SCIENCE TECHNOLOGY **AND INNOVATION (STI) POLICY MAKING**









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Preface 🧉



n formulating public policies, policymakers are faced with two distinct situations. The first and the ideal situation, is for policymakers to jointly identify a desirable future condition, and then create policies and take actions to move toward that desired future state, monitoring progress to allow for necessary adjustments. The alternative, and less desirable, situation occurs when policymakers are unable to reach a consensus regarding a desirable future condition. The later instance which often applies to complex trans-disciplinary and trans-sectoral issues such as Science, Technology and Innovation (STI) policies, policymakers often try instead to move away from present situations judged as undesirable, even though no consensus exists about the preferred alternative. Both scenarios contextualize the STI policymaking arena in developing countries. This training manual aims to provide a hands-on self training on basic principles of STI policy formulation. The target readers are officials of government ministries, parastatals, R & D sectoral policymakers, STI regulators and law makers in charge of policy making or policy related decision-making in STI in the African context.

The manual is divided into six chapters.

Chapter One deals with an overview of the concepts of science, technology and innovation (STI). It presents definitions of STI, its aims and objectives, distinctions between science, technology and innovation; and how these relate to basic Research and Development (R&D); implications for STI policy making and policy implementation – from R&D policy to STI policy implementation : and why STI policy is the



Preface

necessary catalyst for economic development of nations. A few questions designed to test the trainees' comprehension of the related concepts are presented.

Chapter Two presents an overview of necessary tools to ensure a successful STI policy formulation. It comprises basic discussions on the selected tools for achieving a successful STI Policy, including:

- Policy mapping & context assessment tools;
- Data collection and analysis tools:
- stakeholder analyses, write-shops, force-field analyses, SWOT analyses;
- Communication tools such as communications strategy, message design & media relations;
- Knowledge management & learning tools; and
- Policy influence mapping tools such as power mapping, lobbying and advocacy, campaigning, and

DPSIR framework;

The chapter also includes key questions regarding the external environment, available evidence, the political context, and existing linkages, including: what the policymaker needs to know, do and how to do it. Some key questions to test knowledge are presented.

Chapter three, deals with the institutional aspects of STI policy making in Africa. It presents the key sectors to consider various productive sectors (agriculture, energy, mining, tourism, research, industry, education, infrastructure, and the environment.) and the interactions between them. It introduces STI innovation systems. If further explores the constraints and opportunities in moving from sector based policies to innovation systems based policies are presented.

Chapter four discusses engagement of the public in STI policy formulation. It deals with the timing, purpose and objectives of public engagement, level of public involvement required, key stakeholders to consider, basic principles of public involvement, public involvement and the key stages of STI policy making, stakeholder analyses – who to inform, engage, inform, collaborate with, basic skills for designing an effective public involvement program for STI policy making, factors affecting effectiveness of public involvement in policy making, principles for successful application of public involvement techniques in STI policy making, principles of minimizing conflicts of interest, and common mistakes in policy design – why public involvement is avoided?

Chapter five discusses the basic steps in STI policy formulation. The basic cycles in STI policy development that can help overcome the problem of involving the end-users are presented. Two policy formulation model are presented.

Chapter six concludes with an identification of characteristic of a good STI policy



How to use this Manual

Course Design, delivery and evaluation







INTRODUCTION & OVERVIEW OF THE CONCEPTS OF SCIENCE, TECHNOLOGY AND INNOVATION

THIS CHAPTER WAS DESIGNED TO ENABLE YOU HAVE A GOOD UNDERSTANDING OF :

- WHAT STI IS AND IS NOT
- AIMS AND OBJECTIVES OF STI
- THE DISTINCTION BETWEEN SCIENCE, TECHNOLOGY AND INNOVATION AND HOW THEY RELATE TO
- BASIC RESEARCH AND DEVELOPMENT (R&D);
- IMPLICATIONS FOR STI POLICY MAKING AND POLICY IMPLEMENTATION FROM R & D POLICY TO STI POLICY, FROM S & T POLICY TO STI IMPLEMENTATION; ETC.
- WHY STI POLICY IS THE NECESSARY CATALYST FOR ECONOMIC DEVELOPMENT OF NA
 TIONS
- INTERACTIVE QUESTIONS DESIGNED TO TEST TRAINEES' COMPREHENSION OF THE RELATED CONCEPTS DISCUSSED.



