Knowledge management and national information technology policy: the case of Ethiopia

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Abstract: The paper discusses the relationship among information, knowledge and technology management, with special emphasis on their applications in developing economies and how they relate to sustainable development. It also discusses the role of national Information Technology (IT) policy in providing enabling environments for Knowledge Management (KM) for sustainable development. Finally, the paper appraises a major national IT policy in an African country (Ethiopia) to further provide insight into the provision of enabling an environment that can lead to the process of KM for sustainable development.

1 Introduction

The economic development of a nation can be accelerated by improvements in a country's Information and Communication Technologies (ICTs) infrastructure. The explosion in technology which ushered in the information age is the basis for defining power in the modern world. Modern economy can only thrive with an integral Information Technology (IT) and telecommunications infrastructure. ICTs provides the platform for development across economic and other sectors. ICT is not only an enabler of broad based social and economic development of education, health and governance, but also key enabler of sustainable human development in a more general sense.

ICT represent an opportunity to address the challenges of development to reduce poverty by a combination of wealth and job creation, and building capacity within government and community organisations. The effect on poverty alleviation, however, is dependent on ICT being used according to local needs and circumstances. In order for local needs to be effectively expressed and managed, the skills and capacities of both individuals and institutions need to be developed to build on the potential benefits of improved information and knowledge transfer. The management of information is an increasing challenge as information multiplies when it is shared unlike other commodities (Ballantyne *et al.*, 2000).

It is this realisation of the importance of ICT to human and economic development that propelled the UN General Assembly through Resolution 56/183 on 21 December 2001 to endorse the World Summit on the Information Society (WSIS) held in Geneva in 2003 and Tunis in 2005. One of the objectives of the summits was to develop and foster a clear statement of political will and take concrete steps to establish the foundation of an Information Society in developing nations. The role of ICT in the world order is captured vividly in the declaration of principles issued at the end of the 2003 World Summit as follows:

> "we declare our common desire and commitment to build a people-centered, inclusive and development-oriented Information Society, where everyone can create, access, utilize and share information and knowledge, enabling individuals, communities and peoples to achieve their full potential in promoting their sustainable development and improving their quality of life, premised on the purposes and principles of the Charter of the United Nations and respecting fully and upholding the Universal Declaration of Human Rights." (WSIS, 2003)

In June 1997 the Global Knowledge Partnership sponsored the Global Knowledge 1997 conference, 'Knowledge for Development in the Information Age' in Toronto, Canada. The work of the Global Knowledge Partnership:

> "is rooted in the conviction that access to, and effective use of, knowledge and information are increasingly important factors in sustainable economic and social development for individuals, communities and nations; that the information revolution can be a positive force for empowering the world's poor; that effective action to assure the inclusion of the poorest individuals, communities and nations in the global information economy requires increased partnership and mutual learning among public, private and not-for-profit organizations." (Simmons, 2000)

The effective use of information and knowledge, however, depend on the availability of an efficient IT.

2 Literature review

There are several definitions of Knowledge Management (KM) in the literature. KM is defined as the process of creating, capturing and using knowledge to enhance organisational performance (Bassie, 1997). KM is about encouraging individuals to communicate their knowledge by creating environments and systems for capturing, organising and sharing knowledge (Martinez, 1998). KM is the management of the information, knowledge and experience available to an organisation – its creation, capture, storage, availability and utilisation – in order that organisational activities built on what is already known (Mayo, 1998). Apart from creation, capture and usage of knowledge, Mayo (1998) included availability and storage of knowledge in the definition. KM, then, is the process of capturing a (nation's) collective expertise wherever it resides, and distributing it to wherever it can help produce the biggest benefits (Blake, 1998).

KM is concerned with the exploitation and development of the knowledge assets of a country with a view to furthering the country's objectives (Ng and Li, 2003). The knowledge to be managed includes both explicit, documented knowledge, and tacit, subjective knowledge (Davenport and Prusak, 1998). A KM system can also be considered as a socio-technical system that has as its objective the management and sharing of knowledge to support achievement of organisational goals (Ng and Li, 2003). A KM system, by the above socio-technical definition, comprises the knowledge itself, sometimes referred to as the intellectual capital of the organisation, organisational attributes including intangibles such as culture, policies and procedures, as well as some form of electronic storage and retrieval system (Damodaran and Olphert, 2000).

