

**Employing knowledge networks as tools for the
development of Caribbean Small Island developing
States**

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UNITED NATIONS



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Abstract

Expertise, skills, experiences, understandings and capabilities (knowledge) aid development, not just by informing decision-making, but also by providing ideas for actions and activities that can be taken. Due to their size, and economic and environmental vulnerabilities, Caribbean Small Island developing States (SIDS) faces special challenges when working towards their economic, social and environmental development goals. These challenges have contributed to the creation of knowledge gaps, and that which is already available is located in isolated pockets, throughout the Caribbean. Migration of skilled persons compounds the issue, thereby removing much needed knowledge to beyond the traditional borders of the Caribbean. It is necessary to find ways to connect these dispersed knowledge resources. Knowledge networks are tools that can connect the existing skills, expertise, experiences and understandings accessible and create new ones to move towards greater development in the Caribbean.

The purpose of this paper is to explore and highlight the role that knowledge networks can play as an aid in the development of Caribbean SIDS. It offers, with Caribbean examples, definitions and discussions of the components, types, and the advantages and disadvantages they hold for the subregion. The paper goes further to provide some ideas on assembling and analysing the different types of knowledge networks. It concludes with a few recommendations geared toward improving the availability of knowledge in the Caribbean.

I. Introduction

Building and sharing knowledge makes it possible not only for individuals to improve their own circumstances, but also for governments and other organisations working towards the development of countries and people to improve their products and services and so achieve their development goals. Knowledge can aid development because it reveals opportunities that were not considered before (World Bank, 1998, ©2007).

In order for knowledge to be used in the development of people and countries it is necessary to advance the accessibility of available skills, experiences, understanding and capabilities, and establish opportunities to create more. This is specifically true for Small Island developing States (SIDS) in general and the Caribbean in particular as development of these states faces special challenges pertaining to their size, and economic and environmental vulnerabilities. Small islands possess small populations and limited resources, such as experts in specialised fields. They are dependent on international trade and vulnerable to external shocks due to limited diversity in production and export. These countries are extremely susceptible to natural disasters such as floods, earthquakes, hurricanes and tropical storms (ECLAC, 2010a).

Small populations and *brain drain*¹ have created a lack of or limited capacity in specialised knowledge, needed for development of the Caribbean. The experience and expertise that remain in these countries has not been effectively harnessed and considered to give greatest impact in the interest of the subregion.

A tool, such as a knowledge network that makes it possible to connect all sources of knowledge, should therefore be employed to ensure that this intangible resource is harnessed to achieve development goals of individuals, countries and the subregion (UNIDO, ©2011). Employing knowledge networks would enable the:

- a) Bringing together of technical and specialised skills and expertise required, to provide solutions for the challenges being faced by all countries in the Caribbean;
- b) Harnessing of technical and specialised knowledge located beyond the borders of the Caribbean in other SIDS and other countries, developing and developed. Learning from these countries, presents an opportunity for Caribbean SIDS to gain new knowledge that can be employed in the subregion, without having to “reinvent the wheel” and in doing

¹ Brain drain is the loss of expertise due to the exodus of skilled citizens to other countries

so move their own development forward (World Bank, 1998). Learning from others, will provide the Caribbean with more skills, knowledge and understandings that could be used to find solutions to questions in other areas; and

- c) Engagement of end-users and local communities, holding *indigenous knowledge*², as a part of the design and implementation of development, strategies, programmes and plans. In order for knowledge to effectively impact on development it must be applied within the local context. It is therefore essential to understand the economic, social and environmental backdrop of a country, and the cultural norms and traditions that underpin its society (World Bank, 1998). The Caribbean Diaspora could be very important in developing policies, strategies and plans to advance development in the subregion as they have the unique perspective of having knowledge from both the Caribbean and other parts of the world. This can be very useful in developing Caribbean solutions to development questions and challenges.

The potential positive impact of knowledge networks on development, is however not the only motivation for using this tool in the Caribbean. Employing knowledge networks that rely on the collaboration of government with civil society and the general public provide role players with a sense of importance and usefulness, because they feel that their opinion and ideas matter, that they can affect the general development programmes of their country, and have better control over their own individual development. Networks, therefore, have the potential to aid trust-building between the role players, needed to drive the development of the Caribbean.

The knowledge gained through membership in a knowledge network would be employed by Caribbean-based organizations in their daily activities and result in the creation of better products and processes. Through knowledge networks it is therefore possible to strengthen local industries and communities. The improvement of industries and communities will increase their economic success which, in turn, will positively impact both economic and social development of their country.

Since 1992, the importance of information and knowledge for the general development of SIDS has been established by including them in three development instruments adopted to guide SIDS, namely “Earth Summit: Agenda21: United Nations Plan of Action from Rio” (United Nations, 1993), the “Programme for Action for the Sustainable Development of Small Island Developing States” (United Nations, 1994), and “Mauritius Strategy for the Further Implementation of the Programme of Action for Sustainable Development of Small Islands Developing States” (United Nations, 2005) (see text box 1).

The implementation of measures to enable information-exchange and technology transfer are identified as underlying conditions for all suggested strategies, plans and measures at national, regional and international levels to further the development of SIDS. The availability of data and the simple sharing of information is however not the only intended outcome of these programmes and strategies. The overall goal is to improve the capacity of these small islands to mitigate their challenges and so advance their sustainable development. In order to achieve this goal, knowledge, and more specifically the creation, transfer and application of knowledge, is necessary.

It is clear that knowledge has a definite role in furthering the development of the Caribbean. It is also clear that the availability thereof must be ensured for it to be useful, and therefore a tool is needed. A knowledge network provides such a tool.

² Indigenous knowledge can also be referred to as local or traditional knowledge. This type of knowledge is inherently part of the heritage of a country, carried forward in storytelling and trade or craft taught from parents to children. It is therefore knowledge created by local people, based on local observations, studies and investigations and is held as truths by the people of a country. An example is fishermen that know where and when the big schools will be, or the farmers that determined it is necessary to rotate the type of crops planted according to season allowing the field to recuperate. This type of knowledge is often lost, as it becomes an inherent part of society, not requiring a second thought, or as it is displaced by more popular theories or scientific findings.

TEXT BOX 1: BACKGROUND ON INFORMATION AND THE SUSTAINABLE DEVELOPMENT GOALS OF SIDS

In 1992, during the United Nations Conference on Environment and Development, held in Rio de Janeiro from 3–14 June, Small Island Developing States (SIDS), such as the countries of the Caribbean, were identified, for the first time, as vulnerable and economically disadvantaged due to their small size, limited resources and isolation from markets. The conference highlighted the need for specialised planning to meet these challenges and ensure sustainable development of Small Island States.

The conference outcome was a plan for development that became commonly known as Agenda 21, in which areas in need of development were highlighted. Agenda 21 encouraged the strengthening of information-exchange at international, regional and subregional levels in order to share and monitor achievements in sustainable development. It also suggested that new technologies that could increase the output and range of capability of the limited human resources should be implemented and that existing island databases be expanded and adapted to meet the special characteristics of islands. It also speaks of the use of traditional knowledge to build capacity and the use of indigenous coastal populations to raise awareness.

In 1994, the Global Conference on the Sustainable Development of Small Island Developing States held in Bridgetown from 26 April to 6 May, concluded with the adoption of the “Programme for Action for the Sustainable Development of Small Island Developing States”. It reiterated and expanded on Agenda 21 in the area of information by stating that information sharing and exchange of experiences as well as technology transfer, at the subregional level, is necessary for the advancement of sustainable development in SIDS. It also names the importance of cultural heritage as well as the sharing of experiences

In 2005, the “Mauritius Strategy for the Further Implementation of the Programme of Action for Sustainable Development of Small Islands Developing States” was developed and ratified. The strategy recognises the importance of information, but also expands the focus to include a section entitled “Knowledge management and information for decision-making”, specifically mentioning the provision of the correct information and statistical data in order to inform decision making in the subregion.

The importance of knowledge for the continued economic, social and environmental development of Caribbean Small Island Developing States is evident in analysing the goals set out in these three development instruments mentioned above. The acquisition, creation and application of knowledge should therefore be included in the plans formulated to achieve greater development of the Caribbean.

Sources:

United Nations (2005), *Report of the International Meeting to Review the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States* (A/CONF.207/11), Port Louis, Mauritius, January 2005, New York, United Nations publication, Sales No. E.05.II.A.4.

