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ICT Adoption in developing countries: Perspectives from small scale agribusinesses

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ABSTRACT

Purpose - The purpose of this paper is to critically examine how social augmented parameters impact on the effective adoption of Information and communication technology (ICT) by small scale agribusinesses operating in Southeast Nigeria. The relevance of incorporating social imperatives in scholarship focused on technology adoption is due to its role in sustaining the process of adoption and diffusion.

Design/methodology/approach - Data were gathered from a focus group made up of twenty-seven Agribusiness proprietors affiliated with a state cooperative based in the south-eastern Nigerian state of Ebonyi.

Findings - This article puts forward an argument that to ensure successful diffusion of innovation, a balance must be maintained between the amount of effort expended in the design of ICT and social factors such as language and traditional life. We find that a willingness of indigenous ICT users is particularly influenced by the recognition and incorporation of visible social imperatives during the adoption process.

Research limitations/implications - The outcome of this study highlights important issues for ICT adoption. One particular area that must be taken into consideration is the adoption channel. Perceptions of ICT adoption will differ significantly among adopters. For this reason, the need for developing an appropriate adoption channel that ensures successful diffusion of the innovation should be recognised.

Originality/value - This study contributes to ongoing research in ICT innovation adoption in small agribusinesses operating in indigenous societies. The theoretical implications of this paper are the development of a conceptual ICT adoption framework that emphasises social imperatives. We also demonstrate that agricultural enterprises should be treated as 'normal' firms in their own right.

Type of paper- Research Paper

Keywords ICT Adoption, Developing countries, Diffusion of Innovation, Small scale agribusinesses

1 Introduction

There are disparate opinions in existing literature on the question of drivers, decisions and outcomes of Information and Communication Technology (ICT) adoption. These opinions concern the impact of parameters such as lifestyle (Brown *et al.*, 2006), age (Turner *et al.*, 2007; Hernández-Encuentra *et al.*, 2009) and gender (Doss, 2001; Venkatesh *et al.*, 2004). Although such studies are numerous (see da Silveira, 2001; Venkatesh and Bala, 2008) and have traditionally been placed in organisation studies, some scholars such as Cox (2002) posit that agribusinesses are no more different in terms of the role ICT has to play in both their operations and productivity than non-agricultural firms. For this reason, it should be noted that questions on whether general theories and principles of Firms' use of technology can be applied to the agriculture industry remain topical.

The study is set in the south-eastern Nigerian state of Ebonyi. Although dominated by the oil and petroleum industry, the agriculture industry in Nigeria is significant, contributing approximately 31 per cent of the country's GDP (CIA, 2010). Sixty per cent of Nigerians are also employed in the agriculture industry (Manyong *et al.*, 2005), thus making it a vital element of the Nigerian economy. The Nigerian agriculture industry is however characterised by low yield and productivity which are caused by numerous factors such as underinvestment, low ICT adoption, social factors and inefficiencies in supply chains, among others. Thus, the importance of Information and Communication Technologies (ICT) to the sustainability (growth) of small scale

agribusinesses cannot be over-emphasised (Rao, 2007). The reality however is that most enterprises that operate in developing countries (especially those operating in the agricultural business) face major restrictions in terms of their access to appropriate productivity-enhancing ICT. The state of Ebonyi has a population of about two million (Federal Republic of Nigeria, 2007), and is primarily a rural agricultural region. Compared to other regions in Nigeria, Ebonyi has one of the highest rates of agricultural intensity in Nigeria (Aleke, 2010), culminating in the highest number of Small Scale Agribusinesses (SSAs) in the country (Awoke and Okorji, 2004; Benzing and Chu, 2009). It is estimated by Oseni and Winters (2009), for example, that the number of SSAs in Ebonyi is in the region of eighty-five per cent, compared to a Nigerian national average of seventy per cent.

1.1 Aims and structure of the paper

The aim of this research is to seek answers to three research questions:

- (i) *How is Agripreneurship conceptualised?*
- (ii) *What parameters impact on ICT adoption by Small Scale Agribusinesses in Nigeria?*
- (iii) *How are the parameters that impact on ICT adoption by Small Scale Agribusinesses in Nigeria augmented by social imperatives?*

The paper is divided into seven major sections consisting of the introduction (this section), followed by a section which focuses on the development of the concept

of *agripreneurship*. While the third section focuses on literature which explains the adoption of ICT, in the fourth section, we present our research methodology. Section five includes an analysis of our findings. Section six is the discussion, while in section seven; we present the conclusion of the paper.

2 The adoption of ICT

Numerous studies (Mustonen-Ollila and Lyytinen, 2003; Wainwright and Waring, 2007) have argued that traditional diffusion of technology innovation theories which were based on earlier work by Rogers (1962;1995) articulates the process of ICT adoption. ICT made its first appearance (in the form of computers) in Nigeria in 1963 as a tool to support the 1963 national census (Aleke, 2010). Between 1963 and 1973, the total number of computers in the country was between twenty and twenty-five; about six of these were owned by multinational companies. By 1977, the total number had grown to around seventy. By this time, many universities, government departments and institutions in the country began to show an interest in ICT. Although the country has continued to witness continuous investment in ICT, the reality is that, contrary to the more optimistic views, the “digital divide” of ICT applications continues to widen (Mbarika *et al.*, 2002). The reality is that with a weak physical and knowledge base, it is unlikely that this digital divide will narrow over the next few years.

In small scale agribusinesses (SSAs), the use of ICT may in certain circumstances be regarded as innovative (Tan *et al.*, 2009). This is particularly the case for agribusinesses operating in the developing world (Frambach and Schillewaert, 2002),

thus serving as a reason for noticeable growth of ICT in agribusinesses, especially that of developing countries (Rao, 2007). Although this is the case, it appears that motivation for ICT adoption amongst agribusiness proprietors has not yet been explored extensively. In the case of such proprietors operating in the Southeast of Nigeria, an appreciation of motivational factors for adoption remains critical because of the role agriculture plays in the local economy. One such contribution to the economy is the lowering of transaction costs due to the shortening of the supply chain.