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zed into meaningful patterns.

Technology can be most broadly defined as the entities, both material and immaterial, created by the application of mental and physical effort in order to achieve some value. In this usage, technology refers to tools and



machines that may be used to solve real-world problems. It is a far-reaching term that may include simple tools, such as a crowbar or wooden spoon, or more complex machines, such as a space station. Tools and machines need not be material; virtual technologies such as computer software and business methods, fall under this definition of technology (Science and Engineering Indicators, 2002). The word "technology" can also be used to refer to a collection of techniques. In this context, it is the current state of humanity's knowledge of how to combine resources to produce desired products, to solve problems, fulfill needs, or satisfy wants; it includes technical methods, skills, processes, techniques, tools and raw materials. When combined with another term, such as "medical technology" or "space technology", it refers to the state of the respective field's knowledge and tools.

Innovation is any new knowledge introduced into and utilized in an economic or social activity. Innovations may be technical or social. Innovations may be by an individual or by a group.

For innovation to take place there must be continuous learning and the opportunities to learn depend on the degree and type of interactions between and among the different enterprises, organizations and related sectors. Innovations are therefore not solely the product of organized research and development activities undertaken within universities and research and development institutes. Neither can they be determined to be successful unless they result in economic gain or savings or improvements in social wellbeing or services. Everett Rogers, in his book, "Diffusion of Innovations" looks at how innovations are communicated, adopted and adapted. In particular he draws the distinction between an inventor, the individual who generates a new idea, and the innovator, who disseminates the idea to those who implement it.

Distinctions between Science, Technology and Innovation as well as their relationships with basic Research and Development (R&D)

The distinction between science and technology is not always clear. Science is the reasoned investigation or study of phenomena, aimed at discovering enduring principles among elements of the phenomenal world by employing formal techniques such as the scientific method (http://dictionary.reference.com/browse/science). Technologies are not usually exclusively products of science, because they have to satisfy requirements such as utility, usability and safety.

Technology is often a consequence of science and engineering — although technology as a human activity precedes the two fields. The exact relations between science and technology in particular have been debated by scientists, historians, and policymakers in part because the debate can inform the funding of basic and applied science. The issue remains contentious—though most analysts resist the model that technology simply is a result of scientific research (Wise, 1985 and Guston, 2000).



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The earliest approach to the study of innovation was rooted in the "diffusion of innovation" theory which was articulated in the sixties and early seventies by Rogers and others (Engel, 1997). Later, a distinction was made between an innovation as an idea and a "technology" as a design for instrumental action (Rogers, 1986).

Social change was conceptualized as a process including three sequential stages: invention, diffusion and consequences (Rogers and Shoemaker, 1971). The source of such innovations was taken to be scientific research and development. This approach is consistent with the linear or transfer of technology (TOT) model of thinking on innovation. The limitation of such an approach has become increasingly clear (Roling, 1991). However, linear models of technological innovation may be useful in describing key steps in the R&D process and in documenting projects after the fact, but are not particularly helpful in understanding the process in real time. According to Carlsson et. al. (1976) linear models can describe what happened but not how it happened, and tend to reinforce the belief in a kind of orderliness which does not exist."

Innovation Systems

The systems of innovation approach provides a conceptual framework to understand the complexities of the innovation process, the institutional arrangements that affect it, and contributes to broaden the scope of innovation policymaking.

A system of innovation consists of a network of economic agents together with the institutions and policies that influence their innovative behaviour. As a conceptual framework, it refers to a notion of innovation as an interactive process. In this process, enterprises, in continuous interaction with each other and supported by institutions and organizations, create, diffuse and use knowledge within an economic system. These organizations include: the enterprise, industry, associations, innovation and productivity centres, standard setting bodies, research and development institutions, universities, vocational training centres and information services. They share information and knowledge and with the support of banking and other financing mechanisms bring new products, new processes and new forms of organization into economic use

Research & Development

Research and Development, often called R&D, is a phrase that means different things in different applications. In the world of business, research and development is the phase in a product's life that might be considered the product's conception. That is, basic science must exist to support the product's viability, and if the science is lacking, it must be discovered - this is considered the research phase. If the science exists, then turning it into a useful product is the development phase.