United Nations (1994), *Report of the Global Conference on the Sustainable Development of Small Island Developing States* (A/CONF.167/9), Bridgetown, Barbados, 26 April-6 May 1994, New York, United Nations publication, Sales No. 94.1.18.

United Nations (1993), *Report of the United Nations Conference on Environment and Development: Volume II: Proceedings of the Conference* (A/CONF.151/26/Rev.1 (Vol. II)), Rio de Janeiro, 3–14 June 1992, New York, United Nations publication, Sales No. E.93.I.8.

The following chapters will explore knowledge networks as a tool to aid in the development of Caribbean SIDS. Chapter II discusses knowledge networks, specifically their definition, components, formal and informal types, as well as the advantages and disadvantages they hold for the Caribbean by first clarifying what knowledge is and how it differs from data and information as all these concepts play a role in knowledge networks. Chapter III focuses on how to build and/or manage knowledge networks in the Caribbean by providing some ideas on how to assemble a formal knowledge network and how to positively influence an informal knowledge network. The chapter concludes with a discussion on some barriers that might be experienced when building or managing a knowledge network. Chapter IV concludes the study. Some recommendations are also provided as suggestions on how to improve the availability of knowledge within the Caribbean by employing knowledge networks.

II. Understanding knowledge networks

The role that knowledge can play in development of Caribbean SIDS can only be achieved by making the knowledge available to those who require it. In order to make it available or accessible, it is first necessary to understand what the concept entails, so that this resource can be correctly identified. Secondly, it is necessary to identify and implement tools that will enable access to knowledge. As the knowledge, necessary for development of Caribbean SIDS, is spread-out over all islands, a tool that would make it possible to harness all sources of knowledge across the subregion, and beyond should be identified.

This chapter will focus on knowledge networks; firstly, an understanding of what knowledge will be provided and continue on to defining and recognising knowledge networks. As information and communication technologies (ICT) have an important impact on these networks, some attention is given to ICT issues. The chapter ends with a discussion of the advantages that can be gained and the disadvantages experienced in using knowledge networks.

A. Distinguishing between data, information and knowledge

In the field of knowledge there is little consensus on the definition of not only knowledge, but also data and information. A reason for this could possibly be that it is defined from the discipline that is studying it, such as library science, knowledge management, information management, communications theory, information systems and organization science (Rowley, 2007). As the focus of these fields is different so is the viewpoint from which they define these concepts.

There is, however, a general agreement with regard to these concepts and their relationship to each other and that is that data becomes information, information becomes knowledge and knowledge gives rise to wisdom, therefore each is defined in terms of the one lying on the level directly below it (Rowley, 2007). Taking this into consideration, the concepts are defined as follows:

- i) Data is facts, observations or statements, it is unorganized and unprocessed, and it has no context and therefore no meaning by itself. An example of data would be data collected in a survey and placed in a spreadsheet.
- ii) Information is structured and organized data that has meaning. It obtains this meaning through a “relational connection” that makes the data relevant for a specific purpose or context. Thus it is meaningful, valuable, useful and relevant. An example of information would be a graphical representation, such as a bar chart, that is produced from the data held in the spreadsheet.
- iii) Knowledge is a combination of data and information that leads to understanding, skills, capabilities, experiences and values. It is intangible and considered a valuable asset that

assists in the decision making processes and the solution of problems as it infuses analytical abilities. An example of knowledge would be the understanding that is inferred from the graphical presentation that some economic trends repeat themselves every 10 to 20 years.

- iv) Wisdom is dependent on all previous levels of the hierarchy. It is the ability to call upon all amassed data, information and knowledge that provides foresight to act critically in any situation while holding true to the ethical aspects of what is right and what is wrong. An example of this would be to take the knowledge of repeating economic trends and other knowledge about economic climates and industries, and plan toward the next occurrence that will ensure that when the trends appear in the economy the economic impact would be minimised. True wisdom, in this case, will not only be to have the foresight to mitigate possible future economic conditions, but to have the understanding that knowledge of the processes used could be applied in other areas such as social development (Allee, 2000; Bellinger, ©2004; Johnson, 2011; Leonard & Sensiper, 1998; Rowley, 2007).

It is important to remember that the lines between these terms are at best blurred, and that to a certain extent, as much as “mastering” of one leads to another, it is likely that the higher levels could imprint on the lower levels, leading to more data, information, knowledge and wisdom. As the processes involved in moving from one level to another is also decidedly human in nature, the receiver of the data and information will decide what to categorise it as, based on the knowledge that they already possess (Rowley, 2007).

Understanding what the term knowledge entails make it possible to identify skills, experiences, capabilities, values, traditions and understandings inherent to the Caribbean as well as those of importance to the subregion that lies beyond its borders.

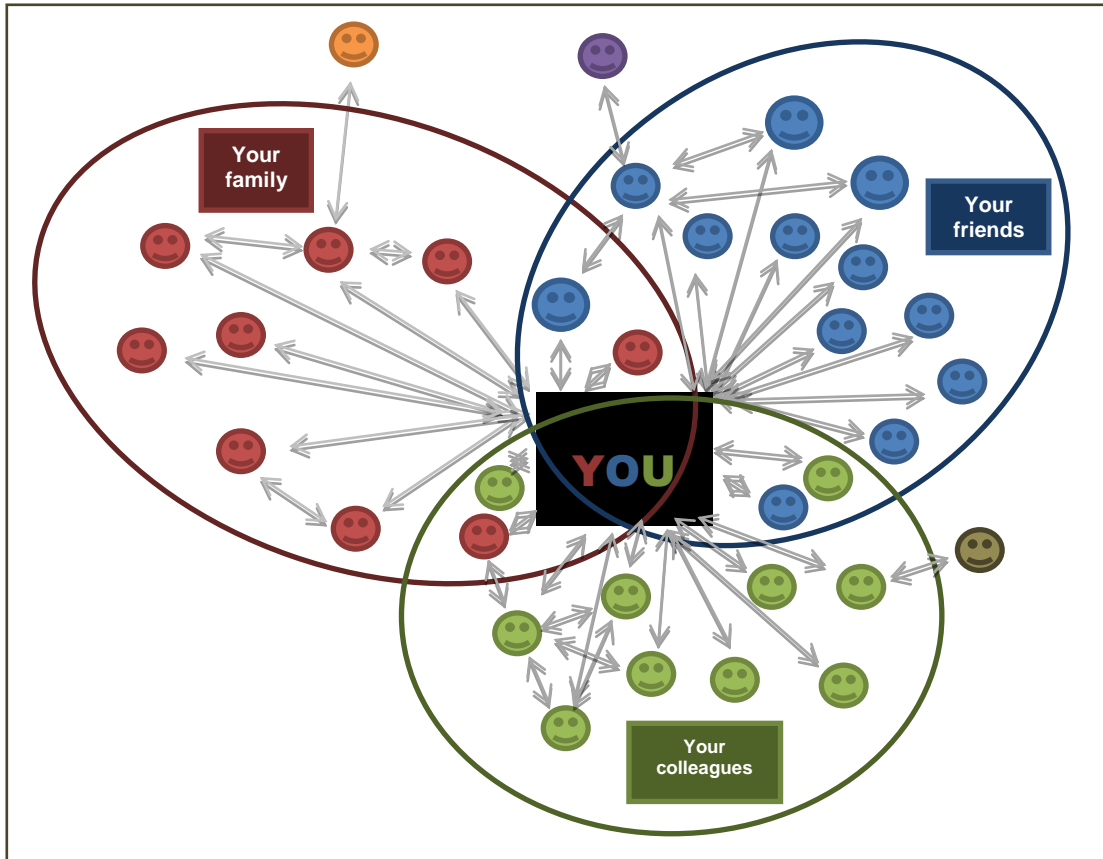
However, knowing what knowledge is needed is not enough to make it available. It is necessary to make use of tools that will firstly ensure availability when and where it is needed and secondly, enable the creation of more knowledge. A tool, such as a knowledge network, is specifically useful within the Caribbean. Knowledge required for development of the subregion is not only spread throughout the island States, but could also very well exist within other small developing states as well as in the Caribbean Diaspora. Through knowledge networks it is possible to make all of these needed sources of knowledge available to be applied in the development of Caribbean SIDS.

B. Definition and components of knowledge networks

The development of information and communication technologies pushed networks to the forefront by making it easier to connect to information repositories, people and knowledge. The term “networking” is often used by individuals, and refers merely to the fact that they are communicating back and forth with another person, this can be face to face, via electronic media or a combination of both (Clark, ©1998). Networking can be as simple as sharing a business card or as complex as collaborating on research.

