

Collaborative Networks as a Mechanism for Strengthening Competitiveness: Small and Medium Enterprises and Non-state Actors in Tanzania as Cases

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Abstract

Industrial organizations are increasingly facing more challenges in the market and society. These challenges include the scarcity of resources, short delivery time requirement, frequent emergence of new technologies, demand for wide variety of competencies, and limited availability of up-to-date experts. Coping with these challenges requires continuous restructuring and managing changes in organizations. However, only large organizations can afford to institute these changes. It also requires continuous innovation in deployment of emerging technologies and management concepts. Thus, due to their small size, lack of competitive capital and inability to acquire complex opportunities, majority of SMEs and non state actors (NSA) find it difficult to cope with the required speed of change. However, both research and practice have shown that dynamic time/cost-effective and fluid creation of temporary collaborative networks wrought by ICTs is an enabler for the small and medium enterprises (SMEs) and NSAs in quest of enhancing competitiveness in the marketplace. This article contributes to the understanding of the challenges related to the establishment of collaborative networks of organizations in developing economies and proposes a customizable model for establishing those networks.

Key Terms: Collaborative networks, developing economies, ICTs, SMEs, non state actors, collaborative capital

1. Introduction

Regardless of size, operating environment of businesses is continuously becoming complex. Business organizations must now be capable of modeling their daily processes and predict necessary variables to sustain their survivability in the market. Recent world events clearly demonstrated the inability of business organizations to individually acquire vast amounts of information and variables, resources and competencies that would have helped them in addressing and responding to emerging complex opportunities. However, innovations in technology are transforming organizations' ability to measure, monitor and model how the market behaves. For example, joining and continuous involvement in collaborative networks is now becoming a precondition for successful-operation in the today's turbulent market for any organization that strives to achieve an assured competitive advantage. This is even very demanding and necessary for those organizations which are *small or medium in size* and thus have too low or insufficient capacity in terms of capital, resources and skills to individually compete and operate in the market. Today, collaboration has become a key for enhancing rapid response to market demands in different sectors of production and service delivery as it facilitates sharing of competencies and resources owned by participating organizations. Thus change in mind-set of the collaborating partner organizations is needed in both structuring the operations in the market as well as in configuring the management hierarchy and authority distribution.

In other words, the businesses, particularly *Small and Medium Enterprises* (SME), are continuously being faced with ever-fluctuating internal and external demands, continuous changes in operating environments, and changes in facilitating technologies. Consequently, they are forced more than ever to reconsider the way in which they structure, coordinate and handle their businesses and all related processes [Vreed, 1995]. The survival of these types of organizations in the current turbulent market is continuously at risk and has become uncertain. Furthermore, increasing market competitions, current governments' tendencies towards trade liberalization and globalization, scarce resources and changes in customers' demands, volatile business opportunities are among the key factors catalyzing this uncertainty, especially for SMEs [Jones, et al., 2000]. Therefore, organizations and SMEs in particular, are increasingly less able to acquire and respond to business opportunities individually and the traditional point-to-point connections between organizations are being rapidly replaced by participation in cooperation networks.

In order to be successful in such competitive and rapidly changing market environments, organizations need to continuously enhance their capacity in terms of competencies, resources and skills deployment and market share to be able to deal with new business models. Similarly, new strategies, organizational and governance principles, processes and technological capabilities must be adopted. To respond to these requirements, organizations are increasingly restructuring their internal operating and information systems, and re-engineering production processes to both eliminate redundant processes and lower the costs.

With the development of new collaborative tools supported by Internet and mobile computing and a better understanding of the mechanisms of collaborative networks, new organizational forms are naturally emerging. All of these cases have a number of characteristics in common:

- Networks composed of a variety of entities - organizations and people – which are largely autonomous, geographically distributed, and heterogeneous in terms of their operating environment, culture, social capital and goals.
- Organizations collaborate to better achieve common or compatible goals.
- The interactions among participants are supported by computer networks.

As such, the notion of collaborative network can be used to as a generic term to represent all these particular cases. Specifically, Camarinha-Matos, Afsarmanesh (2005) define the network as follows:

A collaborative network (CN) is a network consisting of a variety of entities (e.g. organizations, people, machines) that are largely autonomous, geographically distributed, and heterogeneous in terms of their operating environment, culture, social capital and goals, but that collaborate to better achieve common or compatible goals, thus jointly generating value, and whose interactions are supported by computer network.

Most forms of collaborative networks imply some kind of *structuring* over the activities of their constituents, identifying roles for the participants, and some governance rules. These are also known as *collaborative networked organizations (CNOs)*. Other more spontaneous forms of collaboration in networks can also be foreseen. For instance, various *ad-hoc collaboration processes* can take place in virtual communities, namely those that are not business oriented –for example, individual citizens' contributions in case of a natural disaster, or simple gathering of individuals for a social cause. These are cases where people or organizations may volunteer to collaborate hoping to improve a general aim, with no pre-plan and/or structure on participants' roles and how their activities should proceed.

2. History of collaborative networks

Networking and collaboration are frequently praised for the potential benefits they can bring to the involved partners. The potential benefits from collaboration include increasing the profit and survival factors for small and medium enterprises (SMEs) in a context of market turbulence. Relying on this belief, a large number of collaborative networks, namely, virtual enterprises, virtual organizations, dynamic supply chains, professional virtual communities and other forms of collaborations have been launched world-wide during the last 10-15 years particularly in Europe and America as well as a few in Africa. Due to the importance of these collaborations, a new field of knowledge has emerged.

This field is addressed as a new scientific discipline that covers the study of networks consisting of a variety of entities (e.g. organizations and individuals) that are largely autonomous, geographically distributed, and heterogeneous in terms of their operating environment, culture, social capital and goals, but that collaborate to better achieve common or compatible goals (e.g. problem solving, production, or innovation), and whose *interactions are supported by computer network*. As pointed above, nowadays collaborative networks (CN) manifest in a large variety of forms. Moving from the classical supply chains format, characterized by relatively stable networks with well defined roles and requiring only minimal coordination and information exchange, more dynamic structures are emerging in industry, science, and services.