Specifically, R & D comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications (www.uis.unesco.org).

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There is considerable debate over what the 'R' is and what is the 'D' in research and development. Traditionally, research was broken into basic research and applied research, with basic research delving into basic scientific principles and applied research looking for ways to use the basic science to better human lives. Basic Research: The objective of basic research is to gain more comprehensive knowledge or understanding of the subject under study without specific applications in mind. Although basic research may not have specific applications as its goal, it can be directed in fields of present or potential interest. This is often the case with basic research performed by industry or mission-driven agencies.

Applied Research: The objective of applied research, is to gain knowledge or understanding of a specific recognized need. In industry, applied research includes investigations to discover new scientific knowledge that has specific commercial objectives with respect to products, processes, or services. Development: Development is the systematic use of the knowledge or understanding gained from research directed toward the production of useful materials, devices, systems, or methods, including the design and development of prototypes and processes (National Science Board, 2008).

In other words, R&D has a special economic significance apart from its conventional association with scientific and technological development. R&D investment generally reflects a government's or organization's willingness to forgo current operations or profit to improve future performance or returns, and its abilities to conduct research and development.

In general, R&D activities are conducted by specialized units or centers belonging to companies, universities and state agencies. In the context of commerce, "research and development" normally refers to future-oriented, longer-term activities in science, technology or innovation, using similar techniques to scientific research without predetermined outcomes and with broad forecasts of commercial yield.

EXAMPLES OF R&D ACTIVITIES

In the field of medicine, routine autopsy on the causes of death is the practice of medical care and is not R&D; special investigation of a particular mortality to establish the side effects of certain cancer treatments is R&D. Similarly, routine tests such as blood and bacteriological tests carried out for doctors are not R&D, whereas a special programme of blood tests in connection with the introduction of a new drug is R&D. The keeping of daily records of temperatures or of atmospheric pressure is not R&D but the operation of a weather forecasting service or general data collection. The investigation of new methods of measuring temperature is R&D, as are the study and development of new systems and techniques for interpreting the data (www.uis.unesco.org).





Science & Technology Policies

A policy is a statement of intent, action or inaction by the public authority in response to the need to achieve a pre-determined purpose, which may or may not be formally declared (CTA, 2000). This suggests that policy is an intervention, implying that the expected output is an outcome which would not have been the result without the policy intervention. It is worth noting that the word "inaction" is not redundant; its usage recognizes the fact that sometimes what a government does or says is as important as what it does not do or say. Thus, even in the event of no statement or action there will be definite (policy) consequences of a passive stance taken by a government on development issues.

Scientific and technical knowledge and guidance influences not just policy related to science and technology, but also many of today's public policies as policymakers seek knowledge to enhance the quality of their decisions. Science and technology policy is concerned with the allocation of resources for and encouragement of scientific and engineering research and development, the use of scientific and technical knowledge to enhance the nation's response to societal challenges. Science, research and innovations are intricately linked to societal needs and the nation's economy in areas such as transportation, communication, agriculture, education, environment, health, defense, and jobs. As a result, policymakers are interested in almost every aspect of science and technology policy. The three branches of government—executive, legislature, and judiciary—depending on each branch's responsibility, use science and technology knowledge and guidance to frame policy issues, craft legislation, and govern.

Because science and technical knowledge and guidance influences public policy decision making on many other issues, it was once felt that science and technology policy did not need to be a separate field of inquiry , but that view has evolved and the consensus now is that S&T policy is clearly different from other public policy issue areas. These differences include the rapidity of change in science and technology; novelty of many issues in science and technology; scale, complexity, and interdependence among technologies; irreversibility of many scientific and technological effects; public worries about real or imagined threats to human health and safety; and the challenges to deeply held social values (Nichols, 1979).

Aim of Science and Technology Policy: To establish an environment conducive to building up competences and competitiveness and assist the nation to achieve highest added value, efficiency and productivity in the delivery of goods and services through the use of science and technology.