There are various forms of networks, such as information networks, computer networks, communication networks and knowledge networks. Some involve people and others are only connected systems. In the simplest form the representation of a knowledge network consists of nodes and lines between the nodes. The nodes are individuals, systems or computers and the lines connecting the nodes are knowledge, information or data packages carried between them (Van Reijnsen and Helms, 2009). A general example of a network is found when one evaluates a Facebook account. This is an individual’s personal information network and allows them to share information about themselves with other members in the network (see figure).

FIGURE
REPRESENTATION OF A FACEBOOK INFORMATION NETWORK



Source: Economic Commission for Latin America and the Caribbean (ECLAC)

An individual becomes a node in a Facebook network by creating an account (presented by YOU in the figure). Each node, “YOU”, proceeds to connect to other nodes (small circles in figure) by adding “friends” to their account. The choice of nodes to add resides with the “YOU” of the network. In the case of Facebook this can be for example family members, friends and colleagues.

Each node contains information, such as personal and contact information, photos, favourite literature, causes and links. This information can be accessed by other nodes (members) within the network of the individual. The information is thus carried through the network (indicated by the lines between circles in figure 1).

The lines between nodes can also indicate their connectedness to the network. According to Cukor and McKnight (2001), Johnson (2009) and Van Reijssen and Helms (2009) some nodes will have stronger ties to the network, meaning that they will be closer to the “YOU”. This can be seen in Facebook by adding family members or close friends as nodes in a network. Others will be weaker standing at the edge of the network, such as acquaintances.

It is also important to realise that persons do not only belong to one network exclusively, but can belong to numerous ones. A colleague could also be a close or a college friend and a family member of a colleague. It is also true that some are indirectly connected, known as “friends of friends” in Facebook. This means that nodes are not part of the immediate network, but connected via another node. This could, for example, be a friend of a colleague. The colleague is a part of the

immediate network, but the friend is only connected to that same network, due to his/her connectedness with the colleague.

The centre node of a network is only the centre of the specific network for which it can be described as the “YOU”. This does not mean however that the node disappears in another network with another person as the “YOU”, because it becomes a part of the other network. It can be a strong node, standing at the edge or indirectly linked to it, this depends on the relationship with the “YOU”.

Lastly these networks are not geographically bound. Members of personal information networks in Facebook do not have to be in the same city, province or country.

The same construct is found when exploring specific networks such as communication, trust, information and knowledge networks. Some of these constructs are formal, bound to the hierarchy of a unit or department within an organization, while others are more informal and based more on the perceptions of the individuals that form part of the network within a unit or department.

An information network, such as the Small Island Developing States Network (SIDSnet), is an important enabler for the exchange of information among its members (see text box 2). Each member of such a network provides to the network the information regarding a specific issue and other members have the choice to use it. The beneficiaries of these networks are the individual members themselves, because the information that they gain adds value to the information they already hold.

TEXT BOX 2: THE SMALL ISLAND DEVELOPING STATES NETWORK (SIDSNET) AS AN INFORMATION NETWORK

SIDSnet was created in 1997 as an information exchange network, which means that it provided organizations and individuals that work within the development of small island developing States to share information with each other.

Currently the focus of SIDSnet is to monitor international meetings, contribute to closing gaps in data availability, and to encourage action all in support of the sustainable development of SIDS.

The website of SIDSnet provides access to documents, specifically the policy instruments guiding the sustainable development of SIDS. It also provides profiles of small island States, including news headlines and meetings that have taken place. Lastly, searchable databases of experts, partner organizations and donor organizations are available. All of these are sources of information that can be accessed by members of the network.

Membership to the SIDSnet is open to all and requires a simple registration process.

Information is added to the network, and is accessible by all members, but there is no expectation that members that make use of this information return that which they have created. The focus of this network is to provide information and secondly provide a platform where people could meet to explore the possibilities of collaboration. Collaboration and the creation of knowledge is not the main purpose of this network, but an accidental by-product. This makes this network an information network and not a knowledge network.

Although SIDSnet is classified as an information network, it is a valuable resource of information, and the connections that can be made with others in related or similar fields of study or areas of work, does provide the potential for knowledge networks to be formed, either formally or informally.

Source: SIDSnet (Small Island Developing States Network) (©2012) [online], <http://www.sidsnet.org> [4 May 2012].

Although a knowledge network, such as the Caribbean Farmers Network (CaFAN) (see text box 3), has the same construct as an information network, they tend to be more complicated and dynamic. The purpose of these networks are not only to enable the flow and sharing of established knowledge (skills, experiences, values and understandings) but also to create new knowledge and ensure the application thereof through the implementation of policies and strategies. A truly successful knowledge network is one where knowledge is also applied outside of the network, such as to inform

policy or create programmes (Apostolou, Papailiou and Mentzas, 2007; Creech and Willard, ©2001; Raghavan, 2004). These networks normally form because a specific need or situation arises and when the issue has been resolved the networks will adapt to new situations or dissolve.

TEXT BOX 3: CARIBBEAN FARMERS NETWORK (CaFaN) AS A KNOWLEDGE NETWORK

CaFaN was formed in 2004 as a regional network connecting Farmers' Associations and Non-Governmental Organisations (NGOs) across the Caribbean. Their members are located in Antigua and Barbuda, Barbados, Dominica, Grenada, Guyana, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines and Trinidad and Tobago.

The network aims to connect farmers in the subregion, through their associations, to information and knowledge on agriculture, enabling them to face the challenges that they might encounter in the industry. By connecting farmers and associations to each other, through training workshops, study tours and regional planning sessions, the network also enables knowledge creation on new directions in crops, technologies and methodologies.

Linkages between network members and expertise outside of the network are also created, through working with the Food and Agricultural Organization (FAO) as well as other international and foreign non-governmental organization and example is a radio talk show that directly places experiences in the hands of farmers across the region.

An outcome achieved by the network is the assistance that they rendered to CARICOM in the development of the Regional Food and Nutrition Security Policy (RFNSP). The knowledge and information shared among the members of the networks, NGOs and Farmers' Associations and the secretariat of the network enabled the development of an informed policy that takes the needs of farming communities as well as the private sector into account.

Source: Caribbean Farmers Network (CaFaN) (©2009), <http://www.caribbeanfarmers.org/> [1 May 2012].

A knowledge network is therefore defined as a combination of people, organizations and technology dispersed throughout the Caribbean and beyond, that focuses on sharing, creating and applying skills, understandings, experiences and values in order to further the development of the subregion for a sustainable future.

In order to make use of knowledge networks in the development of Caribbean SIDS it is necessary to recognise and identify the types that exist.

C. Types of knowledge networks

There are different ways to determine the type of knowledge network that is presented. The division can be made by determining the type of organizations that are members of the network. Thus networks could be identified as governmental or inter-governmental knowledge networks, even bilateral networks. Another way to classify a network is to look at the structure and determine if it is a formal or an informal knowledge network. While the last way is the most common, both classification types are important to consider as tools for the development of Caribbean SIDS.

1. Formal knowledge networks

Formal knowledge networks are structured in that they have guidelines, regulations, rules and agreements which guide their operations. Their focus is on the creation of knowledge, therefore developing new skills, capacities and expertise, based on the information and knowledge that they share and amass, to impact decision-making (Creech and Willard, ©2001). They can exist within an

organization, such as internal knowledge management networks as well as beyond the boundaries of an organization, involving other organizations, sectors and also countries.

The scope of work is narrow, mostly focussing on a specific subject area or topic that needs to be developed. These networks also have an audience beyond the boundary of the network itself, but not the general public, rather a specific group of people such as policymakers, government or decision-makers.

A formal knowledge network could be tied to the hierarchy of a specific organisation, as the official channels put in place by management guide knowledge creation and knowledge sharing in the organisation. In this case it is mainly vertical in nature, except in those instances where individuals at the same level in the network share or create knowledge (Apostolou, Papailiou and Mentzas, 2007; Johnson, 2009). The knowledge created can be used to create new products in private enterprises and strategies and policies that can improve the well-being of citizens in the public sector.