Some of these collaborative networks are goal-oriented, i.e. focused on a single project or business opportunity. These are configured to address a single customer by delivering a single product output. Such forms of collaborative networks are here referred to as *virtual enterprises (VE)*. The same concept emerges in other practices focused on public service delivery such as government, scientific virtual laboratories and service sectors. Such goal oriented and short term collaborative networks are here referred to as *the virtual organizations (VO)*. Thus, a VE/VO is often a temporary organization that “gathers” its potential from the possibility of (rapidly) forming consortia well-suited to each opportunity.

Collaborative network paradigm has been increasingly penetrating in market and society due to continuous advances in communication technologies and particularly, computer networks and internet technology. The paradigm of collaborative networks has been evolving with contributions from multiple disciplines such as computer science, engineering, management, economics, organizational ecology, sociology, among others. This has lately resulted into a convergence of different groups of researchers and practitioners from different origins. As pointed above, the Collaborative Networks is being recognized as a new discipline of its own [Afsarmanesh, et al, 2009]. However, in terms of ICT application in industry, this new discipline is a natural consequence of a long term evolution, as briefly illustrated in Figure 1¹.

¹ CIM =, IMS =, SCM = supply chain management; CAD/CAM = computer aided design / manufacturing; FMS/FAS =

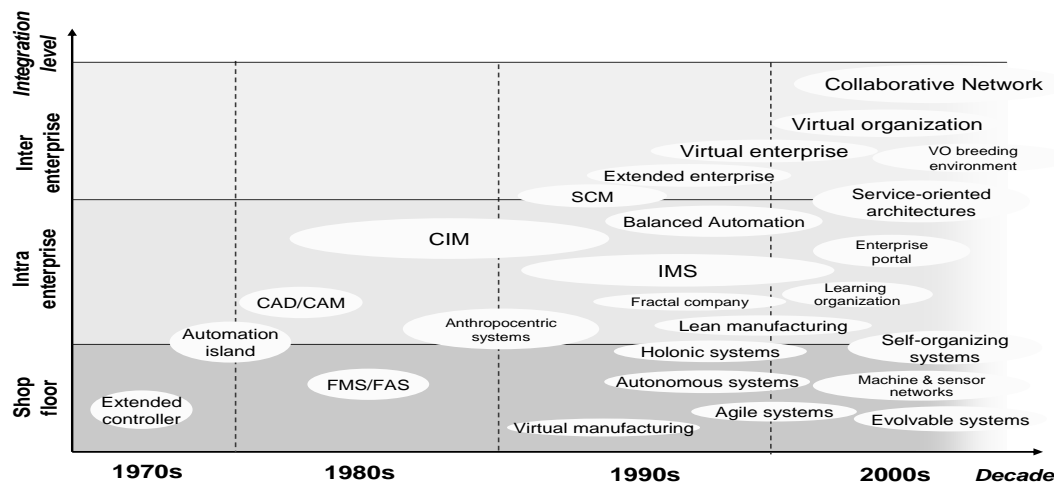


Figure 1: Evolution of collaborative networks in ICT perspective

Some other form of collaborative networks involve human being as the entity members, i.e., formed by human professionals that participate in virtual communities and form virtual teams (VT) to address specific problems such as collaborative concurrent engineering or consultancy. With the development of new collaborative tools supported by Internet and a better understanding of the mechanisms of collaborative networks, new organizational forms are naturally emerging in different sectors, e.g. networks of agricultural product dealers, networks of fishermen, networks of healthcare institutions together with relatives involved in elderly care, networks of governmental institutions, networks of academic institutions forming virtual institutes for joint delivery of advanced courses, networks of entities involved in disaster rescue, etc. The following sub-sections expound further various aspects of collaboration.

2.1 Concepts of collaboration

Organizations interoperate and collaborate within VO and VBE networks while being facilitated by computer networks, in order to achieve certain common or compatible goals such as the acquisition of more business opportunities. Different kinds of co-working relationships are applied in short-term and long-term CNs and in order to further describe and distinguish between the cooperation and collaboration concepts related to CNs. The following descriptions are applied in this paper to characterize the CNs:

Cooperation, practiced in long-term CNs, involves not only the exchange of information and alignment of activities, but also the sharing of resources for achieving compatible goals. Cooperation is achieved by the division of some minor labor (not extensive) between participants. However, a common plan exists that in most cases is not defined jointly, but is designed by a single entity (perhaps by the coordinator/administrator of the cooperation alliance), and which requires some low-level of cooperation.

Collaboration that is practiced in short-term CNs on the other hand is a process in which entities share information, resources and responsibilities in order to jointly plan, implement, and evaluate a series of activities that will help them achieve the common collaboration goal. It implies a group of entities that work intensively together and enhance each other's capabilities. It also implies sharing risks and rewards that, if desired by the group, can also provide outside observers with the impression of a joint identity. Collaboration involves the mutual engagement of participants to solve a problem together, which requires strong trust relationships and thus takes time, effort, and dedication. [Msanjila, 2009]

2.2 Classes of collaborative networks

During the last decade, digital technology has changed the world in profound and exciting ways. Today, organizations communicate and interact instantly with each other, and securely exchange sensitive information - such as those needed for businesses collaborations - without the traditional limitations of time and location. Collaborative networks in developed economies (for example, Europe, America, Japan and others), such as global supply chains, have enabled industries to manufacture and deliver products to markets with incredible speed and efficiency. Advances in technology, specifically those related to ICT have enhanced the mobility and flexibility of organizations in those countries by, for example, facilitating collaboration irrespective of geographic and physical location. Such approaches must now be adopted by organizations in developing economies such as those in Tanzania as described in Section 5.