Consistent with the interest in organisational knowledge and KM, researchers began promoting a class of information systems, referred to as KM systems. The objective is to support creation, transfer, and application of knowledge in organisations. Knowledge and KM are complex and multi-faceted concepts. Thus, effective development and implementation of the system requires a foundation in several rich literatures. Alavi and Leidner (2001) provide a review and interpretation of KM literatures in different fields, presenting a detailed process view of organisational KM with a focus on the potential role of IT in this process.

Prusak (2001) looks at the history of KM and offer insights into what KM means today and where it may be headed in the future. As access to information dramatically expands the value of the cognitive skills becomes greater. Today, knowledge components such as judgement, design, leadership, better decisions, persuasiveness, wit, innovation, aesthetics, and humour become more valuable than ever before. Information management developed during the 1970s and 1980s and is usually understood as a subset of the larger IT and information science world and has brought the most content and energy to KM. Information management is a body of thought and cases that focus on how information itself is managed, independent of the technologies that house and manipulate it (Prusak, 2001).

Knowledge is inextricably bound up with human cognition, and the management of knowledge occurs within an intricately structured social context. It is essential for those designing KM systems to consider the human and social factors at play in the production and use of knowledge (Thomas *et al*., 2001).

A key distinction made by the majority of knowledge practitioners is the reformation of Polany's distinction between tacit and explicit knowledge (Nonaka and Takeuchi, 1995). Tacit knowledge is often internalised and an individual may or may not be aware of what he knows. Explicit knowledge is what the individual holds in mental focus and can communicate to others. Tacit knowledge is what we know while explicit knowledge is codified knowledge such as data and reports.

Selected technologies that contribute to KM solutions can be reviewed using Nonaka's model of organisational knowledge creation as a framework (Nonaka and Takeuchi, 1995). The Nonaka model divides the knowledge creation processes into four categories: socialisation (tacit knowledge formation and communication), externalisation (formation of explicit knowledge from tacit knowledge), combination (use of explicit knowledge), and internalisation (formation of new tacit knowledge from explicit knowledge). Among these technologies now being applied in some KM solutions are those for electronic meetings, for text-based chat, for collaboration (both synchronous and asynchronous), for amassing judgements about quality, and for so-called expertise location. These technologies are in addition to those for handling documents, such as search and classification, which are already well established yet are still developing (Marwick, 2001).

There is the need for human understanding, personal context and for immediate utility of knowledge. KM begins when an organisation enables individuals to link their personal KM systems with organisational KM systems. Too often, KM is thought to be contained in sophisticated electronic networking software tools. This ignores the critical human factor. Personal KM skills are far more important than technical tools (Richardson, 2001).

IT has enormous advantages in easing the delivery of information around the world, as well as the central role of information in the new global economy. This means that IT will shape the dynamics of the new millennium. However, for most Third World countries, IT poses a danger to their fledging economies if technology is not implemented within a social context. Jimba (1999) discusses the theories of underdevelopment and applies them to IT in a Third World context. Mohamed *et al.* (2006) attempted to shed some light on the IT role and the hidden reasons that make knowledge prominently unreachable via IT within the framework of Stankosky's four KM pillars.

The role of ICT in KM causes considerable controversy (Hendriks, 2001). Ng and Li (2003) did a critical review the model of Hendriks and examine its suitability for the relationship of organisational KM and ICT. Some authors have stressed that technology, which is a part of KM, cannot make organisations more "knowledgeable" (Davenport and Prusak, 1998). Some authors suggested that an ICT-driven KM approach stresses only the codifiable, explicit aspects of knowledge while ignoring the tacit aspects. Much of the KM literature is biased towards a technological agenda and away from wider organisational issues, thereby ignoring social and behavioural factors (Hendriks, 2001).

The confusion on the role technology within the field of KM can lead to the danger that organisations could spend large amounts of time, money and other resources on inappropriate technology in support of their KM efforts. Moffett *et al*. (2004) presents the classification of KM technology tools under the headings of collaboration, content management and business intelligence and the tools used to clarify how KM technologies have been applied in organisations (Moffett *et al*., 2004).

In the trend of globalisation, a nation has to maintain effective KM with the assistance of relevant ICT so as to remain relevant and competitive. While the importance of physically transferring people is especially important for the cross-border transfer of knowledge and expertise, IT and advanced communication systems serve as the necessary environment (Bender and Fish, 2000).