Another type of formal network, for example, is that created to complete a specific task or project. They are formal in the sense that they have stated guidelines for operation, such as a constitution and hierarchical structures. Participation in this type of network is by invitation and is based on the individual or organization's expertise, skills and attitudes. The purpose of these networks is to create knowledge in order to complete a task and they can be, but are not exclusively, bound to an organisation, industry sector or specific geographic location (Apostolou, Papailiou and Mentzas, 2007; Clark, ©1998, Creech and Willard, ©2001).

Creech and Willard ©2001, identified seven operating principles necessary for formal networks to operate optimally. The first is that they should be purpose driven. This means that they should be narrow in scope, focusing on a specific issue, situation or problem. Secondly they should be “working networks”, meaning that members should not just share knowledge, but collaborate to find solutions. This has the further implication that the solutions should be actionable, not just focused on the creation of solutions, but solutions that can be implemented. Thirdly institutional commitment is required. This means that members of this network should not just be individuals and experts, but the organizations themselves. The reason for this is that the organization will have an interest in the success of the network and can place more demand on representatives of an organization to fully participate in the processes. It is also true that organizations, due to their position in society and the work that they do, will have a better opportunity to affect the implementation of the knowledge products of networks. In order for organizations to fully commit to the networks it is necessary that participation in it as a member be a part of the organization's mandates (Creech and Willard, ©2001).

Fourthly these networks must be built on expertise. Therefore it is not enough for an organization to show interest in the area of focus, but they should have the necessary expertise to fully participate and collaborate in the work of the network. Fifthly they must be made up of members from different sectors, such as public and private sectors as well as different regions, such as developing and developed countries. Sixthly the capacity of each individual member must be supported and further developed in all areas that the network is working on, such as communication, teamwork and decision-making. Lastly it should be remembered that these networks are dependent on communication. The communication does not refer to only within the network, but beyond its boundaries as well (Creech and Willard, ©2001).

The skills and experiences can be applied by the organization in its daily activities as well as re-used in the network to enhance the work of the network (Clark, ©1998). Adding value to the network increases its reputation, status and influence and also its sustainability. The Climate and Development Knowledge Network (CDKN), is an example of a formal network currently working within the Caribbean (see Text box 4).

TEXT BOX 4: CLIMATE AND DEVELOPMENT KNOWLEDGE NETWORK (CDKN)

CDKN focuses on mitigating climate change in developing countries and its specific purpose is to assist countries to find ways to further climate compatible development. The network is managed by “The Alliance”, which are six organizations, led by PricewaterhouseCoopers. The governance of the network rests with three bodies, namely the Management Oversight Committee responsible for the strategic direction of the network and acts on behalf of the donors, the Network Council responsible for drafting strategy, work plans and financial plans (although they are not involved in the operations of the network), and the Management Team responsible for the day-to-day running of CDKN.

The network brings together organizations from across the world with expertise in climate change and development, policy development, networking, knowledge management, capacity building and research. The work of the network focuses on creating knowledge that is then implemented by assisting decision-makers to create and plan climate strategies that will help to mitigate this phenomenon and ensure further economic growth of the country.

The work of CDKN is divided between research, technical assistance, knowledge sharing and strengthening of partnerships. The research is geared toward identifying gaps in their themes and producing policy-orientated products to fill the gaps. Technical assistance is offered at country-level and is focused on increasing the ability of decision-makers to mitigate climate change.

A recent project in the Caribbean involved assisting the Caribbean Community Climate Change Centre (CCCCC) to prepare the Implementation Plan for the Regional Framework for Achieving Development Resilient to Climate Change. CCCCC is currently assisting the government of Anguilla to implement its energy policy under the project, entitled, “Anguilla Renewable Energy Integration”.

The benefits of the CDKN lay in the expertise that it brings together to find national and regional solutions for mitigating climate change, by combining knowledge existing in the Caribbean as well as that which is held outside of the Caribbean. The result is not only the creation of strategies that is country or region specific, but also builds local expertise, through knowledge sharing, in areas that might have been previously underdeveloped. This expertise, gained by Caribbean nations, can be applied in other areas where it is needed, such as social policy or green economy.

Source: Climate and Development Knowledge Network (©2012) [online], http://cdkn.org/about/?loclang=en_gb [20 March 2012]

Formal knowledge networks in the Caribbean, created with a specific purpose, such as the development of renewable energy capacities, can bring together knowledge on renewable energy as well as expertise from other areas of importance such as capacity building, training, policy developments, project management, knowledge management and economic and social development, which lies across various Caribbean states and also beyond the subregion. This would ensure that all aspects of renewable energy capacities are covered, resulting in strategies that would benefit the whole subregion, while taking into account conditions specific to individual states.

2. Informal knowledge networks

Informal knowledge networks are the most common, forming mostly by accident but also deliberately. These networks are more personal and sometimes based on friendship. Individuals in these networks share certain characteristics, such as interests, expertise and backgrounds and participation is voluntary (Apostolou, Papailiou and Mentzas, 2007; Clark, ©1998; Johnson, 2009).

These networks are not very stable and usually have a short life expectancy. Their composition can change as the needs of the actors change, that means that actors can be added to or leave the network. It can also completely dissolve if the goal of the network has been met. However, even if the network dissolves, some of its actors might continue sharing and creating knowledge, thereby creating a new network. If the degree of affiliation to the network is great, the stability of the network would increase and it could continue beyond the original purpose for it forming (Clark, ©1998; Johnson, 2009).

Members normally join these types of networks to gain knowledge, such as expertise, experiences, skills and even attitudes that they can use in their own activities (Creech and Willard, ©2001). Some identify different types of informal networks, such as learning networks, advice networks and market networks. This depends on the reason for the network to form in the first instance. In some cases it is to provide assistance to find a solution to a problem, and in other cases it is to transfer skills (Van Reijnsen and Helms, 2009).

These types of networks can clearly be seen by analysing one's own relationships with friends, family, colleagues and others. The most stable of these types of knowledge networks takes years to build; they go beyond boundaries of organisations and countries. They are not dependent on formal structures, but can exist within them. These networks provide alternatives for knowledge sharing and knowledge creation that do not exist within the formal structures. They do not replace these structures, but can support them to achieve their goals (Apostolou, Papailiou and Mentzas, 2007; Jewels, Underwood and De Pablos, 2003).

The need for organizations to understand relationships between people and the way that they communicate and share knowledge with each other has become more important as many organizations are scaling down, becoming smaller with less hierarchies (Johnson, 2009). The new focus is on knowledge held by people, that is, that expertise, skills and understandings that are embedded in an individual, can also be seen as a result of new ways of working employed by organizations, such as teamwork and outsourcing. This has led to the flattening or removal of hierarchies (Cross, Parker and Sasson, 2003).

These networks are difficult to track and use to the advantage of an organisation, but they are essential. They can, in most cases, react faster to problems that may arise and mitigate it before it becomes a disastrous situation. In many cases, when an attempt is made to formalise such a network, it will fail, especially if restrictions are placed on the functioning of the network, or if the individuals participating in the network do not benefit from it anymore (Cokur & McKnight, 2001; Dawes, Gharawi and Burke, 2012).

Informal networks do not rely on hierarchy - communication and collaboration can be vertically, horizontally and diagonally. The "rank" of a person has little to no place in these types of networks; the focus is on sharing and creating knowledge for the achievement of a common goal. Participating in these networks is beneficial to all participants, each taking something of personal value away from it. Members of these types of networks can therefore be experts, policymakers and regulators (Dawes, Gharawi and Burke, 2012). Organizations should not try to manage these types of knowledge networks, but rather, create the environments necessary for these types of networks to form and grow, thereby fostering them to further the work of the organization. The Jamaican Diaspora Knowledge Network is an example of an informal network (see text box 5).

TEXT BOX 5: JAMAICAN DIASPORA KNOWLEDGE NETWORK

The Jamaican Diaspora Knowledge Network is an initiative started by the Jamaica Diaspora Institute and the Jamaican Diaspora United Kingdom. It is funded through the European Commission and United Nations' Joint Migration and Development Programme. The purpose of this network is firstly to connect Jamaican nationals in the Diaspora (those living outside of the country) with people, initiatives and organizations in the country and secondly to create the opportunity for people in the Diaspora to share their knowledge in policymaking, programme planning and project implementation.

This is based on the concept that Jamaicans in the Diaspora have had the advantage of being exposed to knowledge from various parts of the world, specifically knowledge that might not be available in the country and is needed or useful to advance the development of the country, such as best practices on the implementation of community-based projects.