3 A Conceptual Framework for *Agripreneurship*

In this section, literature is utilised to address the first research question: *How is Agripreneurship conceptualised?*

Small Scale Agribusinesses (SSAs) face particular daily challenges that are not encountered by other agricultural businesses. For one, SSAs focus on ensuring that they are able to identify, create, enact, develop and take advantage of business opportunities. Often, this capability demands a high degree of 'intelligence', which may be gathered from social circles due the limited capabilities of SSAs to gather information from more traditional sources (such as conferences and trade journals). From the perspective of classical entrepreneurship scholarship, there is still an ongoing debate about the exact definitions of *agripreneurship* (Singh and Krishna, 1994; Knudson *et al.*, 2004; Phillipson *et al.*, 2004; de Lauwere, 2005). We have however adopted a perspective of the *agripreneur* as a business owner who is self employed and seeks to create wealth within the agriculture industry. By adopting this position, we

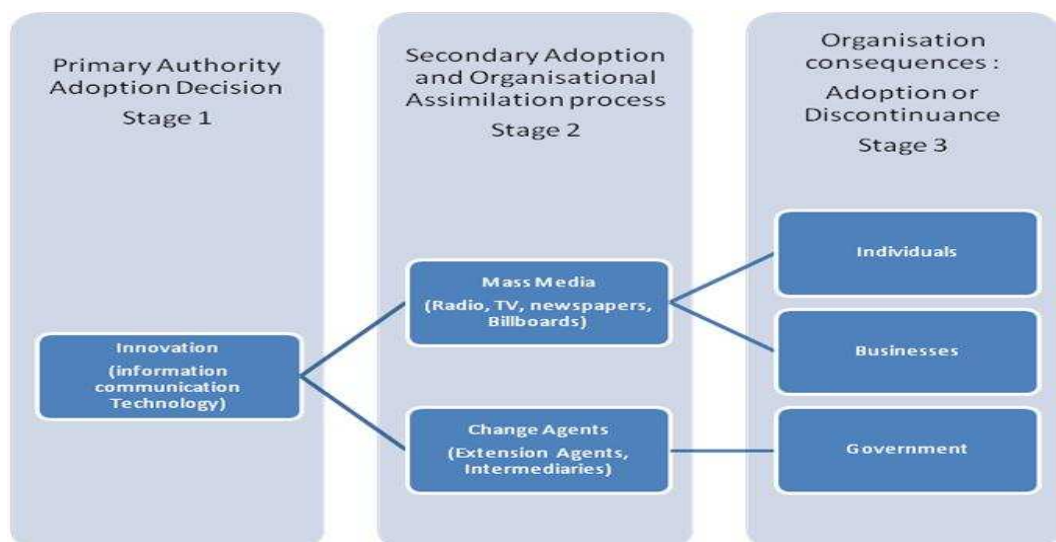
argue along the lines of Phillipson *et al.* (2004) and de Lauwere (2005); that although excluded by governments and non-governmental agencies from 'normal' policy objectives, agricultural enterprises (*agriprenuerships*) should be treated as 'normal' firms in their own right.

Choosing an appropriate conceptual foundation (Figure 1) to examine ICT adoption within the context of SSAs is difficult due to the existence of numerous *agri-based* frameworks (see Just and Zilberman, 1983; Feder and Just, 1985; Baerenklau, 2005; Baerenklau and Knapp, 2007; Mendola, 2007). For example, while Just and Zilberman (1983) explored SSAs ICT adoption from the perspective of land-use allocation and the impact of risk preferences (when considering whether to adopt either modern or traditional technological processes), Wichmann's (1996) study adopted a free transferability of technology imperative. We have however chosen to base our study on three frameworks (*ICT diffusion of innovation Framework; Technology Acceptance Model* and *Social Network Theory*). The decision to adopt these three frameworks is fundamentally driven by recognition of not only the importance of social imperatives in ICT adoption (Venkatesh and Johnson, 2010; Venkatesh and Zhang, 2010) and Small and Medium Sized Enterprises (Zhou *et al.*, 2007), but also because the three frameworks chosen do cater for both organisational and individual adoption perspectives (which are examined in this study).

3.1 ICT diffusion of innovation Framework

The first framework is an ICT diffusion of innovation (DoI) framework based on early work by Rogers (1962;1995) and then informed by more recent studies of ICT adoption (Mustonen-Ollila and Lyytinen, 2003; Wainwright and Waring, 2007; Aleke, 2010). This framework (Figure 1) considers, as its main thesis, the context and content of innovation. The main impact of this framework is that it provides considerable insight into the complexities of ICT innovation across 3 distinct stages. This model is of particular interest to this research, because a key element of the model resides in the exploration of patterns of communication and relationship between actors in ICT adoption. Secondly, the model moves slightly away from the classic ICT diffusion process which has been criticised for its sequential nature and accompanying high level of instrumentality.

Figure 1. Diffusion of Innovation Framework



3.2 Technology Acceptance Model (TAM)

The second framework is derived from the Technology Acceptance Model (TAM), (Figure 2, adapted from Davis, 1989). In this context, this focuses on the consideration of various attitudes that may affect the usage of ICT. Previous studies such as that of Mustonen-Ollila and Lyytinen (2003) showed that user resistance to technology was a major driver for its non-adoption, thus establishing a relationship between the DoI and TAM framework, that can be seen in (Figure 3).

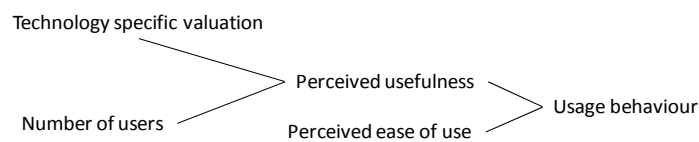


Figure 2. Technology Acceptance Model (TAM)