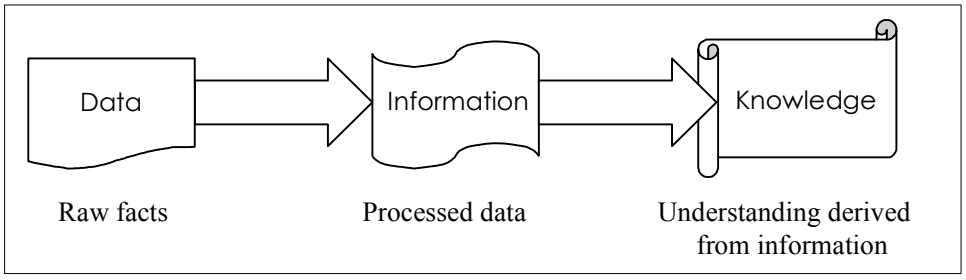
Buchwald (1995) compares historical tendencies in the creation of information policy in the three countries: the USA, the UK, and France. The content of policies in industrialised countries has typically been determined by each country's national perspective on economic, cultural and social issues. In the last two decades nations have experienced a shift from these more internally directed policies to policies reflecting external influences. A policy is a set or principles and strategies that guide a course of action for the achievement of a given goal. Policies may be developed at the organisational or institutional level or at the national, regional or international level. Policies are embodied in the policy instruments. Information policy is a broad area of public policy that governs all aspects of the information life cycle and its related activities (Buchwald, 1995).

3 Data, information and knowledge management

Data is the raw facts that need to be processed. Data can also be defined as the fundamental facts, figures, observations and the measurement, without context or organisation, while information is the processed data that have organised and interpreted, formatted, filtered, analysed and summarised. Information is used to obtain knowledge

which is an understanding or model about people, objects or events derived from information about them. Knowledge provides a structure for interpreting information by assimilating and explaining variations over time and space (Gordon and Gordon, 2004).

Figure 1 The relationship between data, information and knowledge



Information is intelligence or knowledge that contributes to the social, economic, cultural and political well being of society irrespective of the form it is encrypted; irrespective of the mode of dissemination and the social activity that gave rise to it and the institutions that organise and disseminate it (Montviloff, 1990). When data is processed, we have information. Knowledge can then be considered as a mixture of useful information collected over time based on experience and understanding. Information is the result of a human's interpretation of data. Data consists of largely arbitrary symbols.

Computer-based information management tools, such as information retrieval systems or information filtering systems, are effective as long as they are processing data. Knowledge can be represented by means of facts, rules, manuals, or best-practices descriptions, but these representations differ fundamentally from the knowledge that they are to represent. Similar to the step from data to information, the representation has to be interpreted by humans in order to 'regenerate' the knowledge, to put the knowledge into context, and to apply it when acting in a situation. Information must be put into context in order to be useful, and those contexts must be explicated, experimented with, and confirmed (Ehrlich and Cash, 1994). While management refers to the process of achieving organisational goals by planning, organising, leading and controlling organisational resources, KM is the identification, capture, systemisation, and dissemination of knowledge so that it can be used to improve the operation and efficiency of an organisation.

There is still no one universally accepted definition for KM. KM is concerned with the collection and dissemination of knowledge to the benefit of an organisation and its individuals. Knowledge is often seen as information with specific properties; information is viewed as a kind of preliminary stage to knowledge. Knowledge can also be defined as "information that is relevant, actionable, and based at least partially on experience" (Leonard and Sensiper, 1998).

The activities that characterise knowledge work have been termed KM processes (Bukowitz and Williams, 1999; Lai and Chu, 2000; Shin *et al*., 2001). There are four KM processes as described by Shin *et al.* (2001) applies:

1 *Knowledge creation/acquisition.* This involves knowledge addition, replacement, or correction of existing knowledge.

2 *Knowledge transfer/sharing.* This involves conveying and diffusing knowledge throughout an organisation to leverage the ways it can be used to solve problems and strengthen performance. Communication is a crucial element of knowledge sharing.

3 *Knowledge application/utilisation.* This relates to the deployment of knowledge for the benefit of the organisation, enabling members to use the knowledge they possess in practice and to establish the need for more.

4 *Knowledge storage.* Knowledge storage, organisation, and retrieval are the last KM process considered.