(continued)

Text Box 5 (continued)

In order to facilitate interaction over a large geographical area, a web portal was created called “Jamaica Diaspora Connect” (<http://jamaicadiasporaconnect.com>). The portal focuses on enabling the knowledge network through three activities, firstly connecting people to provide opportunities for creating business connections, friendships and find other support. Secondly to inform members of public policies, current affairs, news, issues and events and thirdly to share knowledge expertise and good practices.

The network is beneficial to both the country as well as the Diaspora. Members in the country get the advantage of expertise, skills and understanding that might not be otherwise available. It allows for different points of view to be integrated with locally held ones, creating new knowledge that can be applied to better the Jamaican society. Members in the Diaspora can regain a connectedness to their homeland and knowledge on current situations through shared experiences and skills.

Source: Jamaica Diaspora Connect (©2011) [online], <http://jamaicadiasporaconnect.com/> [23 March 2012].

A Community of Practice (CoP) is another example of such networks. Participation in a CoP is voluntary and normally by invitation or upon application. These types of networks can also be created involuntarily and be formalised later. Its purpose is to discuss issues pertaining to a specific field or topic, for example “operating in trade industry”. A panel could be created to oversee the contributions and provide specific guidelines for participation, contribution and sharing. Those participating could include experts from government, trade experts, industry experts, economists, private business owners, development agencies and donor organisations. They could be located in the Caribbean, Latin America, Europe, Asia and Africa. The purpose is to bring together the best expertise, in order to share knowledge and learn from it so that it could be applied by the members in their areas of work. Although it is beneficial for the members to participate, the knowledge created is seldom applied outside of the network, therefore their purpose is to build capacity by sharing expertise to gain expertise (Apostolou, Papailiou and Mentzas, 2007; Creech and Willard, ©2001).

Some knowledge networks exist within the Caribbean, many are not locally based, but do work in the subregion. The ones created are a good start, but to fully make use of the different types of knowledge networks for Caribbean development, active development of these networks are necessary. One element, essential to the development of knowledge networks in the Caribbean is the availability of information and communication technologies.

D. Role of information and communication technology in knowledge networks

The use of information and communication technologies (ICT) within knowledge networks is not a necessity. However, connecting nodes in a network, whether formal or informal, that are distributed geographically, for example in Caribbean SIDS, would be difficult and expensive without the help of ICT.

It is important to understand that information and communication technologies, although important, are not the main actors in knowledge networks. Rather, ICT is there to support people in the knowledge processes by ensuring that knowledge flows fast through the network, reaching its target faster, and thereby making faster decisions and problem solving possible. Focusing solely on technology can lead to the premature failure of a knowledge network and it is therefore important to consider this when engineering the knowledge network environment.

The technology made available should suit the network by taking into account its geographic location, infrastructure (such as bandwidth) and outputs that need to be delivered. The knowledge being created and shared should also be considered when deciding on ICTs to use, as some technologies would work better than others, depending on the type and format of knowledge.

Technologies that can be used range from simple e-mail or forums to complex information systems. It might be necessary to have more than one type of tool available (Clark, ©1998; Cokur & McKnight, 2001; Van Reijssen and Helms, 2009).

This is necessary to ensure that all members have the capability to participate in communication within the network to ensure the work of the network can continue over great distances. The creation of extranets allow for a secure environment to share knowledge, but are still accessible via the Internet thereby making it possible to access from any geographical location (Dawes, Gharawi and Burke, 2012; Creech and Willard, ©2001; Scarf and Hutchinson, 2003; UNIDO, ©2011).

In the Caribbean the use of ICTs would be essential to ensure the effectiveness of knowledge networks as the members of a network will be spread-out over more than one island and it would not necessarily be possible for members to travel frequently to meet for discussions. Without technology, the members of the network would have little contact with each other, which could not only negatively affect the work of the network, but greatly reduce the potential impact that such a network could have, were that it was efficient and effective.

ICT is an important element to consider when discussing knowledge networks, but fortunately the advancement of mobile technologies in capabilities as well as the need for people to be a part and make use of new technologies to connect to each other has increased the availability of such technologies in the Caribbean. ICTs have advantages, and disadvantages, for knowledge networks, just as does knowledge networks impact on knowledge in general and its members in specific.

E. Advantages and disadvantages of knowledge networks

*“Nam et ipsa scientia potestas est.”*³

~ For also knowledge itself is power

The abovementioned phrase, from the work of Sir Francis Bacon, is often quoted when speaking about the need to obtain knowledge. In recent years, many in the field of knowledge management have added to this quotation so that it says “knowledge is power, so share it”. The power of knowledge gained through sharing lies in the design of better solutions by delivering actionable ideas, that could be implemented and be of advantage to an organisation, government, a country and the Caribbean. Therefore, knowledge networks make it possible to link related but disconnected knowledge to each other therefore yielding better results for development.

The sharing of knowledge through a network also leads to the creation of more. There are two areas where new knowledge is created in a network. The first is the subject area in which the network is working, for example building capacities for renewable energy in the Caribbean. The strategies, solutions and any other research outcomes bring together knowledge from various partners, sparking innovation and unique combinations of knowledge that previously has not been done. The result would be solutions and ideas that previously did not exist, therefore, creating new knowledge in the subject area. The second is for the members of the network. Each member enters the knowledge network with a specific set of skills, expertise, capacities and understandings based on their background and area of work. As knowledge is shared through the network and new knowledge is created by the network, members gain new skills, capacities, expertise and understandings which add to what they already have. Members take the new knowledge that they have gained back to their organizations. These experiences and understandings can bring about changes in the way the

³ *Meditationes Sacrae* (1597) in James Spedding, Robbert Ellis and Douglas Heath (eds.), *The works of Francis Bacon* (1887-1901), vol. 7., p.253.

organization does business, through the application of this knowledge, thus creating more knowledge within the organization.

Therefore, the strength of a knowledge network lies in each member's unique knowledge and point of view which allows for the creation of new knowledge and the benefit from participating in a network is that each member becomes stronger by adding to its own knowledge. Knowledge has no limits, the limits that exist relate to the capacities of the people creating and sharing it as well as the systems they use to support these activities (Creech and Willard, ©2001; Johnson, 2009).

The advantages and disadvantages of knowledge networks relate to how they can positively or negatively impact the creation, transfer and implementation of knowledge.

Firstly, through knowledge networks, knowledge can be discovered. This refers to people at various stages of "knowing". The network will reveal what knowledge is unknown to some but known to others; knowledge gaps (knowledge unknown to all); or incorrect knowledge held as truth or fact. By sharing, collaborating and learning through network the value of knowledge will be increased by correcting what is wrong and revealing what is not known (Johnson, 2009). In effect, the network creates collective intelligence which is everything the network knows, has shared and can be accessed (Anklam, ©2007).

Secondly, networks provide greater access to knowledge which results in faster reaction times and thus better decision making processes (Dawes, Gharawi and Burke, 2012; Johnson, 2009). Knowledge networks are a reliable way to diffuse knowledge throughout an organization as ideas from members can be transmitted between the members instantly (Anklam, ©2007).

Thirdly, they have the potential to alter corporate culture, moving it towards collaborative activities (Cokur & McKnight, 2001). Gaining knowledge can change the way that certain processes, products and their values are perceived. These changed perceptions could lead to better processes and products making an organization more successful or advance the development of a state.

Fourthly, knowledge networks are adaptable as knowledge and people can easily be changed by those participating in it. This flexibility makes them responsive in ever changing environments, thus increasing knowledge that can be applied in such environments (Cokur & McKnight, 2001). It also makes them more resilient and more able to survive should disaster strike (Anklam, ©2007).

Lastly, the advantages for the individual, as a member of a knowledge network, can be far reaching. Participating in networks could enhance the status of an individual among his/her peers and colleagues specifically if the credibility of the network is high. It is also true that as human beings there is a need to be connected to others. Participating in networks provides this needed connectedness, and has also been found to increase the performance of individuals (Anklam, ©2007).

There are, however, some disadvantages to knowledge networks. Firstly, the responsibility lies with the members to play an active role in knowledge creation, discovery and sharing. They have to continuously participate to gain the advantages offered by the network (Johnson, 2009). This can be time consuming and stressful, as it might require changes to what is currently held as justified and true. The possible opposition to accepting these ideas, might lead to hamper the processes of the network and might, in the extreme, cause it to fail.

Secondly, the adaptability and flexibility – albeit good traits – could cause knowledge networks to be unstable and dissolve when they are no longer needed. This could lead to a loss of knowledge that might be needed in the future (Johnson, 2009).