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Strategic Objectives of the S&T Policy

- a) Foster stronger S&T human resource base
- b) Develop a culture of innovation and creativity
- c) Create job opportunities and alleviate poverty

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- a) Foster stronger S&T and more coherent human resource base
- b) Create and sustain a competitive productive sector.
- c) Develop a culture of innovation and creativity
- d) Create job opportunities and alleviate poverty
- e) Build a Vibrant information society
- f) Promote and commercialize IKS
- g) Optimize the interaction between various actors towards the provision of technological prod ucts and services to society.

The Six Pillars which S&T Policy should Address

- 1. What are the basic needs, strengths and resources of the nation?
- 2. How can S&T be applied to harness the Country's material base and wealth?
- 3. Which sectors and in what order should country stake its financial and S&T resources?
- 4. What are the country's most urgent priority areas for technological skills and which are the best models and facilities to provide?
- 5. How can S&T assist country rationalize the scarce resources and balance its socio economic impera tives?
- 6. What strategies should Government and Private Sector employ to enhance development of science and technology?



From R & D policy to STI policy, from S & T policy to STI Implementation - shift in emphasis

It has become increasingly clear that an effective national system of innovation is required if a country is to harness the potential offered by modern science and technology to its social and economic needs (Ahrens, 2005). This awareness has replaced an earlier belief that heavy investment in scientific and technological research and the purchase of technology from abroad, were sufficient to achieve these goals.

Traditional S&T policy are mainly concerned with creation of new knowledge. Input indicators include R&D budget, while output indicators include publications & patents. However, S&T strategies have shifted during the past decade from a NRS (national research system) perspective to an S T & I perspective. The latter comprises a far broader set of actors than the traditional R & D and S&T perspectives. This system of thinking represents a significant change from the conventional linear approach to research and development. It provides analytical framework that explore complex relationships among heterogeneous agents, social and economic institutional opportunities.

There has been a process of evolution in the way practitioners and academics have dealt with Science, Technology and Innovation Policies (STIP). Science policy in the Western world was established in the immediate aftermath of World War II. Initially, the main area of intervention and action was just science. In the late 1960s, technology emerged more clearly as an area of concern; due to budgetary constraints there was a need to be more efficient in the allocation of resources and to ameliorate the impact of technological change on the overall economy and society. From the 1980s onwards, there has been a shift in government policy to a focus on innovation policy. Christopher Freeman classified STI policies from an economic perspective.

He also defined three periods, similar focus and time range:

- 40s and 50s supply-side policies: focused on strengthening S&T capabilities, especially science.
- 60s and 70s demand-side policies: aiming at creating market needs for technology.
- 80s onwards: policies designed to provide effective linkages between supply and demand, and to re spond to a new technological paradigm based on information and communication technologies.



Emerging S T & I policies lay more emphasis on the application and exploitation of knowledge with more emphasis on economic productivity, share of high-tech companies, new markets, new start-ups, (entrepreneurial) skills of the labor force, etc. The ST&I perspective recognizes that innovation takes place throughout the whole economy, and not all innovations have their origin in formal R & D or S&T nor are they all exclusively technical. According to Metcalfe (2000), technology involves much more than science, and innovation involves much more than technology.

Innovation does not always involve the application of technology, as could be the case in organizational and service innovations. Technology by itself is of no significance unless it is translated into innovation. Innovation and diffusion are primarily economic and social processes which involve many other actors and behaviours besides those directly involved in the creation of technology itself. In the same line of argument, Dodgson and Bessant (1996) argue:

"It is inadequate to think of innovation in 'technological' terms alone. The process of innovation involves consideration of finance, marketing, organization, training, relationships with customers and suppliers, competitive positioning, as well as relationships between products and processes" Based on the above, technology policy and science policy are best presented as aspects of a broader innovation policy.

What is innovation policy? Dodgson and Bessant wrote:

"Innovation policies aim at improving the capacity to innovate of firms, networks, industries and entire economies. Innovation is a process which involves flows of technology and information between multiple agents, including firms of all sizes and public and private research institutes. Innovation policy's principal aim is to facilitate the interaction and communication among these various actors. (...) Innovation policy is therefore different from science policy, which is concerned with the development of science and the training of scientists, and from technology policy, which has as its aims the support, enhancement and development of technology".