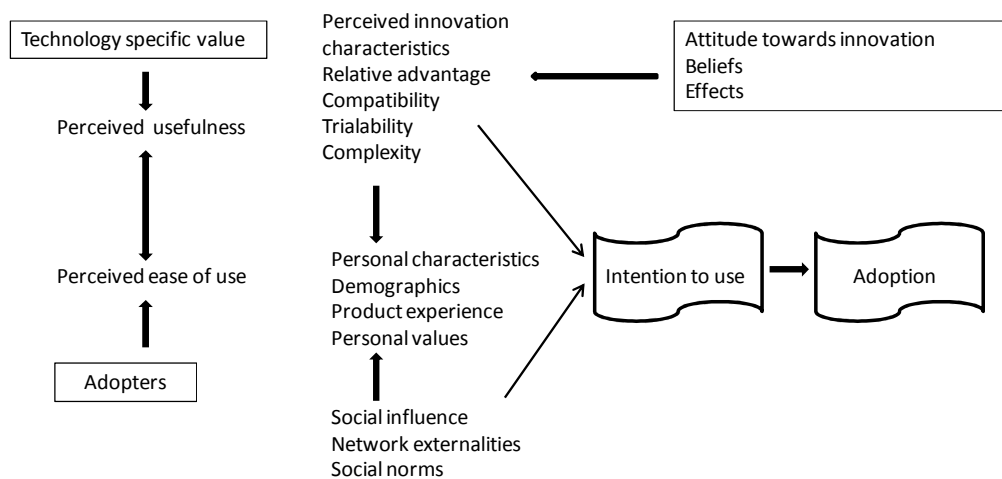


Figure 3. An integrated model of DoI and TAM

Davis (1989) investigated various influences of technology acceptance and came up with two significant determinants “perceived usefulness” and “perceived ease of use” as a theoretical base for specifying the causal link between attitudes and behavioural intentions towards technology. The Technology Acceptance Model (TAM) relies on the theory of Reasoned Action, which posits that behaviour is logically processed in the following order: belief-attitude-intention-behaviour. The relationships between perceived usefulness, perceived ease of use, attitude and intentions have been supported in the information technology literature (such as Shen and Chiou, 2010). Within an organisational context, perceived usefulness is defined as the prospective user’s subjective probability that using a specific technology will increase job performance, while perceived ease of use refers to the degree to which the prospective user expects the technology to be free from over excessive effort during application.

3.3 Social Network Theory (SNT)

The final framework considered is the Social Network Theory (SNT). We incorporate SNT into our theoretical foundations because neither the diffusion of innovation (DoI) framework nor the Technology Acceptance Model (TAM) addresses social imperatives (Hossain and de Silva, 2009). Social network theory refers to a social structure of relationships and links (which can be established in the form of an exchange) between individuals, businesses, organisations and political units (Burger and Buskens, 2009). Such relationships might be within small units, or units of a global scale. Social

networks form the basis for the generation of network knowledge which is the accumulation of knowledge generated through interlinks that exist between persons, groups and organisations. This knowledge extends beyond an awareness of 'friend of friends' with respect to providing an orientation to the social world in terms of sets, patterns and linkages.

For studies in the management of agriculture, the reality therefore is that there are minimal provisions in both practitioner and academic realms on how small scale agribusinesses can address specific network (relationship-oriented) challenges. For example, the questions: What type of social network will deliver business changing advantages? or What type of social network will enhance effective decision making of small scale agribusiness proprietors? remain unanswered. The theoretical and empirical justifications for the establishment of social networks exist in three areas. While the first area focuses on the role of social networks in entrepreneurial activity (McCarthy and Torres, 2005; Jack, 2010), the second area relates to the area of entrepreneurial and agricultural social capital which addresses how interactive networks in agricultural communities can create advantages for both individuals and social groups (Sharp and Smith, 2003; Slangen *et al.*, 2004). The third area relates to the area of transformational learning and its relationship with *agripreneurship* (Foster and Rosenzweig, 1995; Seppanen, 2004; Pyysiainen *et al.*, 2006). Of particular relevance is that these studies were able to conclude that not only did proprietors use informal networks to facilitate business growth, but also that a direct relationship existed between the effective use of such networks and the performance of businesses

(Watson, 2007). Experience in itself will not bring about learning especially if undertaken in isolation (Perry and Euler, 1985). The fact however is that a majority of the perspectives of SSA operators are developed through cultural assimilation and socialisation created through networks.

In summary, the authors argue that a combined exploration of these three frameworks (*ICT diffusion of innovation Framework; Technology Acceptance Model and Social Network Theory*), will go a long way in addressing possible concerns about selectivity and narrowness which may exist if either of these frameworks was solely applied to the study. It is however recognised that although such a combination sets the scene for an attractive conceptualisation (as relates to the study), the frameworks need modification to enhance genuine use.

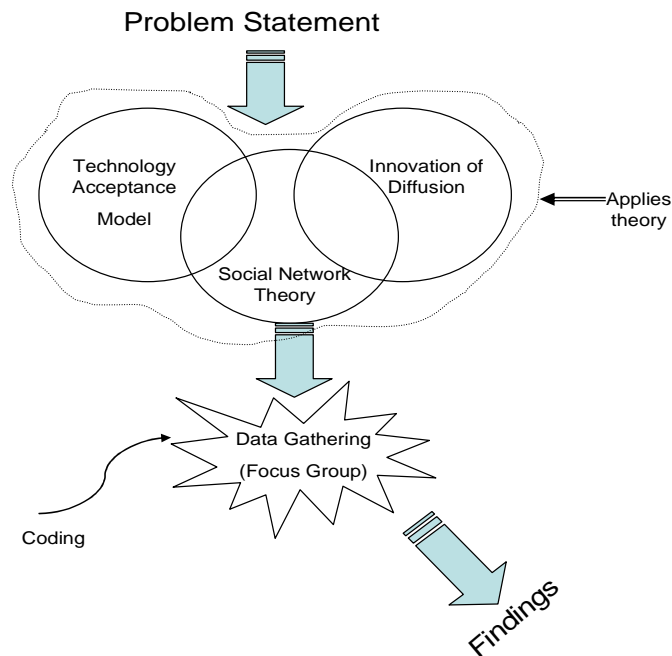
4 The research methodology

In this section of the paper, we present the research approach (see Figure 4) adopted; and also articulate the rationale for this choice of methodology. As the research has emphasised the social extension of diffusion of innovation (DoI) framework and the Technology Acceptance Model (TAM), it was felt that the basis of any chosen research method had to reside in a phenomenological approach that was determined by a social setting (Chell, 2004); in effect, that the research was socially constructed.

Based on this, an *interpretivist* research approach was chosen. Of particular relevance is that such research methods commence with a conceptualisation of reality that seeks to make sense of real world scenarios. Although there is a strong tradition in

using questionnaires in entrepreneurship research, in this study, we used a focus group consisting of twenty-seven Agribusiness proprietors affiliated with the Ebonyi State Federation of Cooperatives to gather data. This method of research has been successfully used in earlier *agriprenuership* research (see Brandth, 1994; Goldstein and Udry, 2008). In particular, focus groups are known for their ability to stimulate interaction between group members and therefore extract knowledge and learning based on practitioner experience (Stewart and Shamdasani, 1990). There are however recognised limitations of use, which includes a tendency for 'acceptable' norms and opinions to be re-emphasised (Smithson, 2000).