Lastly, it can be costly and time consuming to engineer them. Technology must be made available or available technology must be adapted. People might have to be added to a network to include expertise in the areas of "unknown knowledge" (Johnson, 2009).

Overall, the biggest disadvantage to a successful knowledge network are the barriers that exist to freely share established knowledge, specifically sharing that which is held as essential to an

organization's existence, between organizations because of the belief that revealing this knowledge could hamper the competitiveness of the organization.

The advantages far outweigh the disadvantages and with correct strategies in place at the outset of convening a knowledge network, these disadvantages can be mitigated successfully.

The next step is to determine how knowledge networks, formal and informal, can be built, managed and positively influenced to have an impact on the development of Caribbean SIDS.

III. Building and managing knowledge networks

Knowledge networks are complex, specifically because they are dependent on people. The success of such a network requires trust between members and benefits from participating. It is important to cultivate the networks by providing the optimal environment in which they can function. This is a challenging task as it could require changes in traditional corporate cultures and structures (Jewels, Underwood and De Pablos, 2003).

It is important to tread carefully when creating or enhancing knowledge networks as poor design could cause a lack of coordination, excessive conflict, unclear roles, misused resources, poor workflow, reduced responsiveness, and a proliferation of *ad hoc* entities, such as committees, workgroups and taskforces. It will also lead to the creation of grey areas, those areas where responsibilities are unclear (Johnson, 2009). The positive impact that the network could have on the work of the organization is far reaching, but if little attention is given to proper design, the network will fail and could have a negative impact on the organization, in the form of trust issues and staff turnover, which might be difficult to resolve.

A. Assembling formal knowledge networks

Formal knowledge networks form either accidentally or deliberately, but they acquire a proper structure with roles and responsibilities. The origins can be either a realisation by individuals that there are opportunities in combining expertise in order to collaborate for a specific purpose or the identification of a problem or situation that requires collaboration of different expertise and skills to provide solutions (Anklam, ©2007).

Formal knowledge networks specifically geared toward development within regions, such as the Caribbean, are most effective if they cut across organisations, sectors, national borders and involve persons from both developed and developing countries (Cokur & McKnight, 2001). Actively seeking to build formal knowledge networks in the Caribbean will lead to the formulation of truly local solutions for development questions.

Many agencies working in the area of development started as formal knowledge networks and later become institutionalised. In order to achieve a successful network, which can assist in working toward development, it should be carefully crafted to ensure that it functions optimally and effectively.

The building of a formal knowledge network can be achieved in phases. During each phase certain elements present themselves that should be concluded in order to create an established network.

The first phase can be seen as the development phase during which the first steps are taken to set up the network. The focus falls on the development of the purpose, goals, identifying stakeholders and initiating and strengthening relationships. At an organizational level it requires the creation of a governance model, structure, conditions for participation and virtual space. The second phase is known as the growth phase, focusing on building its capacities and capabilities by strengthening its structure and creating connections to organizations and individuals. The third phase is the performance phase which is reached when the network is fully operational, creating valuable knowledge products through collaboration; and has the ability to react to new problems and responsibilities (Aklam, ©2007).

The design of formal knowledge networks can range from simple, such as the creation of a knowledge management network within an organization, to complex, such as an institutionalised network that becomes a private business or non-governmental agency (see text box 4 as an example).

There are three core elements to consider when assembling a formal knowledge network, namely network management and governance, communication and engagement strategies, and performance evaluation.

1. Network governance and management

Network governance refers to the formalization of the relationship between the members of the knowledge network and involves the development of the network structure and roles of members, specifically with regard to decision-making. Formalizing the governance of a knowledge network is not an easy task and literature suggests that it is best not to begin the work of a network by deciding on these issues; rather it is best to start with operationalizing the network. This will allow the members of the network to discover the goals and objectives that need to be addressed. If the governance of a network is realised too early, it might need extensive revision over time and could hamper the work to be done if not cause the network to disintegrate before it is able to have a valuable impact (Creech and Willard, ©2001; Poocharoen and Sovacool, 2012).

Network management is the structure that is put in place to assist the knowledge network with its daily activities. In many cases one or two organizations will take the lead when the network is established. These are the organizations that would like to start a collaboration processes that is more than a mere information exchange network (Anklam, ©2007; Creech and Willard, ©2001).

This component of formal knowledge networks involves the selection of members and the strengthening of the relationship between the invited members by formulating and examining the project proposal documents and specifically the goals and objectives of the network. In order to make the network known it might become necessary to create a charter or mission statement⁴ that can be publicised. Areas, such as capacity building of members, development of work plans and the creation of a secretariat, and specifically a network manager, to provide organizational support should also be developed. Network management requires human resources and financial resources in order to support the work of the knowledge network to its full ability (Anklam, ©2007; Creech and Willard, ©2001; Poocharoen and Sovacool, 2012; Raghaven, 2004).

Membership to a network is initially limited to those organizations or individuals that expressed the original interest in joining the network. However, as the network grows, it might become necessary to include more members due to lack of certain expertise or people might want to

⁴ Should it become necessary for a network to institutionalise itself as a non-governmental agency it is not enough to have a mission statement and/or charter. This is due to the fact that there are laws and regulations in existence that guide the formation of organizations and should be adhered to. As this would require staff to operate it, collaboration between organizations might have to be formalised with agreements and contracts on staffing, funding and responsibility (Anklam, ©2007)

work with the network as it is in their field of interest. It is possible to add members to a network and one of three methods are normally used. The first is opening the membership to all that have an interest in sharing and collaborating. The second is criteria-based membership, which means that membership is open to all as long as the applicant meets the correct criteria. The third type of membership is that which can only be obtained by invitation from the network (Anklam, ©2007).

Ensuring that a network has the proper governance and management will make it easier to achieve success in creating knowledge and developing products.

2. Communication and engagement strategies

Communication strategies are the methods and tools that are used to communicate the findings to the broader audiences of the knowledge network. Tools can include a website, publications, conferences, workshops, personal contact, e-mail, CD-ROMS as well as audio and video media. These strategies should be revisited to ensure that they are still current and usable to impact on the audience. It is important to match the tool used to the audience and their information gathering methods. It is therefore necessary to use more than one tool to communicate findings (Anklam, ©2007; Creech and Willard, ©2001).

It is important to identify the audience of the knowledge network, meaning those people, organizations and structures that the network want to influence and impact on. Two types of audiences can normally be identified, firstly the target audience and secondly the broader audience. The target audience is a very specific group and is the main focus of the knowledge implementation activities of the network. The broader audience represents other groups that have an interest in working on the same issues as the network. Identifying the audiences of the network is essential as this will help to focus its goals and purpose as well as the type of knowledge products that should be developed to affect impact on the audience (Creech and Willard, ©2001).

Engagement strategies are necessary to communicate findings and affect influence on the target audience of the knowledge network. This entails the building of relationships over time and can be rather time consuming as trust is necessary between the knowledge network, its members and the target audience, such as policy- and decision-makers. It is therefore useful to have organizations that already have relationships of trust with the target audience as members.

In order to build relationships with the target audience it is necessary to start by sharing information, then move to nurturing the relationships and finally end with joint action. Engagement strategies can impact on the funding of the network by adding to or subtracting from it. This depends on the ability of the engagement strategies to build trust between the network and the target audience (Dawes, Gharawi and Burke, 2012; Creech and Willard, ©2001).

Without the necessary communication strategies and engagement strategies, the good work done by a knowledge network might go unnoticed, diminishing its potential impact to a smaller arena of organizations that found the network by their own volition (or by accident).

3. Performance evaluation

Measuring and evaluating the performance of the network is necessary to determine the impact that the knowledge network is having, and therefore whether it is reaching its goals. Networks should be evaluated on the quality of work, its influence on decision-making; operational performance and the results of communication strategies (Creech and Willard, ©2001).

Poocharoen and Sovacool (2012) stated that a network should be evaluated by determining the clarity of its purpose, funding, institutional formality, the ability to exercise power, resilience and strong ties.

This evaluation will help to determine the value that is added by the network. Determining the value-added by the network can be used to gain further funding, increase the status of the network

in the subject area and build trust in the network. Evaluation is also useful to determine if the programmes of the network are on track (Creech and Willard, ©2001; Raghaven, 2004). All of these outcomes will determine the value of the network. The higher the value of the network, the more likely it is to obtain the necessary funding to continue its work as well as expand its focus to include some related areas.

