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AFRICA'S RURAL COMMUNITIES AS KNOWLEDGE PROSPECTING DOMAINS FOR EMERGING e-BUSINESS MODELS

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ABSTRACT

The research reported in this paper is a continuing exploration of the concept of Knowledge Prospect Domains (KPD). It is an attempt to discern its applicability to characterize African rural communities (ARC) in an e-Business environment, thereby depicting them as a structured entity from where knowledge could be extracted for emerging e-Business models. By describing African Rural Communities as KPD, and seeking alignment to emerging technologies, adaptive technologies, convergent with proprietary technologies, will be created that could lead to the discovery of new e-Business models. It will be argued that rural communities with its own set of complexities could be realized as a rich source from which knowledge could be appropriated for the innovation of novel business models. Human practices, by processes such as reification, sedimentation, habitualization will be explored. Most e-Business systems that are developed on traditional scientific, engineering and business principles - to serve a well defined set of processes and information flows required by modern business systems - are sometimes in complete cognitive dissonance with human social reasoning processes and needs. The mindset is often to impose technology-driven systems onto society instead of imposing society-driven needs onto technology. Literature review shows that there is a growing disposition in developing societies towards a socio-informatic, needs-driven technology adoption rather than technology adoption for the sake of playing *catch-up* with developed societies. Pertaining to these perceptions some use will be made of social construction theories, like technological determinism (TD), social construction of technology (SCOT) and social shaping of technology (SST).
The research attempt to shows that despite the perception of tranquillity, stagnation and fossilization, pertaining to rural societies, they find themselves in the KPD of Boisot's I-Space and are therefore compliant with so-called Schumpeterian-Learning (S-Learning) as compared to Neo-classical-Learning (N-Learning).
The hypothesis predicated in this paper is that, if African rural societies are constructed as KPD, then valuable knowledge will be extracted that could be utilized for the innovation of sustainable e-Business models.

INTRODUCTION

> *The double influence of the spirit of commerce and the gospel of Christ has given an impulse to the circulation of men, ideas and commodities over the face of the earth, and the discovery of the gold regions has given enhanced rapidity to commerce in other countries and the diffusion of knowledge. But what for Africa? God will do something else for it. Something just as wonderful and unexpected as the discovery of gold. David Livingstone [c. 1853]*

When researching the extant literature and current publications on the bush-fire like spread of mobile telephony into Africa one gets the perception that this might be the unexpected *discovery of gold* that Africa has been waiting for. Headlines such as *Rural Africa new frontier for mobile phone boom; Demand rages among rural folk; Mobile operators scrambling to gain foothold in Africa; Africa's cell phone boom creates a base for low-cost banking;* and commitments like *MTN budgets R700m for rural telecoms; MTN is rolling out more than 300 3G base-stations; Over 5 years, each cellular operator is obliged to distribute 2.5 million SIM card packages and provide 125 000 cell-phones……;* present sufficient evidence to support this perception. At the same time an abundance of new ways to do business, new ways to offer community services and new ways to inject economic-agrarian sustainability are discovered. Most of these novel ways of doing things are based on specific knowledge extracted from which could be called *ill-prospected* African rural communities.

The working hypothesis that will be followed in this research is that, if African Rural Communities (ARC) are constructed as Knowledge Prospect Domains (KPD)[1], then valuable knowledge will be extracted that could be utilized for the innovation of sustainable e-Business models.

The research report is part of a longitudinal study[2]. It will be an extension of previously published research by the author on the concept of *Knowledge Prospect Domains* (KPD).

It will furthermore attempt to demonstrate the *praxis* of the concept/construct KPD in ARC.

RE-VISITING THE CONCEPT OF KPD

In previously published work Knowledge Prospect Domains (KPD) was proposed as;

Those areas where embedded/embodied knowledge, not yet being exploited/extracted by conventional technological means from e-business systems like data processing and data mining, could be extracted by sense making, communities of practice and intervention techniques (creative abrasion) integrating human and machine intelligence in a prospecting rather than mining mode; a domain where experimentation, scanning the edge of chaos, using creative-destructive-learning and system integration will lead to anticipated surprise; where prospecting for mineral wealth – knowledge discovery – precedes mining for gold – knowledge utilization.