KM provides an integrated approach to identifying, capturing, retrieving, sharing, and evaluating enterprises information assets. These information assets include databases, documents, policies, procedures, as well as the tacit knowledge and experience stored in individual's heads. There is no evidence that KM, in all these respects, is any different from other management initiatives (Applegate *et al*., 1988). According to Lueg (2001), knowledge is often seen as information, with specific properties, which is viewed as a kind of preliminary stage to knowledge. This relationship of information and knowledge allows the application of computer-based information management techniques, such as information retrieval and information filtering, to the management of knowledge. KM can easily be adapted to describe what the related discipline 'information management' is about: the collection and dissemination of information to the benefit of an organisation and its individuals. Considering the similarity of concepts and definitions in KM and information management, it is tempting to assume that knowledge can be treated as similar to information (Lueg, 2001).

4 Information technology

IT allows effective and efficient management of information. IT eases communication among people and organisations. IT includes computer hardware, software, and database management systems and data communication technologies. Information systems are a combination of IT, data, procedures for processing data and the people who collect and use the data.

The role of IT in sharing knowledge has been debated greatly. Many investigators insisted that KM initiatives could be successful without using IT tools (McDermott and O'Dell, 2001), and IT should be adopted only when it is necessary. Others argued that IT is strategically essential for global reach when organisations are geographically distributed (Duffy, 2000). The KM conceptual framework developed by Stankosky and Baldanza (2000) has considered technology equally important as any of the other three pillars of KM, organisation, learning and leadership. These four pillars form the 'foundation' of any KM system. Without all of them in some kind of harmony, a KM system does not exist. Borghoff and Pareschi (1998) reported that the Nonaka and Takeuchi model tackles issues directly related to IT infrastructure.

Knowledge itself is an integral part of technology as explained by Perez-Bustamante (1999) who defines technology itself as any applied knowledge that fulfils market expectations or market needs. Linguistically technology refers to the combination of technical expertise and knowledge bases. Knowledge itself can be considered as a superior phase that is proceeded by data and information. Although there are differences on how knowledge and information or data are obtained, interpreted and managed, these differences do not offer a coherent rationale for alienating its role in KM.

If properly used IT can accelerate knowledge-sharing capabilities in both time and space dimensions. Locality, timing, and relevancy factors determine the expediency and the strength of IT's role in KM initiatives. On the other hand, due to the difficulty of incorporating most of human behaviour aspects in technology, IT cannot fully put into operation many of KM's humanistic features. The intermingling relationship and the balance between the four KM pillars are complex and unique to each environment. Too much emphasis on technology without incorporating the other critical elements could easily result in a failed system.

The role of IT in capturing tacit knowledge is as blurred as the definition of tacit knowledge itself. Many investigators identified different types of knowledge (Nonaka and Takeuchi, 1995). Choo (2000) classified knowledge into three categories: tacit knowledge, explicit knowledge, and cultural knowledge. Tacit knowledge is the personal knowledge used by individuals to perform their work and to make sense of their world. Earlier, Polanyi (1958) coined the term 'tacit knowledge' and distinguished between objective and tacit knowledge, with tacit knowledge as being highly individual, and achievable only through personal experience, but cannot be articulated. Therefore it cannot be managed and shared as explicit knowledge. McDermott (1999) describes the partial role of IT in the transformation of tacit to explicit knowledge. He reports that while the knowledge revolution is inspired by new information systems, it takes human systems to realise it. This is because knowledge involves thinking with information. If all what is accomplished is to increase the circulation of information, then only one of the components of knowledge shall be addressed. Once knowledge becomes explicit it can be stored in databases and manuals.

More specifically regarding IT's role, Baker *et al.* (1997) concludes that technology is the obvious solution to assist communication. Nevertheless, technology alone is not a solution as stated by Terrett (1998). The mere existence of a particular type of technology does not turn a knowledge-hoarding organisation into a knowledge-sharing one. Technology and cultural change must go hand-in-hand. Knowledge is human-driven and depends heavily on human relationships and community communication and interaction. The real challenge that faces IT evangelists and their role in KM is to revolutionise the strategic objectives to select, develop and employ the appropriate technology that better serves KM. This can only be achieved by a better understanding of what KM means and how IT can be aligned to support problem-solving or help in decision-making processes.

Cleveland (1990) described a world increasingly 'people-driven' as 'knowledge' becomes accessible globally. This transition is directly facilitated by IT, which also assists in overcoming the cultural and linguistic barriers. However, the degree of cultural acceptance to these technological advances varies from one organisation to another. When technology intensive cultures use technology as an effective tool for its operations, there is often no choice for a KM initiative but to use technology in that particular

environment. Stankosky and Baldanza (2000) has pursued this challenging philosophy. They reports that while the most cited major barriers to KM success is 'culture', the best approach is to work with the existing culture through various strategies.