Figure 4. The Research Approach



An abridged version of the stepped focus group process (de Ruyter, 1996) was adopted. This involved: (Step 1) Presentation of study topic to group by moderator (the lead researcher in this study). Moderation ensured participants were fully aware of the objectives of the session through brief clarifications; (Step 2) Participants were randomly requested to rank parameters that have impacted agricultural ICT adoption in Ebonyi (based on parameters identified from earlier literature and presented to the focus group). Each participant was requested to rank one parameter at a time; (Step 3) All parameters ranked by the focus group were then recorded. The exercise was repeated until the list of parameters had been exhausted. To ensure process control and integrity of ideas, no discussions were allowed during this session; and (Step 4) The researcher reviewed all ranked parameters. Parameters not ranked were then eliminated from the list. To ensure that the potential for bias was controlled, the ensuing coding was undertaken by two of the authors; the first author (who also served as the moderator during the focus group), and the second author who at this stage was not directly involved in the study being undertaken. Both researchers conducted the coding independently; however after initial identification of themes, a set of agreed codes were then applied to the identified themes.

5 The Findings

We found from opinions expressed during the focus group that perceptions on critical ICT adoption parameters differed significantly among the participants. We now explore the four parameters that were ranked highest by the focus group (Cultural antecedents;

Impact of social networks; Use, rate and context of ICT introduction; The dissemination of information).

5.1 Cultural antecedents

Ebonyi is located in a region of Nigeria dominated by people of the Igbo tribe. Sociological studies (see Basden, 1921) have shown that the Igbo tribe's worldview and cosmology is dominated by the market (Basden, 1921), and thus entrepreneurship. In fact, studies (see Benzing and Chu, 2009) have already shown that there is a direct relationship between entrepreneurial attitudes and orientation, and cultural imperatives. For the members of this tribe, we note such characteristics which appear to enhance their entrepreneurial spirit; these include (according to scholars such as Brautigam, 1997 and Meagher, 2009) the relative (compared to other African tribes) lack of social hierarchies. The second cultural antecedent that emerged related to empowerment. We noted a general apprehensive for the possible disruption of traditional life among the focus group members (especially the older ones). This finding is generally interesting especially since we note that the Igbo community is particularly gerontologic (Meek and Arnett, 1938). Research (see Nwaubani, 1994), however alludes to recent tensions in the Igbo community, especially with the recent trend to place 'real power' in the hands of a younger and in some cases more affluent generation of leaders. As a result, it is not surprising that we found that some of the agribusinesses' proprietors under the guise of 'managerial control' had explicitly barred staff from conducting business transactions unless specifically authorised to do so. The third

cultural antecedent we noted was the expression of a high level of social collaboration among the focus group members.

5.2 The impact of social networks

Scholars such as Jones (1962) and Henderson (1966) have alluded to the significance of social relationships in the form of masquerade groups and titled societies in the Igbo society. We posit that these groupings which dominate Igbo cultural and social life have a significant impact on the development of life-long friendships and networks among agribusinesses proprietors based in Ebonyi. An exploration of the impact of social networks did indicate the existence of significant collaboration with partners and other agribusinesses, according to the focus group participants. For example, all participants in the focus group had details of the telephone contact for at least one other agribusiness in the area. It was however noted that the majority of this network was comprised of members of the Ebonyi State Federation of Cooperatives. According to existing studies (Dimara and Skuras, 2003), more often than not, SSA operators in developing countries learn about ICT through social networks. Existing research also supports the notion that overall, due to an attitude of openness to information (Rosenfeld, 1996; Baron and Markman, 2003; Kiss and Danis, 2008), membership of such social networks is more likely to enhance the chances of entrepreneurs meeting their business objectives. There are however occasions when this ascertainment has proved incorrect, such as in Africa where ethnic and tribal loyalties do overshadow business sense (Romani, 2003).

5.3 Use, rate and context of ICT introduction

One of the key parameters raised by the focus group was the newly commissioned Tele and Technology Resource ICT Centre at Abakaliki ¹, which is a result of a joint initiative between UNIDO and the Ebonyi State government. The centre is composed of a building structure, and a satellite dish mounted alongside the building with cables running from the satellite dish to routers inside the building. An Internet modem is provided and the computers are networked. Each centre is connected to a certified Internet service provider (ISP), while connectivity is via a local area network (LAN).

The objective of the centre was to provide telecommunications and e-commerce-enabling technology infrastructure to SSA proprietors. Prior to the establishment of the centre, SSA proprietors conducted their businesses (if in possession of required ICT skill set) mainly in cyber cafés. This meant travelling long distances from Abakaliki, where most of the farms are located, to Enugu², which was the nearest city with a reasonable ICT infrastructure. This in most cases involved a three hour round trip. ~~(see Table 1, FAO Report on Agricultural produce Exportation, 2004).~~

¹ The capital of Ebonyi State

² The capital of the neighbouring State of Enugu

Table 1. Marketed Produce and Distances to Markets (Nigeria)

State	Distance to Market	Percent Sold 0-50 percent	Percent Sold 50-100 percent
Abia	road and <5km	30.16	38.62
	5-10km	10.87	13.92
	>10km	6.49	8.31
Anambara	road and <5km	16.81	55.17
	>10km	6.53	21.44
Ebonyi	road and <5km	9.93	44.00
	5-10km	1.36	6.04
	>10km	2.09	9.27
Enugu	road and <5km	12.70	68.70
	5-10km	2.15	11.65
	>10km	0.75	4.05
Imo	road and <5km	4.68	70.20
	5-10km	1.26	18.90
	>10km	0.06	0.90

Arriving at a cyber café in Enugu however did not imply that one was able to conduct their business of the day. In Nigeria, Internet access is limited and sporadic due to poor infrastructure (Oyelaran-Oyeyinka and Adeya, 2004).

Members of the focus group expressed various opinions about the ICT centre. These concerns included the following: (i) an assurance on the privacy and security of their business transactions, (ii) that Internet service was not readily available, (iii) that 'real' cost of using the UNIDO centre was less than traditional ways of doing business, (iv) that there were no 'hidden' costs using the UNIDO centre, and that (v) training on the new facilities was readily available. These factors create a picture of what

constitutes the barriers to diffusion and implementation of the application of ICT into agribusiness.

5.4 The dissemination of information

The final parameter that was identified as possessing a significant social context was the dissemination of information. In Nigeria, the dissemination of information among agriculture societies has traditionally been the responsibility of the Nigerian government through the Ministry of Agriculture Extension Service (Eze *et al.*, 2006). However, there have been difficulties with this mode of information dissemination which, historically, had depended largely on the goodwill of traditional rulers in each community (called an *Igwe*, i.e. Sky), who provide authority for the 'extension officers' to enter the town; either using the services of 'town criers' or by attending village meetings, these officers would attempt to disseminate information. However especially in the case of village meetings, such activities have usually been ineffective as Igbo village meetings are always raucous affairs due to the existence of a political system which allows every adult male (and in some communities, female) the right to voice their opinion during public debates (Meek and Arnett, 1938). In addition, the Igbo operate a system of federated republicanism which demands that all decisions must be approved by all participants (Jones, 1962). This has made decision making in the Igbo society notoriously challenging.