An emerging effective approach for organizations to co-work in such evolving and expanding markets, while taking advantage of the advanced ICTs, is through the configuration of CNs. Following [Camarinha-Matos & Afsarmanesh, 2006], the CN is further defined as follows:

A CN is an alliance constituting a variety of entities (e.g. organizations and people) that are largely autonomous, geographically distributed, and heterogeneous in terms of their operating environment, culture, social capital, and goals, and that cooperate/collaborate to better achieve common or compatible goals, and whose interactions are supported by the computer network.

In observation of the trends over the last decades and in order to enhance their survivability (by raising their joint capital and capability) in the market, organizations in general and SMEs in developing economies in particular are increasingly interested in attracting others for the purpose of cooperation and/or collaboration. Today, more organizations are ready to share the resources, knowledge, and skills they have, which are scarce in the market, as well as their gained profits, in order to be involved in more business opportunities and to be able to share their risks and potential losses. They now realize that acting together can enhance their competitive power and thus improve their chances of acquiring more and better business opportunities. Therefore, organizations no longer consider forcing others out of the market to be an effective sustainable working approach [Afsarmanesh, et al., 2007].

This paper addresses two specific forms of CNs in detail, namely one short-term type (i.e. VOs) and one long-term type (i.e. VBEs) and discusses how these concepts can be applied in developing economies. Whereas the VOs represent short-term goal-oriented collaborations between partners, while VBEs represent long-term cooperation. The definitions of a VO and a VBE adopted in this paper are as follows.

A VO is an association of (legally) independent organizations (VO partners) that come together and share resources and skills to achieve a common goal, such as acquiring and executing a market/society opportunity [Camarinha-Matos & Afsarmanesh, 2006].

A VBE is defined as a "strategic" alliance of organizations (VBE members) and related supporting institutions (e.g. firms providing accounting, training, etc.), adhering to a base long-term cooperation agreement and adopting common operating principles and infrastructures, with the main goal of increasing both their chances and preparedness of collaboration in potential VOs [Afsarmanesh & Camarinha-Matos, 2005].

2.3 Needs for collaboration in developing economies

The market and society continuously evolve to cope with the complexity of today's connected digital world. While this has been properly adopted in developed economies, in developing economies particularly in Africa, SMEs must work harder to fully connect themselves to the digital world. The challenges constraining their connectivity to the digital world are due to lack of technological resources, lack of relevant technical experts as well as lack of capital to acquire related technological services. Despite these challenges, the technological preparedness of each organization that is required to facilitate collaborative initiatives must match the market evolution. It is more difficult for the SMEs in developing economies that lack of sufficient operating capital to individually achieve the required preparedness. Other principal aspects of preparedness and configuration of long-term CNs - such as VBEs - include establishing common operating principles, acquiring an interoperable infrastructure, and creating trust between organizations [Msanjila & Afsarmanesh, 2009]. When achieved, these aspects of an organization's preparedness enhance the chance of being able to configure more successful VOs quickly and efficiently.

Previous studies have assumed that the most suitable partners for establishing a new VO may easily be identified and selected from the open universe of available organizations, for example through the Internet, and merged into the required VO. However, this assumption overlooks a large number of obstacles in this process such as:

- How to learn of the mere existence of potential partners in open universe and deal with incompatible information.
- How to acquire basic profile information about organizations, when no common template format exists.
- How to quickly establish an inter-operable collaboration infrastructure, given the heterogeneity of organizations at multi-levels, and the diversity of their systems.
- How to build trust between organizations, which is the base for any collaboration.
- How to develop and agree on the common principles of sharing and working together.
- How to quickly define the agreements on the roles and responsibilities of each partner in order to reflect sharing of tasks, the rights on the produced results, and so on [Afsarmanesh & Camarinha-Matos, 2005].

As a basic rule, supporting the dynamic/fluent formation of collaborative networks, such as in a VO consortium, requires its potential partners to be *ready and prepared to participate* in such a collaboration environment. The foundation of this readiness should include reaching commonality agreements on aspects such as the interoperable infrastructure, operating rules, and cooperation. Any

collaboration also requires that all involved organizations meet the required level of competency and performance to be considered trustworthy by other partners. Therefore, the concept of a VBE has emerged as the necessary context for the effective creation of dynamic virtual organizations.

A main aim of the VBE is focused on the transition from point-to-point connections between organizations to a network structure in order to increase the chances of its member organizations' involvement in opportunities for collaboration, and to reduce the costs and time needed to configure opportunity-oriented VOs. Therefore, the transition from point-to-point connection to networked structure enhances organizations' preparedness in the following aspects:

- Maintaining common sharing and operating principles.
- Acquiring an interoperable infrastructure.
- Achieving the same level of understanding through common ontology.
- Defining value systems and performance metrics.
- Creating trust between organizations.
- Acquiring systems for assisting the management of cooperation and collaboration [Afsarmanesh & Camarinha-Matos, 2006].

2.4 Challenges and advantages of collaborative networks

A large number of factors both force and motivate organizations to operate in a very dynamic manner [Geerlings, et al., 2001], what need to be supported through the long-term strategic alliances. In addition to continuous flow of large companies from Asia, Europe and America into African market, other influential factors here include continuous advances in ICT infrastructure, dynamic changes in markets and customer demands, increased services quality requested by customers, new and stable political factors such as market globalization and liberalization, and turbulent economic situations. Business-based and politically-based decisions made by organizations in developing economies now have to be taken much faster (i.e. needing quick response) in order to seize opportunities that are themselves scarce and volatile, and that require the application of advanced technologies for the support of decisions [Msanjila, et al., 2005]. In addition to the required fast response to emerging opportunities, the volatility of the production markets has been increasing. In particular, the following are the emerging business requirements and challenges that motivate organizations in developing economies to join long-term strategic alliances to enhance their collaborative business capital.