Nonaka and Takeuchi (1995) argue that a successful KM programme needs to convert internalised tacit knowledge into explicit codified knowledge in order to share it. Such a programme must also permit individuals and groups to internalise and make personally meaningful, the codified knowledge they have retrieved from the KM system. The focus on codification and management of explicit knowledge has allowed KM practitioners to appropriate prior work in information management, leading to the frequent accusation that KM is simply a repackaged form of information management.

5 Technology and knowledge

Technology is the use of scientific knowledge in solving society's problems. Technology is often considered to be knowledge about techniques as well as principles underlying the physical hardware. Technology has five distinctive dimensions: hardware, software, live ware, system ware and innovation ware. The physical object which can be used and from which benefits accrue is the hardware while the set of instructions that controls it, is the software.

Technology development is made possible through the process of research and innovation. The innovation process is defined as the technical steps that lead to the marketing of new manufactured products and to the commercial use of new technical processes and equipment. Innovation is a complex social process; the crucial step is the commercial launch of a new system (Freeman, 1982). Innovation is different from invention that is an idea, model or blue print that has not been commercialised. Technological innovations take time, capital, consistent efforts and technical skills. It requires the use of local resources to take advantage of local opportunities but does not necessarily requires science of research and development laboratory.

The tacit knowledge that cannot be codified is in the heads of skilled operators and constitutes the live ware while the other systems with which the hardware maintains a complex system of interrelationships constitute the system ware. Technological knowledge is often tacit (*i.e.*, cannot be codified in the form of instructions) and it is often firm, process and products specific.

Historically, there have been a number of technologies 'enabling' or facilitating KM practices in the organisation, including expert systems, knowledge bases, various types of Information Management, document management systems and other IT systems supporting organisational knowledge. The advent of the internet brought with it further enabling technologies. Each enabling technology can expand the level of inquiry available to a citizen, while providing a platform to achieve specific goals or actions. Since its adoption by the mainstream population and business community, the internet has led to an increase in creative collaboration, learning and research, e-commerce, and instant information.

6 Africa and information technology

Information is regarded as a means and an essential pre-requisite to management and development ventures. Information can be used to improve the quality of life, economic productivity, and the management of the environment. Technology is revolutionising how people communicate, and transforming the way information is delivered to the users. The aim of the information superhighway is to impact access to information and freedom of expression and opinion.

Africa is lagging behind in the race to catch up with the information revolution. Africa does not seem to have the requisite national information infrastructures, and the knowledge and skills required to provide relevant content for them. For any African country to share in the information revolution there has to be an established national information infrastructures to connect people to one another, and to a vast array of information through integration of technology, humans, policies, and standards.

Alemna (1999) stresses the importance of New Information and Communication Technologies in Africa and provides an analysis of the opportunities and challenges facing African countries in their attempt to introduce and implement policies meant to encourage the use of these technologies. He concludes that while African countries in general acknowledge the importance of the information revolution, very little concrete action has been taken in this area. Information services play significant roles in securing sustainable development in the African continent. Sustainable development is defined as:

> "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and the future needs." (Brundtland Commission, 1987)

In most discussions of the digital divide, the emphasis is on assisting developing nations by facilitating the flow of information resources from the developed countries to the developing. The moral questions arising from the current state of information flow can be approached from an ethical perspective based on a specific moral framework. According to Britz and Lor (2003) these moral claims are:

- the right of freedom of access to information, the right of freedom of expression, and the right of individuals and groups to control the information they have generated
- the idea of a common good imposes an obligation to share information
- justice is the main tool that can be used to regulate the flow of information.

In relation to KM and developing nations, the exposition of Crouch *et al.* (2001) can be is modified to provide the following observations:

- Effective KM systems must have specific users who demand specific data to take decisions for which they are held accountable.
- Incentives in developing countries to use objective information tend to be weak. KM system users tend to contribute and use information when there are rewards for doing so.

- There is often an overestimation of the client demand for KM systems.
- KM system design tends to be burdened by unrealistic expectations about the degree of precision 'required' without taking into account precision's high costs.
- More information is collected than what can actually be analysed and applied toward decision-making.
- Effective systems tend to build-off of existing databases, taking advantage of current data collection routines.
- Most KM interventions, such as assessment, design, implementation, tend to focus on technical solutions and tend to overlook the organisational processes and institutional incentives that drive information use.
- Large-scale KM efforts require consensus. New information tends to create 'losers' who may actively resist implementation.
- KM systems tend to have the greatest impact on planning and policy support.