The pretext/context in which this was formulated was that of the immediate operating area of e-Business systems where convergence between *proprietary* and *emergent* technologies became visible and *dominant designs*[3] predicated future business and technological developments. This argument held for developed urban societies and mature business processes. It will be argued that this conceptualization could also be

[1] Botha, Daniel F. 2006. 37-43.

[2] Botha, Daniel F. 2007

[3] Weick, K. 36

transposed onto African rural communities (ARC) where convergence of mobile technologies and the emergence of new business models are being significantly reported in the extant literature. To support this reasoning, the concept of KPD will be adapted from the generic to the specific in order to embrace ARC as KPD, albeit from a different paradigm. It is proposed that the notion of *communities of practice* in the ARC context be considered to include *user communities* as knowledge prospects regardless if these communities are constituted formally or informally.

The next section will attempt to utilize social construction theory as a broad framework for positioning ARC in context of emerging technologies. This will be followed by two sections, one focussing on establishing relevant African social descriptors and the second on the relationship with mobile telephony and associated technologies. Subsequently a brief overview of the concept of e–Business models will be given followed by the proposal of constructing ARC as KPD. Finally a multi-factor regression equation for an empirical research model for future research is proposed.

SOME SOCIAL CONSTRUCTION THEORIES

A brief discussion of social construction theories – specific emphasis on technology - will be presented, with the aim of using it as a broad framework for constructing ARC as KPD. *Social constructionism* can be defined as, *analysis of knowledge or reality, or both, as contingent upon social relations, and is made out of continuing human practices……..the analysis of the structure of the common-sense world of everyday life.*[4] Three mainstream theories on linking social construction to technology, namely, *technology determinism*, *social construction of technology* (SCOT) and *social shaping of technology* (SST) are discussed.
Technology determinism[5] is a reductionist doctrine that a society's technology determines its cultural values, social structure, or history. Technological determinism has been summarized as; 'the belief in technology as a key governing force in society' (Merritt Roe Smith[6]); 'the belief that social progress is driven by technological innovation' (Michael L. Smith); 'the belief that technical forces determine social and cultural changes' (Thomas P. Hughes); and 'the idea that technological development determines social change' (Bruce Bimber). Most interpretations of technological determinism share two general ideas:

- That development of technology itself follows a path largely beyond cultural or political influence, and
- That technology in turn has *effects* on societies that are inherent, rather than socially conditioned

To some extent this theory holds for ARC. Mobile technologies as such, from a pure technical viewpoint, did not emanate from these communities. But is this conclusive?

Technological determinism stands in opposition to the theory of *social construction of technology* (SCOT). Leading adherents of *social construction of technology* (SCOT) like Wiebe Bijker[7] and Trevor Pinch[8] argue that technology does not determine human action, but rather, human action shapes technology. They also argue that the ways in which a technology is used cannot be understood without understanding how that technology is embedded in its social context. It holds that both the path of innovation and the consequences of technology for humans are strongly, if not entirely shaped by society itself, through the influence of culture, politics, economic arrangements, and the like. SCOT is a response to *technological determinism*. If

[4] Honderich, T. 829
[5] Staudenmeier, S.J., & John M. 134-148.
[6] Smith, Merritt Roe, & Leo Marx, eds.
[7] Bijker, Wiebe E., Thomas P. Hughes, & Trevor J. Pinch, eds.
[8] Pinch, Trevor J. & Wiebe E. Bijker. 347-360.

it is argued that e-Business models are *the methods, theory, and practices governing such applications* [9] and that these models came about because of, and not despite of, ARC then the theory of SCOT holds for ARC – *the path of innovation shaped by society.*

Yet another view is that of *Social Shaping of Technology* (SST)[10] where the central concept is that there are choices – though not necessarily conscious choices – inherent in both the design of individual artefacts and systems, and in the direction or trajectory of innovation programs. If technology does not emerge from the unfolding of a predetermined logic or a single determinate, then innovation is a 'garden of forking paths'. Different routes are available, potentially leading to different technological outcomes. Significantly, these choices could have differing implications for society and for particular social groups. SST both agrees and conflicts with elements of other theories that tie sociology and technology together such as SCOT and Technological Determination (TD). SST is concerned to explore the material consequences of different technical choices, but criticises TD, on its argument that technology follows its own developmental path, outside of human influence, and in turn, influences society.