In an attempt to address these challenges, the Ebonyi State Government launched an online portal (<http://www.ebonyionline.com/>) in early 2005. The initial

objective (the portal has since been expanded to represent a form of state business directory) was to facilitate the auctioning of agricultural products such as special animal breeds and hybridised crop species. The portal was also developed to facilitate information dissemination across the agricultural community. However, initial use of the website was limited particularly due to very low literacy levels in the state (Ebonyi has one of the lowest literacy levels in Nigeria, see Khalid, 2004). This has led to calls (see Aleke *et al.*, 2009; Aleke, 2010) to investigate the development of web content in the indigenous Igbo language. Although such calls are no doubt reasonable, it has to be recognised that the number of people who can read or write *Igbo* are very limited because of its tonal nature (Clark, 1978) and the non-existence of a central dialect (Emenyonu and Uko, 2004). Gyamfi (2005) has shown that less than one per cent of web content (0.4 per cent to be specific) is available in any sub-Saharan language.

6 Research synthesis

In this section we establish links between the empirical work undertaken and the literature examined, thus demonstrating the contribution of the paper. Confirming the existence of a real life case (to be discussed) ensures that the authors link the theoretical foundations of the study to the reality of agribusiness. This is important bearing in mind earlier work by Zahra (2007), who highlights the need to incorporate detailed and intimate exploration of unique contextual scenarios on entrepreneurship studies. To achieve this objective, we adopt a philosophical position firmly rooted in social *constructionism* (Burr, 1995), which is popular in ICT research (see Mitev, 2005).

Such an approach enabled the development of social realities that are derived from the entire environmental context within which the study is conducted. Examination of social imperatives in ICT adoption is driven by recognition that aside from attitude, social influences which are driven by a desire to align behaviour with a dominant group could affect intentions to adopt ICT (Kulviwat *et al.*, 2009).

The use of ICT by SMAEs in developing countries is a form of technological innovation (Rao, 2007). For example, ICT has been shown to drive significant transformation within agribusinesses operating in developing countries (Sassenrath *et al.*, 2008), thus resulting in enhanced productivity (Minten and Barrett, 2008). Although difficult, it is necessary to acknowledge the reality that a recognition of the role of ICT on its own, without augmenting it with sustainability requirements, cannot be regarded as successful adoption. Numerous scholars including Janssen and van Ittersum (2007) and Spielman *et al.* (2009) have examined contextual imperatives, which may include the demographic profile of adopters, that impact on the adoption of technology within the agriculture industry. Although we have seen this interest in examining contextual imperatives in agriculture-based ICT adoption, Kulviwat *et al.* (2009) have pointed out that relatively few scholars have sought to operationalise ICT adoption that focuses on social dimensions. However, although the importance of social dimensions to the adoption of ICT cannot be overemphasised (see Jack, 2010), the unfortunate reality is that scholars such as Warriner and Moul (1992) and Romani (2003) have found considerable evidence to suggest a complicated social dimension in indigenous agribusinesses driven by the disruptive influences of tribal and ethnic loyalties.

6.1 Social networks

The adoption and diffusion of electronic commerce (EC) technologies in small and medium sized enterprises (SMEs) remains a critical area of investigation in the information systems (IS) literature. Studies pointing to technologically uncertain and globally focused economy have examined both the adoption of e-commerce technologies by SMEs and the perceived barriers preventing the adoption. A number of studies such as Eisenhardt and Schoonhoven (1996) have suggested that in order to accommodate these changes brought in by e-commerce adoption; many SMEs are turning towards some form of strategic alliance or network. In this arrangement the locus of the impact of changes brought in by e-commerce technology innovation is at an inter-firm level, rather than firm-wide.

Work conducted by Clough (1985) represents evidence of the success of social agricultural networks in Nigeria. In the case of our study, although the majority of the focus group participants belonged to the same co-operative, we found that the composition of the social network was formed of other groups such as the Abakaliki Co-operative Farmers Society and the Ebonyi Rice Millers Association, as well as the Timber Dealers Association and the Poultry Cooperatives.

6.2 The role of government

The Ebonyi State government continues to take a leadership role in supporting agribusiness ventures. For example, the state government has established a state agricultural development programme which has, in addition to other initiatives, sought to improve agricultural production output through, for example, a production technology training initiative organised with NGOs such as the United States Agency for International Development (USAID). State Government intervention in terms of the facilitation of ICT diffusion is seen in the provision of a Mobile Internet Unit (MIU) to serve SSAs. The MIU is a motor van built with desktop computers (connection is via dial-up). The use of these MIUs in Ebonyi state has enabled local SSA owners to exchange instant market information with their suppliers and customers. It has also enhanced the effectiveness of social networks.

6.3 Use, rate and context of ICT introduction

Another area of interest that emerges from the focus group (and described in the causal diagram), relates to the context of ICT adoption. The focus group participants were positive that the UNIDO centre had contributed to the empowerment of SSA proprietors in the area; however it was also considered to represent a business risk. Small and medium enterprises are generally risk-averse (Nguyen, 2009), especially regarding issues surrounding the adoption of technology. In addition to its primary function of providing necessary ICT infrastructure, the ICT centre at Abakaliki now serves as a focal domain point for social networks for SSA proprietors. The centre also serves as an ICT skill acquisition centre and - in most cases - the only 'office' of the

owner-proprietors. What appears to emerge from the focus group was that 'relative' satisfaction and rate of the introduction of new technology was likely to increase over time as SSA proprietors became more familiar with the technology on offer.

6.4 Online portals and Language Challenges

We could argue that the establishment of a dedicated agribusiness website, although used by the social network primarily for the exchange of emails, contributes positively to the development of *agripreneurship* in the area. In the first place, although literacy levels of Nigerian SSA operators are quite low (Oladele and Fawole, 2007), the demand for this service was high, perhaps as a result of the free computer awareness and training programme funded and run by UNIDO, the Ebonyi State government, and the Centre for Small Industry and Research Development (CENSIRT), Ebonyi State University. This centre was established in 2001 to enable the SSA owners to be exposed to the use of computers - at least to the extent of sending email messages. The website also created an awareness of the potential of ICT among SSA owners and other potential users of ICT who otherwise would not have been exposed to it. The result of this interest in ICT by local SSA owners is that commercial agents, once seen as crucial in driving e-commerce adoption in developing countries (Duncombe and Molla, 2006), are now experiencing a reduction in the demand for their services, which is being translated into a reduction in transaction costs for the SSAs.