➤ **Required competencies:**

Production and manufacturing industries must acquire and maintain sufficient, varied, and strong competencies to be able to cope with the current demands that need to be met for each business opportunity. It is becoming ever-more difficult and rare for a single industry to equip itself with the increasing number of competencies that are required for the entire life cycle of production.

➤ **Required resources:**

Various - and sometimes an immense amount of - resources are needed to produce each kind of product, and in some cases dedicated to a single business opportunity. These resources are not always reusable for other business opportunities, since different customers' requirements change continuously and become more one of a kind. Therefore, acquiring and keeping all required resources has proven expensive and difficult for individual industries.

➤ **Required investment:**

Business opportunities demand a large start-up investment a priori to their execution. In some cases, the costs incurred during the pre-investment stage may not even be repaid during the execution of the business opportunity, and thus become a part of the fixed costs. In principle, fixed costs do take more time to be repaid; however, since customer requirements are continuously changing there is no guarantee that such investments will be re-used to meet other customers' needs. Cooperation and/or collaboration with other organizations can help to prevent the incurrence of certain unnecessary fixed costs by re-using some of the investments made previously by other organizations.

➤ **Short delivery time:**

Customers now demand shorter delivery times. They need their products and services to reach the market before their competitors' products do in order to generate more profit, which an enterprise alone can hardly afford.

➤ **Change in requirements:**

The current market environments are very volatile. Consequently, business requirements change continuously. This further raises the pressure on industries to advance capabilities and to equip themselves with much-needed resources, competencies, and so on.

Once an organization joins the long-term CNs there are a large number of potential benefits that can be gained. These include the following:

- a. *Agility in opportunity-based VO creation*: supporting a reduction in the needed efforts and complexity, flexibility for VO re-configurability, and cost effectiveness.
- b. *Provision of base effective ICT infrastructures for members*: the common grounds for interoperability, inheritability and collaboration.
- c. *The VBE bag of assets*: providing properties of interest for its members and general shareable information or knowledge (e.g. standardized product definitions and processes), software tools, lessons learned.
- d. *Provision of mechanisms, guidelines, and assisting services*: for both motivating and facilitating the configuration and establishment of VOs, and for creating a system of incentives, mechanisms to create positive reputation, and services for partner searches, contract negotiation, etc.
- e. *Proactive management of competencies in VBE*: assuring coverage of the needed competency/resources within the VBE.
- f. *Assuring continuity support through support institutions*: Supporting insurance, branding, training, etc.
- g. *Supporting creation of trust among VBE members*: by recording the performance history, and definition of criteria for organizations' trustworthiness.
- h. *Provision of general guidelines for collaboration*: constituting rules of conducts, working and sharing principles, value systems, collaboration ethics and culture, IPR protection, etc.
- i. *Enhancing the chance for VO involvement*: through the provision of members' profiles in the VBE catalog, including their competencies, resources, products, services, and so on, and helping member organizations to acquire opportunities.
- j. *Improving the potential / capacity of risks taken by the VO initiators*: due to a reduction in the VO setup efforts/time, and the availability of both a wide variety of competencies (resources) and indicators of the level of trust and past performances of VBE members [Afsarmanesh & Camarinha-Matos, 2005].

3 Capital and capability challenges in developing economies

In this section we discuss a number of challenges which contribute to the lack or insufficient capital and capability of SMEs in developing economies.

a) Political related challenges

Reinforcing the effectiveness of collaborative networks and creating the necessary conditions for making the network an endogenous reality in the worlds of business and industry, including the SMEs, is a key factor for the globalization of an economy. Collaborative networks provide a basis for competitiveness, world-excellence, and agility in turbulent market conditions. They can support SMEs in the identification and exploitation of new business potential, boost innovation, and increase the SMEs' capabilities. The networking of SMEs with large-scale enterprises also contributes to the success of larger companies in the global market. However, in developing economy such as Tanzania, collaborative network concepts have not been effectively adopted and applied in SMEs' daily operations. Considering the fact that business opportunities are continuously becoming complex in terms of demand for resources and capital these individual SMEs in Tanzania hardly can compete with larger companies or networked companies from abroad. Thus although globalization and liberation politically look as a good approach for enhancing local economies by allowing foreign companies to operate in their countries, if not properly adopted and if SMEs are not politically supported to collaborate, their survival might at risk due to weak capital and capabilities to compete with stronger global companies.. The current policies of focusing on business stability in the developing economies are mostly influenced by large financial agencies and donor countries. On one hand, these policies might be focused to preparing better business environment for foreign companies and have little to do with operation of local SMEs. Therefore, policies need to be formulated to support the establishment of collaborative networks involving local SMEs and foster goodwill from foreign organizations.

b) Market related challenges

In relation to this category we can find challenges related to capital, capability and complexity of opportunities as discussed below:

• Capital consequences:

Most of business companies in developing economies do not have a strong capital base that can support them to capture majority of emerging business opportunities that are continuously becoming complex. Because of constant changes in business environment investment made for previous opportunities might not be useful for new opportunities. The new opportunities might

demand huge capital and expensive technology and skills for many of organizations in developing economies to cope.

• **Capability consequences:**

Considering the continuous advances in ICT technologies, production, order collection and provision of some services is moving towards online trends. These demand acquiring modern resources and keeping a large number of experts for every type of required knowledge. This might prove difficult for SMEs in developing countries such as Tanzania to build such a capability, but collaboration among these organizations might soften this challenge. This might enhance joint competition power of SMEs in the market.