AFRICAN RURAL COMMUNITIES DESCRIPTORS

It is now deemed necessary to present some grounded framework against which ARC structures could justifiably be described. For this purpose the globally recognized DARE[11] program was found to be a suitable choice from which the following definitions, in the context of ARC, was found to be of significance (Bryceson 1996)[12]:

- *De-agrarianisation* is defined as a long-term process of occupational adjustment, income-earning reorientation, social identification and spatial relocation of rural dwellers away from strictly agricultural-based modes of livelihood.
- *Depeasantisation* represents a specific form of de-agrarianisation in which peasantries lose their economic capacity and social coherence, and demographically shrink in size. They literally unravel as communities.
- The new *Sustainable Rural Livelihoods*[13] (SRL) approach is a response to the complexity of rural livelihoods and their growing non-agricultural character

There has been a reluctance to consider how neo-liberal policies impact on African rural social structures. Rather the tendency has been to see African social institutions, especially those associated with rural peasant societies, as *constraints* to the implementation of economic policies, inferring that vested interests and traditional conservatism cannot rise to the market challenge. DARE argues the opposite – African peasant societies have been extremely responsive to neo-liberalism with as yet unclear implications for the social and economic fabric of African countries. The examples of mobile and related technology adoption in ARC, that will be used as research data, provides further support to the arguments of DARE; arguments which is predicated for this paper.

Rural restructuring factors[14] characterized by: peasant's deteriorating commercial agriculture; rising cash needs; increasing income diversification (the upsurge in non-agricultural income diversification represents

[9] One of the definitions of *Technology* from Collins concise dictionary.
[10] Williams & Edge. http://www.rcss.ed.ac.uk/technology/SSTRP.html
[11] DARE – De-agrarianisation and Rural Employment research program at the African Studies Centre, University of Leiden, funded by the Dutch Ministry of Foreign Affairs (DGIS)

[12] Bryceson, D. F.
[13] Bryceson, D. F.

large-scale agrarian labour displacement within an accelerated process of depeasantization); proliferation of income earners within the rural household; decreasing rural isolation; diversification and class differentiation are robust descriptors for the complexity, uncertainty and diversity in ARC. This makes ARC according to Boisot[15] a *regime bordering on chaos* (a chaotic regime) and therefore fertile for purposes of knowledge discovery (new insights), one of the conditions to satisfy the definition of KPD. In this regime, *scanning* (one of the six phases in Boisot's I-Space[16]), for new business models becomes paramount. It is predicated that this evidence be used in the attempt to qualify ARC as KPD.

Furthermore in coping with uncertainty, specific *tensions within African peasantries* could also be cited to bear on the argument that ARC can be considered KPD. Four tensions identified by DARE [17] are appropriated:

- Securing economic survival: market experimentation versus subsistence fallback
- Marshalling resources and social networks: household solidarity versus individual autonomy
- An unacknowledged identity crisis: agrarian conservatism versus sceptic otherness
- Strengthening or weakening the economic foundation of rural livelihoods? Linkages between non-agricultural activities and agriculture

If it is accepted that uncertainty should be confronted with capability, it should also be acknowledged that the future of African rural dwellers lies increasingly in labour force participation outside of rural agriculture. It signifies that some other commercial cash-generating activities should be realized. This is where mobile technologies can make a significant difference. The need is for literacy, numericy, knowledge of the national language, and various occupational and computer skills that will provide the means to command sufficient income for themselves and their families, as well as to raise the overall level of productivity in their respective countries. Confronting uncertainty with capability presents *a capacity to act* and therefore, an abundance of e-Business model opportunities. Capability enhancement through human capital investment is therefore vital.

The upsurge in non-agricultural income diversification which has taken place on the African continent during the last fifteen years represents large-scale agrarian labour displacement within an accelerated process of depeasantization[18]. One way to combat this trend is to accelerate the cash flow into these peasant communities; this could be called *the pecuniary dynamics of ARC* in which mobile technologies are already playing a multiplier role.