7 Conclusion

Concerning each of the individual parameters, we found the following. On social networks, we found strong evidence of active social networks within specific 'product' lines. It was interesting to note however that interface with other networks outside individual networks were also strong. We also note that the study was conducted in Ebonyi which is a geographical and political area of Nigeria dominated by a single tribal group (Igbos). This meant that we did not examine how tribal and ethnic differences may impact on the perceived advantages delivered by social networks. In terms of the role of the government, we found strong evidence of government support for ICT adoption. It will however be interesting to examine to what extent the government as an ICT adoption agent has sought to co-produce the adoption experience by taking into consideration the diverse perceptions of the user community (i.e. the small scale agribusiness proprietor). We did not find any evidence that such attempts had been made. Overall our findings include:

- Strong evidence of active social networks within and outside individual networks.
- Strong evidence of concerns by adopters on possible disruption to 'normal' ways of life by ICT.
- Strong evidence of government support for ICT adoption.
- No evidence that the government had sought to co-produce the adoption experience.

There is a growth in literature focusing on both ICT Adoption and the agricultural industry. In various forms, these works have focused their attention on factors that not only drive adoption (and the rate of adoption), but also those parameters that drive the choice of technology. In developing countries where resources are limited, a clear understanding of these factors (adoption, and choice of technology), have implications for government policy making in areas that deals with incentive provision and agricultural extension services provision. Another area of policy which may be impacted by a clear understanding of the factors that drive adoption is in the area of timing. For example a decision to adopt technology if made at the wrong time (with a clear understanding of not only the factors, but how they are related), may negate the expected benefits of the technology, leading to non-optimisation of adoption benefits.

A limitation with the paper relates to the non-validation of the findings as a second focus group was not run. This was not undertaken as the study is positioned as an exploratory rather than a confirmatory study. This limitation suggests opportunities for future studies which will aim to validate the conceptual framework. There is also a need to generalise the findings by drawing data from a considerably larger size of SMEs.

References

Aleke, B. (2010), *Developing a Model for Information and Communication Technology Diffusion among Small and Medium sized Agribusiness Enterprises in Southeast*

Nigeria, Unpublished PhD Thesis, University of Northumbria, Newcastle upon Tyne, UK.

Aleke, B., Wainwright, D. and Green, G (2009), "Policy Issues of e-Commerce Technology Diffusion in Southeast Nigeria: The case of Small scale Agribusiness", *The Northumbria Built and Virtual Environment Working Paper Series*, Vol. 2, pp. 39-54.

Awoke, M. and Okorji, C. (2004), "The Determination and Analysis of Constraints in Resource Use Efficiency in Multiple Cropping Systems by Small-Holder Farmers in Ebonyi State- Nigeria", *Africa Development*, Vol. 24 No. 3, pp. 58-69.

Baerenklau, K. (2005), "Toward an Understanding of Technology Adoption: Risk, Learning, and Neighborhood Effects", *Land Economics*, Vol. 81, pp. 1-19.

Baerenklau, K. and Knapp, K. (2007), "Dynamics of Agricultural Technology Adoption: Age Structure, Reversibility, and Uncertainty", *American Journal of Agricultural Economics*, Vol. 89, pp. 190-201.

Baron, R. and Markman, G. (2003), "Beyond social capital: the role of entrepreneurs' social competence in their financial success", *Journal of Business Venturing*, Vol. 18 No. 1, pp. 41-60.

Basden, G. (1921), *Among the Ibos of Nigeria*, Nonsuch.

- Benzing, C. and Chu, H. (2009), "A comparison of the motivations of small business owners in Africa", *Journal of Small Business and Enterprise Development*, Vol. 16 No. 1, pp. 60-77.
- Brandth, B. (1994), "Changing Femininity: The Social Construction of Women Farmers in Norway", *Sociologia Ruralis*, Vol. 34, pp. 27-149.
- Brautigam, D. (1997), "Substituting for the state: institutions and industrial development in eastern Nigeria", *World Development*, Vol. 25 No. 7, pp 1063-80.
- Brown, S.A., Venkatesh, V. and Bala, H. (2006), "Household Technology Use: Integrating Household Lifecycle and the Model of Adoption of Technology in Households," *The Information Society*, Vol. 22 No. 4, pp. 205-218.
- Burger, M., and Buskens, V. (2009), "Social context and network formation: An experimental study", *Social Networks*, Vol.31 No. 1 (January), pp. 63-75.
- Burr, V. (1995), *An Introduction to Social Constructionism*, Routledge.
- Chell, E. (2004), "Critical Incident Technique" in Cassell, C. and Symon, G. (Eds.), *Essential Guide to Qualitative Methods in Organisational Research*, Sage.
- Clark, M. (1978), *A dynamic treatment of tone, with special attention to the tonal system of Igbo*, Ph.D. dissertation, University of Massachusetts.
- CIA. (2010), "World Factbook", available at: <https://www.cia.gov/library/publications/the-world-factbook/geos/ni.html> (accessed 07 April 2010).

- Clough, P. (1986), "The Social Relations of Grain Marketing in Northern Nigeria", *Review of African Political Economy*, Vol. 45, pp. 16-34.
- Davis, F. D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 3, pp. 319-340.
- da Silveira, G. (2001), "Innovation diffusion: research agenda for developing economies", *Technovation*, Vol. 21 No. 12, pp. 767-773.
- de Lauwere, C. (2005), "The role of agricultural entrepreneurship in Dutch agriculture of today", *Agricultural Economics*, Vol. 33 No. 2, pp. 229-238.
- de Ruyter, K. (1996), "Focus versus nominal group interviews: a comparative analysis", *Marketing Intelligence and Planning*, Vol. 14 No. 6, pp. 44-50.
- Dimara, E. and Skuras, D. (2003), "Adoption of Agricultural Innovations as a Two-Stage Partial Observability Process", *Agricultural Economics*, Vol. 28, pp. 187-196.
- Doss, C. (2001), "Designing Agricultural Technology for African Women Farmers: Lessons from 25 Years of Experience", *World Development*, Vol. 29 No. 12 (December), pp. 2075-2092.
- Duncombe, R. and Molla, A. (2006), "E-Commerce Development in Developing Countries", *International Journal of Entrepreneurship and Innovation*, Vol. 7 No. 3, pp.185-196.