B. Using social network analysis to identify and harness informal knowledge networks

Informal knowledge networks cannot be explicitly engineered; there is no blueprint, basically because their formation is normally by accident, based on the need of an individual to find information to solve a problem or get work done. Individuals will seek out others for advice and information based on their knowledge of another's expertise and the trust that they have in their colleagues.

Organisations and government must accept, not only the existence of informal knowledge networks, but also the impact that they have on their work, from daily operation to innovation and development. Once the existence is accepted and the importance understood, the knowledge dynamics, i.e., the main role players and the carriers of knowledge necessary for optimum functioning of any strategy can be determined (Jewels, Underwood and De Pablos, 2003).

As organizations are formed, formal structures are put in place to guide the work to be done. Traditionally these are hierarchical in nature, such as a supervisor with subordinates. This does not only indicate the reporting lines, but is also based in the way that communication and therefore the flow of information and knowledge is expected to flow through the organization. This therefore creates units, divisions or departments with the skills and knowledge thought necessary to conduct the work.

The formal structures that are created very often do not take into account the inherently human elements of communication, such as trust and respect. Decision-makers responsible for creating the formal structures rely on their knowledge and understanding of the people in the organization and the goals that need to be reached. They are therefore established to deal with anticipated problems that are easy to solve, but when unexpected problems occur the informal knowledge network takes action to solve it. These networks are therefore essential for the organization to reach their goals (Cross, Parker and Sasson, 2003).

In order to make optimum use of informal knowledge networks in an organization it is necessary to analyse them and determine firstly the impact that they have on the way the organization work and secondly the type of environment necessary for it to grow. The understanding gained from these analyses might require deliberate changes in formal structures as well as tools used by them to effectively use the impact of the informal network. A method commonly used to analyse these networks are social network analysis.

Social network analysis maps the informal relationships within an organization and in doing so helps to determine how information and knowledge is shared in the organizations, how effective it is, where changes are necessary and which groups and people are strategically important (Cross, Parker and Sasson, 2003; Apostolou, Papailiou and Mentzas, 2007).

1. Steps of social network analysis

The first step in conducting a social network analysis is to take a look at the organizational chart as this provides information on the formal structure of the organization as well as the expected flow of information and knowledge through the organization.

The second step is to conduct a network survey. This involves the use of questionnaires to determine which colleagues contact each other, colleagues that others ask advice from and which

colleagues are trusted by others. These questionnaires should not seek to determine general information about the internal organization communication, but be focused on a specific knowledge asset or product that is perceived to be problematic. It is important to consider that some respondents might not like to answer questions about friendships and internal issues, as they may believe that this information is too personal or fear reprimand. The confidentiality of respondents' answers is essential to ensure the validity of the analysis (Apostolou, Papailiou and Mentzas, 2007; Cross, Parker and Sasson, 2003).

Part of the network analysis is not only to determine the flow of knowledge through an organization, but also to profile people in the knowledge network. The purpose is to gain understanding of issues in the organization and personal motives for joining networks. The focus here is to gain knowledge on personal interest, skills, experiences, job satisfaction factors, expectation and personal ambition as it relates to the specific area under analysis (Apostolou, Papailiou and Mentzas, 2007).

It is also useful to include a questionnaire for the managers and decision-makers at the top of the organization, as they have a certain perceived idea of how information and knowledge flow through the organization. This questionnaire focuses more on their "idea" of flow, such as who they think are trusted, contacted and asked for advice (Cross, Parker and Sasson, 2003).

The third step is to follow-up on the answers given in questionnaires, such as through interviews with respondents. The purpose here is to cross-check the answers given as a true representation of the informal network. Basically it means to determine that if a colleague responded that they are communicating with another on a daily basis, it is necessary to ask that colleague if this is so. The reason is that only a true representation, based on the consensus of the whole organization, should be used to conduct the analysis.

The fourth and final step is to map the network. This is usually done through the use of software than have the capability to handle such large data sets (Apostolou, Papailiou and Mentzas, 2007; Cross, Parker and Sasson, 2003).

2. Identifying strengths and weaknesses of the informal network

The map of the informal network will be able to show three sub-networks, namely communication networks, advice networks and trust networks. Communication networks show the employees that discuss work-related matters on a regular basis. Advice networks show who colleagues consider can provide them with information, knowledge and guidance to solve problems. Trust networks indicate the colleagues trusted by others in their decision-making, information provided and leadership and will share sensitive information in a time of crisis (Apostolou, Papailiou and Mentzas, 2007).

The informal knowledge network map will reveal strengths and weaknesses that exist in the network. It will identify the key persons that all communicate with. In an ideal network this will also be the persons that are considered trustworthy as well as important in providing advice and the overall structure will follow the general direction of the organizational chart. However, this is hardly ever the case, as since these networks are inherently human, there will be differences based on the way colleagues are perceived by one another and is based on their knowledge, past experience and choices they have made, and also even their personal work ethic and belief systems.

Some occurrences, identified by network analysis, could have potential negative impacts on the work of the organization, and include holes in the network, "bow-ties", imploded relationships, irregular communication patterns, fragile structures and geographical distribution. It is important to identify these negative factors so that they might be mitigated.

It is more likely that a network analysis will reveal that although some colleagues are key figures, and therefore standing central in a communication network, they are only a peripheral node in the advice network or trust network. This might be due to the fact that colleagues recognise their

knowledge in certain technical areas, but an autocratic leadership style could make colleagues feel that the person is not trustworthy (Cross, Parker and Sasson, 2003).

Holes in the network are areas where a node or connection is expected but not found. An example would be when the analysis reveals that one unit is not connected to another, although their work is related. This could result in the loss of knowledge, as the potential knowledge that could be created through a connection between the two units is less likely to happen (Apostolou, Papailiou and Mentzas, 2007; Cross, Parker and Sasson, 2003).

Another occurrence that might be identified is the existence of “bow-ties”. These are networks where many nodes all depend on one node, but not on each other. As this person stands central to the operations of the others that are connected to him, it provides them with power with which they can influence the clusters both negatively and positively. Should this person leave an organization, the connection between the clusters will be lost. This position could also place a lot of pressure on the individual and as they are divided between the clusters they could become rigid and slow in the execution of their duties and in effect become a bottleneck (Apostolou, Papailiou and Mentzas, 2007; Cross, Parker and Sasson, 2003).

Imploded relationships show a cluster formed within a network where the nodes in that cluster have very few connections to other groups, for example when a unit only communicates with others in that unit and not with other units. Irregular communication patterns refer to members of a unit that only share with other groups and not within their own group. The reasons for this can be hidden and underlying and specifically related to trust. Fragile structures are where members of a network only receive information from a few people; this could be due to an authoritative relationship between members. Geographic distribution relates to the physical area between network members and is important to consider when considering technological tools to enhance the work of the network (Apostolou, Papailiou and Mentzas, 2007).

A network analysis will also reveal the strengths of the network, such as the key information brokers, therefore those persons that readily share information and knowledge with colleagues as well as those that stand at the boundary of each cluster in the network that ensure knowledge flow between networks (Cross, Parker and Sasson, 2003). It will also reveal staff members that are highly social which could be employed as network facilitators (Apostolou, Papailiou and Mentzas, 2007).

3. Possible actions and decisions based on the analysis

Once the strengths and weaknesses of an information knowledge network are revealed and compared to the perceived understanding of the decision-makers and managers regarding the network, some decisions can be made.

The major decision that has to be made is whether to employ the results from the survey and the “suggestions” made by the informal network on staff of importance. A person that was perceived as being central to the network, and also holds a supervisory position based on this perception, could be displayed as being central in the advice network (because of their technical knowledge), but are only loosely connected to the communication and trust networks. Such persons can become bottlenecks and hoarders of knowledge.

Should the decision be to follow the informal network, this node (person) could be removed from the position and another connection, revealed by the analysis as strong in communication and advice networks, could replace it. This would entail some restructuring of the formal structure of the organization with promotions, transitions or terminations. It is also possible, should the node that is removed from the network have knowledge that is essential to the organization, that they be moved to another area of the organization where their knowledge will be of better use (Cross, Parker and Sasson, 2003).

The restructuring of formal structures could also entail more than just the movement of key staff identified in the social network analysis. It is possible that it becomes necessary to populate a

knowledge asset (person or group of persons) to build a network with more nodes (other staff) and, for this, the result of the profiling of individuals is essential. The profiles allow for the populating of a network with nodes that have similar interests and goals, but it is important to include nodes from all areas of the organization. This not only ensures that all types of skills and expertise are available in the “new” network, but that the network remains dynamic in its problem solving and innovations (Apostolou, Papailiou and Mentzas, 2007).