The following extracts from publications highlight the pecuniary descriptors of ARC: *Mobile phones have the ability to make a dramatic change to village life in Africa; One of the most exciting areas is in making social transfers to the very poorest in society; The mobile phone is creating niches that Africa's poor entrepreneurs are able to exploit in new ways; When ever an opportunity appears, however obscure, someone will move to exploit it within days; Mobile payments can also facilitate transactions in remote areas and can even improve security by removing cash from the business process altogether; Several studies show that, once the inertia of cash has been taken away, an economy will start taking off and accelerating; With over 3 million transactions a month in the DRC alone, Celpay recognises the need for leading mobile banking solutions in emerging cash-based economies; additional features and functionality for customers,*

[14] Bryceson, Deborah.
[15] Boisot, M.
[16] Boisot, M.
[17] Bryceson, Deborah.
[18] Bryceson, D. F.

including inter-bank transfers and enhanced airtime vending; Most operators sell airtime in tiny denominations for people who live from hand to mouth; Celpay Zambia upgrades technology to directly answer African population requirements; and *The venture hopes to build on the rapid spread of pre-paid cell phones to create a whole new banking system, one designed for low income users that have been under-served or ignored by traditional banks*. These are but some of the cases that can be reported on where rural Africa has some unique requirements for the use of *cyber-money*.

From the cases that was perused it can be abstracted that the following *cash flows streams* (X_{cfs}) characterizes ARC: Money transfers from *urban to rural* areas where relatives are the beneficiaries (X_{u2r}); income from non-agricultural peasant-like industry (X_{nai}); income from sustenance and small scale commercial farming (X_{scf}); income from state social funds (X_{ssf}); and, income from international and non-governmental organizations aid funds (X_{aid}). These factors are the independent variables to describe the dependent variable X_{cfs}.

MOBILE AND ASSOCIATED TECHNOLOGIES IN THE AFRICAN CONTEXT

> *Once a powerful technology exists and is known to exist, a productively powerful society without much of a market also becomes possible. Whether it then inevitably engenders a hidden market (the double economy), or networks of reciprocity, is an interesting question*[19].

Mobile phones are the very first technology in history where there are more now being used in the *developing world* than in the *developed world*[20]. Mobile phones have the ability to make a dramatic change to village life in Africa. One of the most exciting areas is in making social transfers to the very poorest in society

Most of the World's *Developed Communities* migrated from the large screen of the PC to the smaller screens of the laptop/notebook and PDA and lately to the still smaller screen of the mobile phone whilst over the same time-line computing power (memory and micro-processor speed) tracked the migration, i.e. recent mobile phone computing power is now virtually equal to that of earlier/legacy PCs. It is of significance to note that some *Developing Communities*, of which Africa is the most prominent, did not follow this migration but are taking a technology leap, closing the digital divide, and having their novel digital world experience directly on the small screen; if the mobile is going to become Africa's PC this calls for a serious new way of thinking about business models and *pecuniary dynamics*. Add to this, *mobile internet access*, *NFC technology*, and *smart-* and *scratch-card* applications, you have the *requisite variety*[21] that could evoke a multitude of business models and opportunities.

Various *contact-less* payment systems rely on technology called *near-field communication* (NFC), short exchange of data, when machine induces an electrical circuit in the NFC device. This technology is embedded in *contact-less plastic cards*[22] – both in and out of phones making it easier to use for small payments.

The well known *scratch-card*, mainly used in the lottery business, found a new application in the African context; the simplicity of this novel business model design speaks of elegance. You simply buy a $5 scratch card, scratch of the panel to get the voucher number and then text that number to your counterparty. Compare this to using a UK internet bank account to send 5 pounds from your account in London to a friend

[19] Gellner, Ernest.
[20] Economist.com. March 5th 2007.
[21] Weick 89
[22] Economist.com. Feb 15th 2007.

in Edinburgh: if you are lucky it will take three days and it may take four.[23] A number of mobile operators in Africa have developed electronic versions of this mechanism - the *scratch-card solution* – by allowing the direct transfer of airtime from one person to another, thus hugely improving liquidity of this 'currency'. There are initiatives in countries such as Kenya and South Africa working to capitalize on this gap in the market by providing payment services matched to the needs of the poor and un-banked. Phone-to-phone (P2P) transfers[24]

Connectivity could become a kind of currency as we move forward in the on-line world. Mobile phone minutes are just another currency[25] Air-minutes like air-miles are becoming redeemable currency.