- Eisenhardt, K. and Schoonhoven, C. (1996), "Resource-based view of strategic alliance formation: strategic and social effects in entrepreneurial firms", *Organization Science*, Vol. 7 No. 2, pp. 136-150.
- Emenyonu, E. and Uko, I. (2004), *Emerging Perspectives on Chinua Achebe: Isinka - The Artistic Purpose: Chinua Achebe and the Theory of African Literature*, Africa World Press.
- Eze, C.C., Ibekwe, U.C., Onoh P.J. and Nwajiuba, C.U. (2006), "Determinants of Adoption of Improved Cassava production Technologies Among Farmers in Enugu State of Nigeria", *Global Approaches to Extension Practice*, Vol.2 No. 1, pp 37-44.
- Feder, G. and Just, R. (1985), "Adoption of Agricultural Innovations in Developing Countries: A Survey," *Economic Development and Cultural Change*, Vol. 33 No. 2, pp. 255-298.
- Federal Republic of Nigeria. (2007), "Federal Republic of Nigeria", *Official Gazette*, Vol. 24 No. 94.
- Foster, A. and Rosenzweig, M. (1995), "Learning by Doing and Learning from Others: Human Capital and Technical Change in Agriculture", *Journal of Political Economy*, Vol. 103, pp. 1176-1209.
- Frambach, R. and Schillewaert, N. (2002), "Organisational Innovation Adoptions: A Multi-Level Framework of Determinants and Opportunities for Future Research", *Journal of Business Research*, Vol. 55 No. 2, pp. 163-176.

- Goldstein, M. and Udry, C. (2008), "The Profits of Power: Land Rights and Agricultural Investment in Ghana", *Journal of Political Economy*, Vol. 116 No. 6, pp. 981-1022.
- Gyamfi, A. (2005), "Closing the Digital Divide in Sub-Saharan Africa", *Information Development*, Vol. 21, pp 22-30.
- Henderson, R. (1966), "Generalized Cultures and Evolutionary Adaptability: A Comparison of Urban Efik and Ibo in Nigeria", *Ethnology*, Vol. 5 No. 4, pp. 365-391.
- Hossain, L. and de Silva, A. (2009), "Exploring user acceptance of technology using social networks", *The Journal of High Technology Management Research*, Vol. 20 No. 1, pp. 1-18.
- Jack, S. (2010), "Approaches to studying networks: Implications and outcomes", *Journal of Business Venturing*, Vol. 25 No. 1, pp. 120-137.
- Janssen, S. and van Ittersum, M. (2007), "Assessing farm innovations and responses to policies: A review of bio-economic farm models", *Agricultural Systems*, Vol.94 No. 3 (June), pp. 622-636.
- Jones, G. (1962), "Ibo Age Organization, with Special Reference to the Cross River and North-Eastern Ibo", *The Journal of the Royal Anthropological Institute of Great Britain and Ireland*, Vol. 92 No. 2, pp. 191-211.
- Just, R. and Zilberman, D. (1983), "Stochastic structure, farm size, and technology adoption in developing agriculture", *Oxford Economic Papers*, Vol. 35 No.2, pp. 307-328.

- Kiss, A. and Danis, W. (2008), "Country institutional context, social networks, and new venture internationalization speed", *European Management Journal*, Vol. 26 No. 6, pp. 388-399.
- Khalid, A. (2004), "Adult and non-formal education delivery in Nigeria", paper presented at the Regional Conference on Adult Education and Poverty Reduction, 14 - 17 June, Gaborone, Botswana, available at: http://www.gla.ac.uk/centres/cradall/docs/Botswana-papers/Khalidadamupaper_40.pdf
- Knudson, W., Wysocki, A., Champagne, J. and Peterson, H.P. (2004), "Entrepreneurship and innovation in the agri-food system", *American Journal of Agricultural Economics*, Vol. 86 No. 5, pp. 1330-1336.
- Kulviwat, S., Bruner, G. and Al-Shuridah, O. (2009), "The role of social influence on adoption of high tech innovations: The moderating effect of public/private consumption", *Journal of Business Research*, Vol. 62 No. 7, pp. 706-712.
- Manyong, V.M., Ikpi, A., Olayemi, J.K., Yusuf, S.A., Omonona, B.T., Okoruwa, V. and Idachaba, F.S. (2005), *Agriculture in Nigeria: identifying opportunities for increased commercialization and investment*, IITA, Ibadan, Nigeria.
- McCarthy, B. and Torres, A. (2005), "A study of network typology in relation to the performing arts", *International Journal of Entrepreneurship and Innovation*, Vol.6 No. 3, pp 168-176.

- Mbarika, V., Jensen, M. and Meso, P. (2002), "Cyberspace across Sub-Saharan Africa", *Communications of the ACM*, Vol. 45 No. 12, pp. 17-21.
- Meagher, K. (2009), "The informalization of belonging: Igbo informal enterprise and national cohesion from below", *Africa Development*, Vol. 34 No. 1, pp. 31-46.
- Meek, C. and Arnett, E. (1938), "Law and Authority in a Nigerian Tribe: A Study in Indirect Rule", *Journal of the Royal African Society*, Vol. 37 No. 146 (January), pp. 115-118.
- Mendola, M. (2007), "Agricultural technology and poverty reduction: A propensity-score matching for rural Bangladesh", *Food Policy*, Vol. 32, pp. 372-393.
- Minten, B. and Barrett, C. (2008), "Agricultural Technology, Productivity, and Poverty in Madagascar", *World Development*, Vol. 36 No. 5 (May), pp. 797-822.
- Mitev, N. (2005), "Are social constructivist approaches critical? The case of IS failure", in Howcroft, D. A. and Trauth, E. M. (Eds.), *Handbook of critical information systems research: theory and application*, Edward Elgar, pp. 70-103.
- Mustonen-Ollila, E. and Lyytinen, K. (2003), "Why Organisations Adopt Information System Process Innovations: A Longitudinal Study Using Diffusion of Innovation Theory", *Information Systems Journal*, Vol. 13 No. 3, pp. 275-297.
- Nguyen, T. (2009), "Information technology adoption in SMEs: an integrated framework", *International Journal of Entrepreneurial Behaviour & Research*, Vol. 15 No. 2, pp. 162-186.