Most countries of sub-Saharan Africa are often referred to as "information have-nots" (Arunachalam, 1998) and Africa is considered as "the 'lost continent' of information technology" (Odedra *et al.*, 1993). Literature on the impact of ICT in developing countries portrays ICT as generally supportive of the development process by making information and knowledge more accessible and more directly useful in many applications (Bhatnagar, 2000; Jimba and Atinmo, 2000). The role of ICTs is considered crucial to the provision of people's basic needs, such as healthcare, food, and shelter, both in emergency situations and in the longer term, directly in social economic terms and indirectly by enabling research activities (Avgerou, 1998).

The implementation of computer networks in sub-Saharan Africa has been slowed by various infrastructural issues, which also curtail the possible benefits of ICTs (Barata *et al.*, 2001; Darley, 2001). In sub-Saharan Africa, as of 2001, there were only 16 phone lines for every 1000 inhabitants, compared to 583 phone lines in high-income countries (ITU, 1999).

Ali (1989) examines various methods for the dissemination of science and technology information in developing countries. The importance of science and technology in the formation in technological advancement and research and development is obvious. Science and technology contributes directly to the economic development of a country. Scientists and technologists cannot function properly without having access to up-to-date information in their respective fields. The bulk of such information is being generated in developed countries. Providing access to this information for scientists and technologists working in the developing countries, no doubt is a challenging task. For knowledge and IT for sustainable development in Africa, countries must have veritable IT policies.

7 ICT policy for sustainable development

The demand for public policy decisions around national and international information and IT issues in industrialised countries has accompanied the political and technological changes of the 20th century. While countries such as the USA, the UK, France and Canada confront many of the same information issues (*e.g.*, competitiveness, universal

access, data protection, sovereignty), each country has approached policy from its own cultural perspective, tempered by external influences (Buchwald, 1995). Public policy in the realm of information, referred to as 'information policy', is defined by information scientist Hernon (1989) as:

> "a set of laws, regulations, directives, statements, and judicial interpretations that direct and manage the life cycle of information. That life cycle encompasses planning, and the creation, production, collection, distribution and dissemination, and retrieval of information."

According to Montviloff (1990) information policies provide guidance for the design of strategies for the development and for the use of information resources, services and systems. An information policy can be formulated at the institutional, national, regional or international level. Previously distinct policy areas related to information are merging as technologies converge and the scope of information policy encompasses telecommunications, broadcasting, satellite and other information technologies. At the national level, information policy has not represented a cohesive body, such as a national information policy, in any industrialised country. In theory, proponents of a national information policy believe that it would convey 'a sense of national purpose' through 'guiding principles' that 'integrate local, state, regional, and national government information' and maintain policy jurisdiction over government and relevant nongovernmental information (Hernon, 1989). It is believed that cohesive information policy would strengthen a country's position when negotiating policies in the international arena.

The role of ICT policies is to provide a strategic policy framework for the acquisition and use of IT for social and economic impact. In order to be effective policies on IT should be harmonised and integrated with other socioeconomic policies for national development. The main objective of national ICT policy is to cost-effectively acquire and optimally use informatics to process information as an integral factor in all sectors of national development. The possession and use of knowledge are, without doubt, essential ingredients for national progress. Information, the communicable form of knowledge, especially scientific and technological information, is one of the main prerequisites for economic and social development. This means that the free flow of scientific and technological information and its assimilation are essential preconditions for progress in developing countries. The use of IT in national planning should not be viewed as merely supportive of decision-making processes. Use of information is integral to decision-making processes; information is the decision-making process. Collective and applied information is the development process (Dosa, 1990). Dosa (1990) makes the point that "collective and applied information is the expression of a society". On this basis each decision maker is an information processor and producer. Furthermore, information processing is not distinguishable from information generation and transmission (Ali-Dinar, 2007). There is so much evidence of poverty globally in the midst of such technology development and innovation. Closing these gaps requires creative pro-people policies that focus on national priorities. Most countries therefore develop national ICT policies in recognition of the enormous potential of ICT. To avoid being left behind, several nations develop such ICT policies addressing several core issues for keying into the benefits of an ICT-driven world. Lack of a coherent and comprehensive policy often leads to redundancy, waste of resources, ineffective ICT diffusion and development and an inability to tap into global opportunities.