From this it could be inferred that ARC have a significant potential of adopting emerging technologies (AET) into their rural livelihoods which leads to the innovation of unique sustainable e-Business models (SEB). These business models subsequently affect the sustainability of these livelihoods (SRL).

e-BUSINESS MODELS

Developers and business analysts who build complex structures or systems have been creating models of what they build. The term *model* could be defined as an abstract representation (*cognitive simplification*[26]) of the real world that reduces complexity and represents only the details necessary for a specific purpose.

From the literature[27] three types of definitions for *business models* could be identified:

- Business model definitions that concern themselves with the *participants in a joint business venture*; models that specify the relationships between different participants in a commercial venture
- Business model definitions that concern themselves with the *process and structure of a business organization* that should be in place to operationalize the strategy of the business.
- Business model definitions that concern themselves with how business models are *seen from the perspective of the market place.*

Researching the literature for a single definition on the concepts of *e-Business* and *e-Business models* proved rather daunting. The use of the letter "*e*", supposedly denoting *electronic,* could be largely the cause of the confusion. Although their seems to be some converging consensus on the term, *e-Business systems,* denoting business application architecture running on generic IT-infrastructure, many authors still regards e-Business as being exclusively *Internet based* and mostly B2B. The latest publications on the subject by noted authors such as Laudon & Traver[28], O'Brien[29], and Papazoglou & Ribbers[30], to name but a few, recognize that non-internet-based emerging technologies, when integratable with internet-based proprietary technologies be acknowledged as part of e-Business systems and therefore e-Business models. This line of reasoning will be followed in this paper, as previously argued by Botha[31]. Business models emanating from the KPD of ARC satisfy the definition of the 3rd kind above namely, *from the perspective of the market place*, and will be considered to be internet- and non-internet-based stand-alones and hybrids.

[23] Birch, David.
[24] Birch, David.
[25] Birch, David.
[26] Boisot, M.
[27] Papazoglou, M.P. & Ribbers, M.A.
[28] Laudon, K. & Traver, M.
[29] O'Brien, J. & Marakas, G.M.
[30] Papazoglou, M.P. & Ribbers, M.A.
[31] Botha, D.F. 2007.

CONSTRUCTING ARC AS A KPD

Superimposing the evidence presented above on the definition of KPD and by seeking a comparative goodness-of-fit with key phrases/constructs of the definition the following deductive inferences can be supported/made:

- *Knowledge not yet been extracted by conventional technologies*: Knowledge-based technologies, such as data-mining, are conventionally used to extract new knowledge from e-Business system operations. The knowledge that led to the advent of emerging disruptive technologies and their accompanying simplistic business models came from *sense-making*[32] (scanning, cue extraction, interpretation, enactment) and communities of practice/users, integrating human intelligence with machine capability in a prospecting – exploring *requisite variety* - mode.
- *Creative-destructive learning*: It could be argued that statements in the literature on the application of emergent technologies in ARC such as: 'Bank branches and post offices are these days as *redundant to financial systems* as copper wire and telegraph poles to telephony'[33]; 'But, the new systems could prove to be a *disruptive technology*. Banks could be *disintermediated'*[34]*;* and, 'Never mind the *$100 laptop* the mobile phone is already Africa's PC, and is having significant socio-economic effects'[35], supports this concept.
- *Communities of practice/users*: Mobile phones have the ability to make a dramatic change to village life. Mobile phones are the very first technology in history where there are more now being used in the *developing world* than in the *developed world*[36].
- *Creative abrasion*: 'Celpay[37] is a truly innovative company which saw the issues that customers had with banking access and implemented solutions, a number of years ago, that directly answers the requirements of the population.' 'The key point to note is that the average cost per transaction significantly lowers as volumes increase with an electronic system.'
- *Sense-making*: 'Celpay is a truly innovative company which saw the issues that customers had with banking access and implemented solutions, a number of years ago, that directly answers the requirements of the population. 'We know from our experience in other countries that mobile phones are ideal tools for transacting, and we also know that transaction volumes will grow rapidly once adoption starts. Mobile payments can also facilitate transactions in remote areas and can even improve security by removing cash from the business process altogether'[38]
- *Integrating human and machine intelligence*: The rapid adoption of mobile technology into village life created, *occasions for sense making*[39] that led to new business models never conceived before as viable in urban communities. 'The mobile phone is creating niches that Africa's poor entrepreneurs are able to exploit in new ways; When ever an opportunity appears, however obscure, someone will move to exploit it within days'[40] is but one example that supports this perception.