- Nwaubani, E. (1994), "Chieftaincy among the Igbo: A Guest on the Center-Stage", *The International Journal of African Historical Studies*, Vol. 27 No. 2, pp. 347-371.
- Oladele, O. and Fawole, O. (2007), "Farmers Perception of the Relevance of Agriculture Technologies in South-Western Nigeria", *Journal of Human Ecology*, Vol. 21 No. 3, pp. 191-194.
- Oseni, G., and Winters, P. (2009), "Rural nonfarm activities and agricultural crop production in Nigeria", *Agricultural Economics*, Vol. 40 No. 2, pp. 189-201.
- Oyelaran-Oyeyinka, B., and Adeya, C. (2004), "Internet access in Africa: empirical evidence from Kenya and Nigeria", *Telematics and Informatics*, Vol. 21 No. 1, pp. 67-81.
- Perry, C. and Euler, T. (1985), "Experiential learning and management education", *Higher Education Research & Development*, Vol. 4 No. 2, pp. 185-92.
- Phillipson, J., Gorton, M., Raley, M. and Moxey, A. (2004), "Treating farms as firms? The evolution of farm business support from productionist to entrepreneurial models", *Environment and Planning C: Government and Policy*, Vol. 22, pp. 31-54.
- Pyysiainen, J., Anderson, A., McElwee, G. and Vesala, K. (2006), "Developing the entrepreneurial skills of farmers: some myths explored", *International Journal of Entrepreneurial Behaviour & Research*, Vol. 12 No. 1, pp. 21-39.

- Rao, N. (2007), "A framework for implementing information and communication technologies in agricultural development in India", *Technological Forecasting & Social Change*, Vol. 74, pp. 491-518.
- Rogers E.M. (1962), *Diffusion of Innovations*, New York Free Press.
- Rogers, E.M. (1995) *Diffusion of Innovations*, New York Free Press.
- Romani, M. (2003), "Love Thy Neighbor? Evidence from Ethnic Discrimination in Information Sharing within Villages in Côte d'Ivoire", *Journal of African Economies*, Vol. 12 No. 4, pp. 533-563.
- Rosenfeld, S. (1996), "Does cooperation enhance competitiveness? Assessing the impacts of inter-firm collaboration", *Research Policy*, Vol. 25, pp. 247-263.
- Sassenrath, G.F., Heilman, P., Luschei, E., Bennett, G.L., Fitzgerald, G., Klesius, P., Tracy, W., Williford, J.R. and Zimba, P. (2008), "Technology, complexity and change in agricultural production systems", *Renewable Agriculture and Food Systems*, Vol. 23 No. 4, pp.285-295.
- Seppanen, L. (2004), *Learning challenges in organic vegetable farming: an activity theoretical study of on-farm practices*, Ph.D Dissertation, Helsinki, Finland: Institute for Rural Research and Training, Helsinki University.
- Sharp, J. and Smith, M. (2003), "Social capital and farming at the rural–urban interface: the importance of nonfarmer and farmer relations", *Agricultural Systems*, Vol. 76 No. 3, pp. 913-927.

- Shen, C., and Chiou, J. (2010), "The impact of perceived ease of use on Internet service adoption: The moderating effects of temporal distance and perceived risk", *Computers in Human Behavior*, Vol. 26 No. 1 (January), pp.42-50.
- Singh, K. A., & Krishna, K. V. S. M. (1994). Agricultural Entrepreneurship: The Concept and Evidence. *Journal of Entrepreneurship*, Vol. 3, No. 1, pp. 97-111.
- Slangen, L., van Kooten, C. and Suchánek, P. (2004), "Institutions, social capital and agricultural change in central and eastern Europe", *Journal of Rural Studies*, Vol. 20 No. 2, pp. 245-256.
- Smithson, J. (2000), "Using and analysing focus groups: limitations and possibilities", *International Journal of Social Research Methodology*, Vol. 3 No. 2, pp. 103- 119.
- Spielman, D., Ekboir, J. and Davis, K. (2009), "The art and science of innovation systems inquiry: Applications to Sub-Saharan African agriculture" *Technology in Society*, Vol. 31 No. 4 (November), pp.399-405.
- Stewart, D. and Shamdasani, P.N. (1990), *Focus Groups: Theory and Practice*, Sage Publications.
- Tan, K., Chong, S., Lin, B. and Eze, U. (2009), "Internet-based ICT adoption among SMEs: Demographic versus benefits, barriers, and adoption intention", *Journal of Enterprise Information Management*, Vol. 23, No. 1, pp. 27-55.

- Turner, P., Turner, S and Van de Walle, G. (2007), "How older people account for their experiences with interactive technology", *Behaviour & Information Technology*, Vol. 26 No. 4, pp. 287-296.
- Venkatesh, V. and Johnson, P. (2010), "Social Richness, Telepresence, and User Acceptance: A Longitudinal Field Study of Telecommuting Technology Implementations," *Personnel Psychology*, Vol. 55 No3, pp.661-688.
- Venkatesh, V., Morris, M.G., Sykes, T.A. and Ackerman, P.L. (2004), "Individual Reactions to New Technologies in the Workplace: The Role of Gender as a Psychological Construct," *Journal of Applied Social Psychology*, Vol. 34 No. 3, pp. 445-467.
- Venkatesh, V. and Bala, H. (2008), "Technology Acceptance Model 3 and a Research Agenda on Interventions," *Decision Sciences*, Vol. 39 No. 2, pp. 273-315.
- Venkatesh, V. and Zhang, X. (2010), "Culture and Technology Adoption: Theory and Empirical Test of the Unified Theory of Acceptance and Use of Technology (UTAUT) in the U.S. vs. China," *Journal of Global Information Technology Management*, Vol. 13 No. 1, pp. 5-27.
- Wainwright, D. and Waring, T. (2007), "The application and adaptation of a diffusion of innovation framework for information systems research in NHS general medical practice", *Journal of Information Technology*, Vol. 22 No. 1, pp. 44-58

- Warriner, G. and Moul, T. (1992), "Kinship and personal communication network influences on the adoption of agriculture conservation technology", *Journal of Rural Studies*, Vol. 8 No. 3 (July), pp.279-291.
- Watson, J. (2007), "Modeling the relationship between networking and firm performance", *Journal of Business Venturing*, Vol. 22 No. 6, pp. 852-874.
- Wichmann, T. (1996), "Technology adoption in agriculture and convergence across economies", *Berlecon Research Papers 1996-02*.
- Zahra, S. (2007), "Contextualizing theory building in entrepreneurship research", *Journal of Business Venturing*, Vol. 22 No. 3, pp. 443-452.
- Zhou, L., Wu, W., and Luo, X. (2007), "Internationalization and the performance of born-global SMEs: The mediating role of social networks", *Journal of International Business Studies*, Vol. 38 No. 4, pp. 673-690.