There is therefore the need for a comprehensive IT policy by any country that aspires to be part of the information age. An integrated national IT policy should have components covering:

- the acquisition and/or development of the technology
- the development of human resources and their use including informatics in the academic system
- the establishment of a telecommunications infrastructure
- the storage and use of data in private and public sector databases
- the protection of intellectual property rights.

Specifically, a typical ICT policy should address:

- *Development of ICT infrastructure*: Public-Private-Partnership, telecom infrastructure, internet connectivity, pro-poor internet access, ICT networks, computers and related equipment, *etc*. Access to infrastructure should lead to access to relevant content and services.
- *Enabling environment*: An enabling environment is critical for the Information Society. Such an environment provides support for ICT empowerment while eliminating constraints. Legal, institutional and regulatory framework is required to ensure fair competition; to attract investment; to develop ICT infrastructure, solutions and applications; to provide tax and other incentives for ICT industry and investors; to support transfer of technology; to meet the needs, priorities, aspirations of various stakeholders; to provide legal infrastructure for intellectual property protection, digital contracting, privacy and data protection, and cyber crime.
- *E-government*: E-governance is for transparency in government operations, improving the quality of government's service delivery, improving efficiency, accountability, financial management, information management, reducing bureaucracy, and delivery of public services in healthcare, education and environment. It also affects the enhancement of government ICT infrastructure.
- *Development and growth of the ICT industry*: The policy should facilitate the development of a local ICT industry that will reduce import dependence and enhance export opportunities. The ICT industry should enable employment generation and wealth creation through the production, manufacturing, development, delivery, and distribution of ICT products and services.
- *ICT diffusion and increased ICT literacy*: Policies will deal with ICT diffusion, and ICT literacy, and awareness of the benefits of ICT, the creation of new economic and social opportunities for poverty eradication, job creation and empowerment.
- *Human resource development*: Knowledge creation and the ability to translate ICT skills and knowledge to the benefit of society are critical. A country's future is determined by the size and quality of its human capital. ICT skills are required for empowerment to enhance value and create opportunity through new technologies. Human capital must be developed through training, research and capacity building. Fundamental ICT skills are needed especially for creative problem solving and innovative solutions.

- *E-commerce*: This deals with policies that should facilitate various aspects of e-business such as e-payments, e-commerce, secure transactions and the appropriate legislation. Rapid development of Business-to-Consumer (B2C), Business-to-Business (B2B) and Business-to-Government (B2G) e-business should be promoted. E-business is particularly important for using ICTs for the promotion and development of small and medium size enterprises.
- *Role of the private sector*: Policies should address how public-private partnership initiatives can be effective. It is particularly important for these initiatives to provide, support and use the information infrastructure, to encourage the deployment and use of ICT within the economy and society.
- *Gender issues*: There is a need for policies to address the issue of equal access of women to ICT. The policies should be gender sensitive.

Policy makers and stakeholders recognise that IT is a strategic imperative for development. Developing nations therefore resolve to commit part of their national resources for the realisation of an IT vision statement. Many developing nations in Africa had therefore formulated National IT policies. We discuss the objectives of a major national IT policy in Africa.

8 Ethiopian national IT policy

The basic principles upon which the Ethiopian National Policy on Information Systems and Services (NPISS) is based are the following:

- that information is an economic resource like any other resources with its own value and cost of production and that it should be managed and developed like other economic resources
- that information has a defined life cycle, from its generation, through collection (acquisition), processing to disposition and that decisions about each phase of the cycle have implications for the other segments of the life cycle
- that NPISS should be an integral part of a National Development Plan and that because of its (information) versatile nature, information and related plans and strategies are embodied in development plans
- that the size and diversity of information activities mean that accountability for and management of information resources must follow a suitable operational mechanism
- that apart from giving information services to its users at national level, the role of central management and oversight bodies should be examining major or precedent-sifting initiatives and investment decisions; addressing common government-wide problems; and creating positive incentives for effective management of information resources
- that the quality and availability of information manpower is a determining factor to the quality of information service in a nation and it is in the interest of the government to develop national capability in the training of information practitioners

- that it is generally in the interest of the government and as well as the public to exploit the economies and efficiencies available through the use of modern information processing and transmission technologies
- that national self sufficiency in regards with total availability of information in the modern world is neither possible nor desirable anywhere in view of the volume and cost of information and published records. And that resource sharing would ensure the harnessing of the information resources not only within a nation but also those of the regions in which a country is located, and indeed of the whole world.