• **Complexity of Emerging Opportunities**

The market and society continuously evolve to cope with the complexity of today's connected digital world. Similarly, customers are also continuously defining and providing complex opportunities in terms of the requirements they set such as those related to quality, delivery time, and amount of services. These requirements are becoming too complex for a single SME in developing economies to properly address and meet the customer demands. Jointly, SMEs can effectively handle such opportunities through collaboration.

c) Technological related challenges

The current world economy is a knowledge-based economy without borders, where competition now lies not only in acquiring business, but also in acquiring and owning technology for the purposes of communication, receiving customer orders and the delivery of products/services. Technology can play two roles: (1) facilitating collaborations among organizations in a collaborative consortium, acting as a communication infrastructure; and (2) applying in production for use as resources (e.g. machines, computers, etc.). Thus organizations possessing technologies, which thoroughly address these two technological roles, will be more prepared than others when it comes to competing for an opportunity. In relation to the technological aspects, expertise in specific technology, physical resources of the technology and required knowledge to use the technology is a very serious challenging to SMEs in developing economies.

d) Information-related challenges

To smoothly collaborate, organizations need to be well informed in every collaboration and opportunity aspect and to rationally trust each other as well as to properly analyze the risks associated with intended collaboration. Furthermore, information regarding the emerging opportunities needs to be harvested as quickly as possible in order to optimize the bidding process. These issues require gathering of information and providing the collected information to every actor in the collaborative network. Several opportunities related to customer coverage, raw material searching, knowledge acquisition, etc. exist in developing countries but the information flows poorly to the needy SMEs. Consequently, these SMEs are continuously facing challenges in their daily operations due to lack of relevant information. This challenge is well linked to the technology-related challenges.

e) Management-related challenges

The need for flexible and responsive organizations has been widely publicized in today's technologically enabled and competitive market. In order to support this flexibility, a shift needs to take place to new organizational structures and processes. Organizations in this century cannot remain static. They must constantly respond to dynamic environments. What is more, they must also learn to take a proactive stance, even creating changes. To be in a static mode may mean that organizations and particularly those in developing economies will be left eating the dust of their competitors when markets and technologies advance [Msanjila & Afsarmanesh, 2007].

The changes, uncertainties, and complexities that characterize today's greatest challenges in business and in particular in those performed in virtual world, also present challenges to managers at all levels. Responding to changes in external environments requires ever-vigilant managers. Managers must be flexible in order to effectively promote flexibility in their organizations. The necessary flexibilities include the flexibility to manage and compete for rewards, the ability to flexibly and collaboratively plan, flexibility in collaborative problem-solving, technological flexibility, and flexibility in addressing CN politics [Msanjila & Afsarmanesh, 2006]. These challenges might prove to be difficult for SMEs in developing countries and especially those countries that are not politically democratic as discussed earlier in (a).

f) Social related challenges

Social challenges may mainly relate to how the SMEs are trusted by the communities where they are operating. An accurate definition of social trust is difficult to establish. However, it has been

encapsulated as an ongoing motivation of social relations that form the basis for interactions. At the individual level, social trust can entail perceived honesty, objectivity, consistency, competency, and fairness; all of which foster relationships among individuals that must be maintained by the sustained fulfillment of these elements [Boslego, 2005]. A decision to trust on the basis of a social perspective has been described by several trust experts as a "risk judgment", which is a form of cooperation that has no immediate payoff or benefit, and one which involves a gamble that trusted parties will act as expected [Good, 1988]. Aspects of social trust are not universal, but vary across cultures, contexts, countries, and so on.

While people may trust their relatives, co-workers, classmates, friends, and even their friends' friends, the puzzle of social trust is the idea of trusting strangers. The difficulty a person encounters in trusting a stranger is similar to that which an organization faces when it needs to trust another completely unknown organization with which it has never previously interacted. The only basis on which social trust other organizations can be judged is that organization's social performance and status, which may be influenced by their ethnic or cultural group, the characteristics and values of the society in which they were registered and are currently operating, their past experiences and interactions, and - more broadly - the historical tradition of their society [Msanjila & Afsarmanesh, 2006].

4 The role of ICTs in collaboration among SMEs in developing economies

The main role of ICT in facilitating collaboration among SMEs in developing economies is to act as an infrastructure supporting interactions among involved actors. This addresses the establishment of a strong foundation for an ICT-independent infrastructure that supports the operation and interoperability of various tools and systems within the established CN environments. ICT infrastructure should also provide functional, organizational and technical services that fundamentally impact each enterprise, global consistency, and interoperability. Although such infrastructure is rarely found in developing countries such as those in Africa, SMEs in these countries that are aiming at joining and configuring collaborative networks must strive to acquire such infrastructure.

Owing to the heterogeneity of the Enterprise Applications and the dynamics of the business relations, the Enterprise Applications Integration in the form of the "federated model" has been the most suitable for traditional collaborations in Europe and America. However, CNs need to study and incorporate more efficient approaches that address short time impacts and new technological standards applicable in developing economies like those in Africa. Furthermore, the following series of questions are usually raised when establishing a business model: Who is the provider of services? What are the technical and commercial requirements? What is the product? What are the benefits for respective stakeholders of this product? What is the market and what is the marketing plan?

Developing economy qualified business models need to be addressed in order to identify the essential requirements for the approach - namely the essential modality of doing business and the essential cost/benefit plan - so that it may be accepted and that stakeholders are willing to pay for these services. The following aspects with respect to ICT-infrastructure need to be considered in order to address the technical and business model requirements:

- i)* The development of a reference architecture that covers different forms of collaboration (ad-hoc, mediated, pre-planned, etc.), the different stages of the collaboration life cycle (initiation, planning, operations, dissolution, etc.), and in order to be independent from the sector (industry, government, etc.), the application (supply chain, e-learning, etc.), the number of the organizations involved and the typology of the network (chain, ecosystem, etc.). In order to develop a comprehensive architecture in particular the following aspects were considered: (1) A framework for ICT technology-independent reference architecture for collaborative networks, (2) The foundation of interoperability principles derived from past R&D on VO, (3) Approaches for enterprise applications, integration and interoperability, (4) Semantic mediation over formats, protocols and models through multi-language differentiation mediation, (5) A base prototype infrastructure mapping the reference architecture to current / emerging technologies.
- ii)* The defining and devising of business models for the developed ICT infrastructure. The deployment and maintenance of ICT infrastructures require different approaches than the traditional ones and must consider the emerging business characteristics and nature of CNs. It addresses: (1) The elaboration of suitable business models and characterization of stakeholders in the "CN infrastructure" business, (2) Cost-efficient deployment methods for business models, and (3) Assessment models and methods for business achievements of the ICT infrastructure.
- iii)* A security framework based on an independent ICT infrastructure. Two aspects need to be addressed, which together contribute to the security framework: (1) Security by establishing trust between several partners that aim to collaborate in a certain business opportunity. What are the key criteria for assessing not only individual trust in a digital or virtual market, but also organizational trust? This aspect can be addressed in research as a technological aspect of trust and (2) Security by developing tools, technologies, digital signature, data encryption and private networks that can

protect knowledge, intellectual property or the competitiveness of the collaborative network and each contributor organization.

5 Collaborative networks in Tanzania and related establishment challenges

5.1 Collaborative networks in Tanzania

Below we present representative examples of collaborative networks operating in Tanzania. The information presented here was collected by visiting the network centers, online questionnaires, network websites, etc. A summary for each collaborative network is provided below.

(i) Small Industry Development Organization - SIDO

SIDO was established in October 1973 as a parastatal organization under now Ministry of Trade, Industry and Marketing of the Tanzanian government. Its objective is to develop the small industry sector in Tanzania. It aims at fulfilling a very wide range of functions, from policy formulation to direct support to industries, to hands-on involvement in the establishment of SMEs in both rural and urban areas. Some of the best-known and successfully activities that were performed through collaboration of member SMEs are the Industrial Estates, Technology Development Centers, Training cum Production Centers, hire purchase schemes for equipment, technology development, technology transfer through twinning arrangements and exchanges with industries in Europe and Asia, and direct marketing. These programmes were strongly supported by the Government and by foreign donors. In the context of a centrally planned economy, the virtual absence of a private sector, and an initially very low level of industrial activity, SIDO's efforts has made a key and well recognized contribution to the development of the country.

SIDO's role as the Government's instrument for small-scale industrialization had been redefined to respond to the political and economic changes. Although SIDO represents a successfully example case of collaborative networks in Tanzania but it had not stand by its own in terms of members capital and collaborative capital. It is still operating under support mainly from the Tanzania government. In addition to lacking suitable ICT infrastructure for collaboration and information management such as those related to competencies, knowledge and resources, SIDO lacks suitable collaborative business models that could push it towards stable and self sustained network. However, this deficiency can be turned into an asset by taking an advantage brought by ICTs solutions as well as if SIDO management and other stakeholders decide to reconfigure their CN to enhance operational effective. Whereas in past communication among key SIDO players was difficult, computer networks and particularly the internet have removed this constraint by enabling virtual communication among actors. Even though the mobile phones penetration in Tanzania is about 40%, field research has shown that majority of SIDO players have mobile phones which are used to foster the CN.

(ii) Tanzania Association of Tour Operators - TATO

TATO was established in 1983 to represent tour operators in Tanzania and provide a common and comprehensive stand and input for the government and in its institutions in matters pertaining to the formulation of tourism policy, plans and programs. Generally, the focus of the association is to pursue the interests of its members by providing advice and information to the government and its institutions on the formulation policies and legislation in relation to the tourism industry, with the aim of creating an environment for tour operators and other players that is conducive to the growth of tourism in Tanzania.

The association assists in providing members with free resources including on online toolkit provided by IBM for small businesses. The association also has carried out regular workshops and meetings on how to take advantage of the growing tourism industry in Tanzania. In order to ensure high standards of tourism services offered, the association provides accurate and timely information about travel related requirements and regulations. The members also benefit from access to access to new and international customer markets though the membership directory provided online. Generally, TATO aims to establish and maintain high quality and standards amongst its members and other tourism intermediaries, such as hotels, reserved areas, airlines and marine transport. Another key role supported by TATO is to assist members select others to form best team for a brokered opportunity. The TATO support this task by providing a broker organization with up-to-date information regarding each potential partner.

The effective and efficient functioning of the TATO depends heavily on the availability of required information and knowledge in the tourism sector. The information technology and communication (ICT) plays a significant role in supporting collaborative tourism operations in Tanzania. TATO has established a list of members and discussion forums in their website, which allows smooth communication and discussion among the tourism key players. The association also acts as a product quality guarantor to various SMEs who are the members. Of the nearly 350 licensed tour operators in Tanzania in 2008, 250 (87.5%) were members of TATO. The association is the only private organ which is a government-recognized representative for tour operators in Tanzania.

(iii) Tango – Tanzania network of NGO

The Tanzania Association of Non-Governmental Organizations (TANGO) is one of the largest and longest standing national umbrella organization serving the Tanzanian NGO community. It was founded in 1988. The coalition now has a membership of more than 500 NGOs and collaborating with 30 district and 6 regional generic NGO networks. As an umbrella body it is committed to promoting the well being of its constituency by acting as a unifying organ and mandated representative in advocating for transformation for the common good. [www.tango.or.tz]. Members of TANGO are known to collaborate in a variety of things. Prior onset of mobile telephony, it was reported that communication among the members was very slow and costly. However, with penetration rate of about 40% of mobile phones in Tanzania, members of TANGO confirm that now they can mobilize members quite fast and relatively inexpensively. One member of TANGO remarked that mobile phones have been a savior of their network because one can reach almost all members in a day. An easiest way was reported to be using a “viral” short message service (sms). This happens when one member sends a few text messages to close friends and request recipients to do likewise.