[32] Weick 49-55
[33] Economist.com. March 5th 2007.
[34] Economist.com. Feb 15th 2007.
[35] Birch, David.
[36] Economist.com. March 5th 2007.
[37] *FUNDAMO-On-line News letter*.
[38] *FUNDAMO Newsletter*.
[39] Weick 83
[40] Birch, David.

It is proposed that the four factors as described above are sufficient to construct ARC as KPD. It is furthermore predicated that SRL – the dependent variable factor - will be directly proportional to SEB and SSS. SEB will be dependent on CFS, TDV and AET – the latter three being independent variable factors.

PROPOSED RESEARCH MODEL

The hypothesis supported by the evidence presented above can now be described by the following regression equation: (This equation describes the KPD for ARC)

$$\mathbf{Y_{srl} = a + b_1X_{seb} + b_2X_{sss} + e}$$

Where:

Y_{srl} = variance in sustainable rural livelihoods (SRL)

X_{seb} = variance in sustainable e-Business models (SEB)

$= c_1X_{cfs} + c_2X_{tdv} + c_3X_{aet} + e_1$

X_{sss} = variance in sustainable social services (SSS-health, education & infrastructure)

X_{cfs} = variance in cash flow streams (CFS)

X_{tdv} = variance in technological development (TDV)

X_{aet} = variance in adoption of emergent technologies (AET)

b_1, b_2, c_1, c_2, and c_3 are the regression coefficients of variables Y and X, whereas a is the constant for the null-hypothesis, and $e = e_1 + e_2$, the constants of random error.

Furthermore X_{cfs} can be described by:

$$X_{cfs} = d_1X_{u2r} + d_2X_{nai} + d3X_{scf} + d_4X_{ssf} + d_5X_{aid} + e_2$$

Where X_{u2r} = variance in money flow from urban to rural

X_{nai} = variance in non-agrarian income

X_{scf} = variance in subsistence and commercial farming income

X_{ssf} = variance in state social funds flow

X_{aid} = variance in income from international and non-governmental organizations aid funds

The model is based on the pretext/assumption that SSS, TDV, and AET could also be significant factors to measure SRL. The contribution that these independent variables make was not fully researched and argued for the purposes of this paper, but they are recognized as salient contributors to describing SRL. The primary investigation focussed on SRL dependence on SEB.

CONCLUSION

The research indicates that ARC as KPD are a rich source of knowledge and by mindfully *prospecting* this knowledge through sense-making, could lead to SRL. This will be dependent on *pecuniary dynamics* which entails a steady flow of *cyber cash/money* into these livelihoods, providing the means to the village people to enhance their quality of life by exercising their own choices (empowerment) on how to spend this money. The pecuniary dynamic is made possible through e-Business models based on *emerging*, sometimes *destructing*, but mostly *adaptive*, mobile and associated technologies. Furthermore the ARC described as KPD, provides a fertile environment where existing banking and telecommunications companies, through technology applications, communities of users, and new business models converge. This emerging pattern of community enrichment could lead to the upliftment of rural livelihoods which in turn could diminish the phenomena of *depeasantisation* and *de-agragarianisation*. A secondary spin-off from these new ways of doing business based on the KPD of ARC is a paradigm shift on existing business models and proprietary technologies developed for rural areas and the developed world. Finally a conceptual theoretical model induced from the literature research is proposed. The model, in the format of a multifactor regression equation, describing the KPD of ARC, is proposed for further empirical research.

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