9 The scope of the policy

The NPISS covers the different aspects of the provision of information services to various user groups of the society. In addition to this, it also comprises manpower development and building up of the necessary infrastructures and ensuring continuous and adequate funding. The NPISS has been given wider scope so as to cover the various aspects of information activities. The activities of information and documentation covered extend from generation, through collection and processing to the dissemination of information, and the resources involved in them.

In the policy formulation process, policy objectives are used as a guide to every strategic and tactical planning to be made. In setting the objectives, the major principles of information which indicate the importance and application of information for scientific and technical, social, economic and/or political activities of a nation must be considered.

From the point of view of an economic resource, one of the basic principles of information is that information is an economic resource, like other resources, with value and cost of production and it must be managed like other economic resources. Based on this principle, objectives can be set for the management of information resources. There are four basic inputs as the basis for information policy objectives. These are:

1 institutional machinery (organisational framework)

2 manpower

3 physical facilities, processes and utilisation

4 finance/funding.

The following policy objectives may be stated, considering the basic principles of information and the basic inputs to the policy objectives, to fulfil the need for the efficient management and utilisation of information resources of the country.

10 General policy objectives

- To establish and strengthen structures and mechanisms for planning, budgeting, coordination, management and promotion of the national information and documentation activities, ensuring the smooth growth of the institutional infrastructure for information and documentation, devise a legislative machinery to provide for and promote a coordinate development of information resources.

- To develop the gathering or collection, generation, processing and analysing information and monitoring the development of national information and documentation activities.
- To optimise the human, financial, institutional and other information resources for achieving the information support requirements of research and development communities, planers and decision-makers, *etc*.
- To develop national capabilities to utilise ICTs and channels for collection, generation, communication and dissemination of information; and also to conduct research in the field.

Specifically the objectives are:

- To develop a system, whereby appropriate coordination and cooperation of the various institutions and organisations that are involved in information related activities, is affected and sharing of resources is made possible.
- To develop information manpower of all categories required to meet the ever-increasing demand for skilled personnel that shall ensure effective management of the country's information resources and services.
- To encourage and promote the indigenous capability of generating information in all fields of knowledge and ensure support for the creation of conducive conditions for generators (original or translation) and the development of infrastructure.
- To develop an appropriate mechanism to acquire or collect data/information in all fields that supports the national effort for development.
- To improve the existing or develop new system of information organisation and storage to facilitate the retrieval of information generated from many fields.
- To provide appropriate information services which would support the national economic development efforts in general and R&D, technology transfer, extension services, *etc*., in particular by developing internal collection and accessing a wide range of information sources through the development of information networks.
- To information and documentation units with the necessary equipment and facilities that will facilitate the prepare management of information resources and improve the quality of information services.
- To develop, acquire and adopt standard information processing procedures, norms, formats and facilities to be used at all levels of information processing activities.
- To prepare and implement a plan of action for establishing a national information network based on both manual and electronic means for exchange of data and information.
- To promote and develop indigenous capability of producing new ideas, methods and techniques through research and development which can suit local conditions and solve domestic problems, and to create professional satisfaction for people in the field of information.

11 Conclusion

African countries that seek to have a comprehensive KM system in place must adapt these activities. ICTs are increasingly playing a crucial role in developing countries' capacities to produce, to provide access and apply information, and thereby to enhance the process of acquisition and sharing of knowledge (Morales-Gomez and Melesse, 1998). For African countries, it is important to have a coherent and systematic information strategy as a tool for donor agencies to respond to the information needs of developing countries. Akhtar and Melesse (1994) give an account of the history of the development of an information strategy for Africa and a consultative process that allowed the Africans themselves to assess their information problems and prioritise their needs.

The efforts of Ethiopia in having solid foundations for information and KM are noteworthy. To this end, 'The Ethiopia in the Knowledge Age' conference was held from 18–20 June 2001 in Addis Ababa. The aim of the conference was to develop an IT vision for Ethiopia and to continue a policy dialogue between major Ethiopian stakeholders for a coherent national ICT policy. In addition, the National Information and Communications Infrastructure Framework Study Task Force was set up in the Office of the Prime Minister of Ethiopia to indicate directions and approach for the establishment and implementation of an integrated, comprehensive and effective National Information and Communication Infrastructure Framework (NICIF, 1999). The document produced stressed the need for an adequate ICT national policy, rules and regulations. There is no literature describing how successful is Ethiopia in the implementations of its IT policy. A future study is needed to investigate the success or failure of the implementations of the national IT policy of Ethiopia or other African countries. These successes shall be measured in greater length on how these policies contribute to sustainable development in the countries.

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