(iv) MVIWATA

MVIWATA (*Mtandao wa Vikundi vya Wakulima Tanzania*) is a farmers’ organization which unites small holder farmers in order to have a common voice in defense of economic, social, cultural and political interests of smallholder farmers. MVIWATA was founded in 1993, by 22 innovative farmers from Morogoro, Iringa, Kilimanjaro, Mbeya, Rukwa and Dodoma regions for the purpose of creating a farmer-to-farmer exchange forum [www.esaff.org/Tanzania/]. Members of MVIWATA as is a case with TANGO, evaluate onset of mobile phone technology as a boon of collaboration. Leaders of MVIWATA who are scattered all over Tanzania manage to stay in touch using mobile phones. This is because land fixed telephone penetration in Tanzania has remained at dismal 0.1% throughout.

(v) Tanzania Gender Networking Programme

Tanzania Gender Networking Programme (TGNP) is a non-governmental organization working in the civil society sector since 1993. It is an activist organization focusing on the practical promotion and application of gender equality, equity and women’s empowerment objectives through policy advocacy and mainstreaming of gender and pro-poor perspectives at all levels in the Tanzanian society and beyond [www.tgnp.org]. Among NSAs in Tanzania, TGNP are top users of ICTs in their collaboration activities. Apart from mobile phones, TGNP website is vibrant and replete with content on the network’s activities.

5.2 Community of Practice as VO

Virtual groups in Tanzania as represented by community of practice come in different formats and sizes. In this paper, an analysis of two groups is used to showcase the thesis. These groups are eThinkTankTz and Tanzanet.

(i)eThinkTankTz

Towards the end of 1990s a group of Tanzanians from various walks of life were concerned about the lack of coordination in information communication technologies (ICTs) as potential force in socioeconomic development. Efforts by a few pioneering members resulted in the formation of an eThinkTank forum which grew rapidly and by October 2001, the eThinkTankTz had grown to over 200 members, mostly senior executives and managers from a wide range of public and private organizations (and not only those specialized in ICT). Members were not only located in Tanzania, but included individuals in far-flung countries including South Africa, Namibia, Kenya, the United Kingdom, Canada, Japan, the United States of America, the Scandinavian countries, and others. Similarly, as part of a public-private-non-profit partnership with United Nations Development Programme (UNDP), the Government of Tanzania joined the membership. The objectives of the eThinkTank included to:

- Engage political leadership to give a mandate to the National ICT Council to deal with ICT at the national and international levels, and to drive policy changes.
- Represent a partnership of all key ICT stakeholders amongst the public, NGO, and private sectors.
- Be the national focal point for all matters involving ICTs in Tanzania, and act as a link with ICT focal points elsewhere.
- Safeguard Tanzania’s unique characteristics including its sovereignty, diversities, unity, culture, and social values in the globally networked world.
- Maintain a view of global and regional strategic perspectives to assure cross-border alignment of significant ICT initiatives and interdependencies.

Given the good representation of members, even before formal registration of eThinkTankTz, efforts to lobby the government paid dividend in 1999 when the Tanzania government abolished a value added

tax on computers and some of the allied equipment to encourage the acquisition of more ICTs facilities such as computer systems. It was also instrumental in formulating an ICT policy which was released in 2003 after an elaborate consultation with relevant stakeholders.

This virtual group has continued to be a force to be reckoned with as a number of issues on the socio-economic development of Tanzanian society are keenly being debated and to some extent these debates are informing policy making processes. In 2003 Tanzania endorsed its ICT Policy thanks to initiatives of eThinkTankTz [Kamuzora, 2009].

(ii) *Tanzanet*

This is one of the oldest virtual groups bringing Tanzanians and other interested subscribers from all parts of the world. It was formed in 1991 by Tanzanians studying abroad. The forum has continued to be a virtual Agora whereby subscribers assemble to exchange ideas and discuss thoroughly many local (Tanzanian) and international politics as well as other topical issues. The forum also runs a website (www.tanzanet.org) which features a number of news headlines. Since the forum is organized democratically, it has several functional committees, whereby the Network, Research and Development Committee is responsible of running backend services. Of these services include managing the mail server as well as maintaining the website. For a long period now the forum has deployed free source software to run its mailing system as well as the website. The mailing system is run on Mailman server client and the website is managed using a content management system known as Phpnuke. In order to access to daily news from Tanzania various strategies are implemented and the website carries dynamic news from one of the long time successful news website in Africa, www.allafrica.com.

5.3 Lessons from existing CN in Tanzania

Through the analysis of the existing collaborative networks in Tanzania the following are the lessons learned from that study:

- Most business focused collaborative networks do not have strong and well functional infrastructures to enable them to benefit from the advances in ICT.
- Most collaborative networks are government supported due to weak or outdated business models.
- Collaborative networks constitute members originating from the same domain of business or activities.
- Most online communities and networks are mostly non-business networks and are aimed at sharing social information or handling some political discussions.

5.4 Challenges facing collaborative networks in Tanzania

As it can be observed from the examples above, most successful cases of collaborative networks in Tanzania has the government hand in them. The crucial challenge that in fact requires government initiatives has been initial investment. Because most SMEs are unaware of the benefits of collaborative networks they present strong reluctance on investing in joint working until fruits are emerging. In addition to this challenge, the following are some other representative specific challenges in Tanzania [Kamuzora and Kamuzora, 2004]: (1) Lack of ICT infrastructure and supporting systems (2) Information culture dilemma, (3) Impact of *ujamaa* (African socialism), (4) Better foreign products, (5) Low level of formal education in the country, (6) Lack of start-up capital

6 Potentials on formulating collaborative networks in Tanzania

Potential class	Potential indicators	Description
Organizational potential	Existing of facilitative factors	Development agents are aware of importance of collaboration
	Political history and the Ujamaa	Positive path dependence of abhorring individualism
	Religion factors	Highly religious citizenry
Technological potential	Government initiatives towards ICT adoption	Various policies and political will geared to enhance adoption of ICTs.
	Advances in ICT technologies	Globalization facilitates advanced ICTs such as smart phones to penetrate critical number of users with ease
	Availability of ICT services	Still power problems are hindrance but green technologies promise some solutions
	Installation of fiber optical network	Roll out of national fiber backbone to district headquarters.

