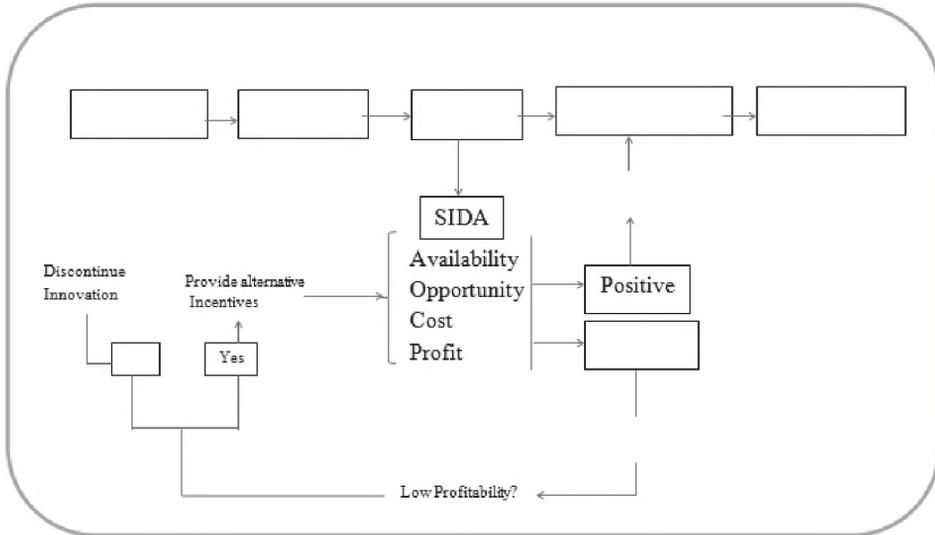


Fig. 6. Self-Interest decision Analysis in the Diffusion of innovation decision process loop  
Source: own elaboration.

Figure 6 introduces Self-Interest Decision Assessment into the innovation diffusion decision process based on the analysis of the data from the survey. The SIDA box contains factors which directly contribute to the achievement of the self-interest of the entrepreneurs which facilitates affirmative decision to implement the Internet cafes to diffuse broadband Internet services. These factors are network availability, quality and reliable Internet services and cheaper cost of bandwidth. Tax incentives and provision of equipment and startup capital by government are incentives that might contribute to self-interest decision process to extend their services to rural areas, an indication that a form of public private intervention would be needed to enable rural areas enjoy the benefit of innovative Internet services. The future studies on self-interest in private public partnership in innovation decision would need to address the degree of influence of self-Interest in relation to other factors contributing to affirmative innovation decision.

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**EXTENSION OF BROADBAND INTERNET SERVICES TO RURAL AREAS:  
SELF-INTEREST IN DECISION MAKING FOR INNOVATION DIFFUSION –  
THE CASE OF GHANA**

**Summary**

This paper assesses the factors that would facilitate the diffusion and adoption of broadband Internet services in rural areas using the internet café business model. The rural areas of developing countries are predominantly ignored or underserved with broadband Internet connectivity. However in the cities, the Internet café business model has been a major driver in the diffusion of the Internet services. This paper adopts an exploratory approach to investigate why Internet café entrepreneurs do not supply Internet services to rural areas. It also explores the factors that would stimulate investments from the same who are currently investing in Internet services provisioning in the cities. Ghana is used as a case study by surveying 25 Internet Café operators. The analysis of the data collected facilitated self-interest assessment and its influences on the decision for broadband service diffusion and adoption in the rural areas using the Internet café business model.

*Translated by Patrick Ohemeng Gyaase, Idongesit Williams*