Direct intervention is not the only course of action to take, as it is possible to choose other ways to try and effect change in the network. One method is to use inter-office memos to imprint on units that they must share certain information with other units. Some use trainings to enhance knowledge of staff and try to enhance the network by combining persons from different clusters in training groups. In most cases these methods are relatively ineffective, as although some connections might be formed during training, there is little guarantee that it will continue after the intervention has concluded.

It is also possible to formalise the network by providing it with identifying roles, support structures, ownership and key performance indicators that would allow for determining the success of the network (Apostolou, Papailiou and Mentzas, 2007). This provides recognition to the importance of the network and its abilities. At this stage the informal knowledge network will cease to exist and a formal knowledge network is formed. It is, however, important to understand that this is only useful if the network handles very specific issues in the organization or if the network becomes a new product of the organization, because the formalisation of an informal network could lead to its destabilisation and collapse.

Although the building and managing of knowledge networks, whether formal or informal, seems relatively uncomplicated, it is necessary to consider some barriers that could negatively impact on the functioning of a knowledge network.

C. Barriers to knowledge network development

In order for knowledge networks to be successful it must be able to operate with fewer difficulties. However, as these networks depend on people, organizations, governments and communities – all with their own values, fears, guidelines, mandates and regulations – barriers will occur that must be mitigated so that the rewards offered by the knowledge network may be experienced. To achieve development goals, knowledge networks should be accessible to all, this does not mean only access to knowledge but also the creation and sharing thereof. It should be available to governments, development agencies and the people themselves (Cokur & McKnight, 2001).

A major barrier is the potential reluctance of members to openly share knowledge. This could be related to the personal beliefs of people and organizations that by sharing the loss of essential knowledge could occur which, in turn, could harm the competitiveness of an organization. The reluctance to share could also exist due to limitations of policies, rules or guidelines that direct the work of an organization. It might also be that an individual only appears reluctant to share knowledge, because they might not be aware of the value of the knowledge and that other persons may need it. This is related to the effects of decentralization that occur in organizations where people work over large geographic areas and are not necessarily familiar with colleagues in other offices as well as their functions and knowledge that their colleagues possess.

Trust in a knowledge network is essential for effective operation. If trust between members in a knowledge network is limited or hampered, the sharing and creation of knowledge could be severely limited. Trust is also difficult to gain and might take time to build. In some cases, achieving trust is easier when organizations that have membership in the knowledge network have collaborated on past endeavours (Dawes, Gharawi and Burke, 2012).

Legislation regarding access and ownership of knowledge could harm knowledge networks. Limiting laws can potentially place much needed resources outside the reach of the members of the network.

Language and cultural differences, specifically when a knowledge network stretches beyond the boundaries of countries and organizations might have to be mitigated as a barrier. Within the Caribbean there are many languages, including English, Dutch, French and Spanish and although these countries share certain common characteristics, each has its own culture, beliefs, values and practices. These differences have the potential to negatively impact the effectiveness of knowledge networks as they can lead to misunderstandings and miscommunication (Dawes, Gharawi and Burke, 2012; Creech and Willard, ©2001; Johnson, 2011; Scarf and Hutchinson, 2003).

Apart from national cultures, organizational culture could also present a potential barrier to knowledge networks. The values and belief systems of individuals in an organization can impact on how they share knowledge within the network. Personal belief and value systems of individuals can also affect their effectiveness within a network. This can result in attempts to advance personal or organizational agendas through membership in a specific network. Conflicts can occur if there is no consensus on appropriate approaches to use (Dawes, Gharawi and Burke, 2012; Creech and Willard, ©2001).

The lack of availability of information and communication technologies (ICT) can hamper the work of a knowledge network. Some countries in the Caribbean have very well developed technology infrastructures that are accessible to all. Others, however, have limited capacity in this regard and might not be able to provide the access to the same technologies as others. In the subregion, where communication technologies are essential to communication between the islands, the absence of these infrastructures could slow down the processes of knowledge creation as well as implementation (Scarf and Hutchinson, 2003). The availability of cost-effective ICT that can be employed to ensure the connectedness of a knowledge network, is necessary, but could be hampered by budgetary constraints.

In order for a knowledge network to continue with its work, resources are required, both financial and human. Human resources relates to individuals that organize the daily activities of the network, such as secretarial duties. This could mean allocation of additional duties for existing personnel, should the necessary expertise needed for management of a knowledge network be present. The addition of duties to staff could potentially lead to increased stress for the persons performing more functions. In such a case, it is necessary to choose staff whose work could be enhanced by being a part of the knowledge network, rather than adding additional duties. Another option might be to employ additional personnel with the necessary skills to manage the network, specifically if the skills are not currently available in the organization or if the network is expanding and requires a separate management arm. This, however, has financial implications and would only be possible if the necessary funding is available.

Financial resources are also required, in order to enhance the underlying infrastructures and activities needed to enhance the work of the network. This includes budgets for ICT infrastructures, marketing and publicising the work of the network and the knowledge products that they create, and engagement with target audiences. Varying cost structures between organizations that are difficult to integrate, adequate funding to sustain participation, multiple currencies and currency restrictions have to be addressed to ensure that financial limitation does not hamper the work of the network (Creech and Willard, ©2001). Funding from donors can have strings attached that could negatively affect the work of the network by limiting its reach (Poocharoen and Sovacool, 2012).

Mitigating these barriers can be time-consuming and slow the work of the network, but are essential to ensure the effectiveness of a knowledge network.

IV. Conclusions and recommendations

Knowledge is an important resource that can aid in the development of the Caribbean. However, the physical nature of the subregion with its small populations has led to the creation of gaps in the expertise, experiences, understandings and skills needed for development. The limited local available technical knowledge has been further compounded by the migration of skilled persons to other countries beyond the borders of the Caribbean. Technical knowledge that is locally available is dispersed throughout all Caribbean States.

It is necessary to find ways to connect these dispersed local knowledge resources, as well as create links to resources beyond the Caribbean, such as the skilled Diaspora and other small states and developing nations. Connecting to these knowledge resources will provide opportunities for the Caribbean to come in contact with new ideas, skills and understandings, that, when combined with locally held ideas, skills, expertise and experiences, will result in the creation of local solutions to local challenges. A secondary result of this link to other sources of knowledge, is that new local knowledge is created that can be utilised to solve challenges in other areas and be shared within the linkages created so that those beyond the borders of the Caribbean might also benefit.

Connecting the Caribbean to these dispersed resources forms knowledge networks that can aid in development by making it possible to make better decisions. These networks are complex and should be carefully engineered and managed to ensure that they are of use not only to its membership, but also for the audience that lies beyond the borders of the network.

Employing knowledge networks are not only advantageous to the development processes of the Caribbean, but also have the capacity to positively impact other areas beyond these processes. The knowledge created and shared through the network leads to informed policy development which in implementation holds bigger benefits for all citizens of the Caribbean in the form of economic growth, social progress and environmental effectiveness. Barriers do exist and need to be mitigated to ensure an optimal operating environment for a knowledge network.

The potential of knowledge for the Caribbean, and the role that tools play to make this resource accessible, have not yet been grasped. In this regard some recommendations are made to further the role of knowledge and the use of knowledge networks within Caribbean development:

- (a) Knowledge gaps, i.e. areas in which technical knowledge is very limited, should be identified, by creating “national directories” of experts and their areas of work. National directories should be used to create a Caribbean directory, accessible to all.

- (b) Create linkages between locally held knowledge that is dispersed throughout the Caribbean, through the use of the directories to identify related experts and having an event so that they might be introduced.
- (c) Create linkages with organizations and countries, beyond the borders of the Caribbean, to close subregional knowledge gaps, through discussions with and visits to counterparts.
- (d) Determine the current level of connectedness within and between Caribbean SIDS. This will highlight to what extent knowledge is shared and provide a springboard to determine the impact of networks on the economies of the subregion.
- (e) Strengthen the ICT infrastructure within the Caribbean to facilitate the connectedness of the subregion and knowledge resources to each other.
- (f) Conduct social network analysis case studies to create an instrument that can firstly be used in the Caribbean to investigate knowledge networks and secondly provide methods for enhancement of the network in order to improve the effectiveness of both public and private sectors.

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