Capital potential	Cheap and availability of raw materials	ICTs can facilitate acquisition of knowledge and skills to add value to some raw materials. Similarly, the raw materials can be used to leverage cooperation with emerging economies such as China
	Cheap labor	Comparative advantage in ICTs based labor intensive activities
	Tax exemption for some ICT resources	Favorable tax regime on ICT resources as well as other foreign direct investment

7 Towards a model for establishing collaborative networks

For the purpose of capturing all necessary components towards establishing a model of collaborative networks in developing economy below we discuss four types of characteristics of the intended model.

a) *Structural characteristics*

The structural characteristics address the constituting elements of the collaborative networks, namely the involved actors and their relationships. This aspect also addresses the roles of each actor, which indicate the importance of the actor in the collaborative networks. In this aspect we have identified and categorized four types of actors depending on their roles:

- *Regular members*: These are actors joining the collaborative network to enhance their joint capital through collaborating with others to address larger business opportunity.
- *Administrator members*: These are also regular members, which have been appointed or selected to handle managerial and administration activities within the CN.
- *Customer members*: These are actors that become members of the collaborative network due to fact that they provide business opportunities for the regular members to respond.
- *Supporting members*: These are actors, which join the collaborative networks for the purpose of providing support services to regular members such as legal support, continuing education and training, etc.

b) *Componential characteristics*

This addresses those elements that either tangible or intangible but constitute and has a major influence on the successfully operation of the collaborative network. Such elements include different resources such as the human resources, software and hardware resources, as well as information and knowledge resources. The intangible aspect here refers to the fact that not all these elements are “physical” or tangible in a strict sense; in fact some are conceptual, e.g. the collected knowledge in the collaborative network. Nevertheless, these elements together represent the “things” or characteristics out of which the collaborative network is constituted.

c) *Interaction characteristics*

This addresses the aspects related to how the actors co-work within the collaborative network as well as how these actors behave. The “base operations” that are running within the collaborative network, and time-sequenced flows of executable operations (e.g. processes) may indicate the maturity and life phase of the collaborative network and thus need to be properly characterized. Furthermore, the behavior of actors indicates the management style of the interactions between those factors such as principles, policies, and governance rules that either drive or constrain their behavior. Included here are elements such as the principles of collaboration and rules of conduct, principles of trust, contracts, conflict resolutions, etc.

d) *Environmental characteristics*

A number of components need to be properly addressed to properly characterize the environment in which the collaborative network will be operating. Below we discuss some crucial indicators that need to be thoroughly considered.

• **Technological indicators:**

The emergence of collaborative networks is mostly catalyzed by the advances of information and communication technologies. Computer networks and the Internet is the key facilitator of the co-working and virtual collaboration which is the fundamental feature of the collaborative networks. Thus the availability of facilities for information and communication technology is very important for the configuration and operation of the collaborative network.

• **Social indicators:**

Issues related to interactions between the collaborative network and the society in general are captured by this dimension. Although this perspective can have a very broad scope, the idea is to model the impacts that the collaborative network has or potentially can have on the society, for example its impact on employment, economic sustainability of a given region, potential for attraction of new investments, as well as the constraints and facilitating elements (e.g. legal issues, public body decisions, education level) the society provides to the development of the collaborative network.

- **Capital indicators:**
Both individual actors' capital and the joint capital of all actors will indicate the health of the CN towards operating in the market. Although SMEs usually have relatively small capital to individually compete, but when they join their initiatives and appear to the market as one big entity they present a bigger capital enough to out-compete the bigger organizations.
- **Managerial indicators:**
The need for flexible and responsive organizations has been widely publicized in today's technologically-enabled and competitive market. In order to support this flexibility, a shift has taken place to new organizational structures and processes. Organizations in this century cannot remain static. They must constantly respond to dynamic environments. What is more, they must also learn to take a proactive stance, even creating changes. To be in a static mode may mean that organizations will be left eating the dust of their competitors when markets and technologies advance [Msanjila & Afsarmanesh, 2007]. The changes, uncertainties, and complexities that characterize today's greatest challenges in business and in particular in those performed in virtual world, also present challenges to managers at all levels. Responding to changes in external environments requires ever-vigilant managers. Managers must be flexible in order to effectively promote flexibility in their organizations. The necessary flexibilities include the flexibility to manage and compete for VBE rewards, the ability to flexibly and collaboratively plan, flexibility in collaborative problem solving, technological flexibility, and flexibility in addressing politics of the CN [Msanjila & Afsarmanesh, 2006].
- **Market indicators:**
Issues related to both the interactions with "customers", representing potential beneficiaries, and "competitors" are covered by the market indicators. Facets related to customers include elements such as the transactions and established commitments (contracts with customer), marketing and branding, etc. On the competitors' side issues such as market positioning, market strategy, policies, etc. can be considered. Also part of this dimension are the purpose / mission of the CN, its value proposition, joint identity, etc.

8 Conclusion

The paper has addressed the potential of applying collaborative networks in enhancing the collaborative capital and capability of SMEs and NSAs in developing economies. It has addressed the challenges ahead towards successfully configuring such networks. Some examples of collaborative networks that operate in Tanzanian society are described as a base of understanding the state of the art of collaborative networks in developing economies. Similarly, the paper has demonstrated how ICTs have facilitated existing forms of collaborative networks. On the major type of ICTs which is more applied in the network is mobile telephony. However, the paper observed that there is still a large gap towards realizing the configuration of effective collaborative networks in Tanzania particularly related to availability of required technologies and systems and lack of proper customized business models, among others.

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