What should an innovation policy include? Most of taxonomies refer to technology policy, few to innovation policy. Dodgson and Bessant (1996) organized the policy tools for innovation support under the following headings (with examples in brackets):

- direct financial support (grants, loans guarantees),
- indirect financial support (venture capital),
 - information (databases, consultancy services),



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- scientific and technical infrastructure (public research labs, research grants),
- educational infrastructure (general education and training system),
- public procurement (national or local governments),
- taxation (company, personal, tax credits for R&D),
- regulation (patents, environment control),
- public enterprise (innovation by public-owned industries),
- political (regional policies, awards and honours for innovation),
- public services (telecom, transport), and
- trade (trade agreements, tariffs).

This classification shows the wide variety of measures, both direct and indirect, that could be implemented. Within this range of tools some are supply-oriented, others demand-oriented, and others aim to facilitate linkages between supply and demand.

Why STI Policy is the necessary catalyst for Economic Development of Nations?

According to Ahrens (2005) national policies for science, technology and innovation (ST&I) are now widely recognised as having an important impact on a country's growth and development prospects. This is because science technology and innovation (S T & l) are major contributors to food security, poverty reduction, and economic growth, as has been proven in Asia since the early-1970s through the Green Revolution in agriculture.

The World Bank study of the difference between poverty and wealth in the development trajectories of Ghana and South Korea shows the increasing importance of knowledge as a driver of growth of the global economy, and how the ability of a society to produce, select, adapt, commercialize and use knowledge is a key to sustained economic growth and improved living. In other words, what any society that must develop into a vibrant economic major income society must do is to first place science, technology and innovation as the bedrock of its society.



However, developing countries often lack significant ST&I capacity, yet all face the challenge of catching up with more advanced economies if they are to compete effectively in an increasingly globalized market place, to overcome their relative underdevelopment, and thus eventually to eliminate poverty within their societies. ST&I policies have many different components (Ahrens, 2005). They include measures to promote research and technological progress directly, whether in regions, industrial sectors or national economies. But the relevant policies also embrace the institutional, organizational and politico-administrative measures needed to strengthen national systems of innovation (Wagner et al., 2001), as well as to integrate such systems into a country's wider policy framework.

Designing coherent policies

It is becoming increasingly clear that the main reason for the difficulty in building up an adequate capacity in science and technology (and moving up the scientific and technological ladder) is insufficient government capabilities and effectiveness. To overcome any relative backwardness in economic development, developing countries need to strengthen both their ST&I policies and their national systems of innovation. And to do this, they will need an effective state apparatus for designing and implementing coherent innovation policies, establishing market institutions, and enforcing the rules and mechanisms of interaction.

S T & I policies in both developed and developing countries are embedded in a complex policy framework that is often subject to pressures from a range of social groups. As a result, designing national S T & I policies usually results in a policy mix that reflects diverse objectives and interests.

In order to ensure the coherence, consistence and efficiency of S T & I policies, policy makers should adhere to several principles that have emerged over the last decade as the result of analyses and increased understanding of how innovation processes and technological accumulation works.

These principles include a commitment to:

- developing successful networks between the state, academic organizations and industry, to increase the efficiency of the innovation system;
- fostering flexible research organizations that can adapt and meet changes in research objectives over the course of national economic development;
 - self-sustainability, with an emphasis on temporary rather than permanent government support;
- competition among the organizations that form the innovation system, requiring a transparent (and predictable) market-oriented regulatory and legal framework;



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- a lack of bureaucratic rigidity in research organizations;
- continuous evaluation;
- techniques for risk analysis and risk management; and
- ensuring subsidiarity, that is, ST&I issues should be handled by the lowest competent level so deci sions on diffusion activities, for example, can be taken at the regional level. The role of central govern ment will be restricted to mission-oriented policies - which focus on the development selected tech nologies considered to be strategic for a country — and to create a 'level playing field'.
- The extent to which a country adheres to these principles as well as their significance for that country — depends on the stage of development that it has reached, and the capacity of its governance structures.
- Functional and horizontal policies that can strengthen science, technological development and innovation:
- developing and maintaining a market-friendly policy and regulatory environment that stimulates the technological efforts of firms, and helps enhance technological capabilities;
- promoting a trade policy that facilitates technology transfer from abroad, including the encourage ment of foreign direct investment (investment in a given country by foreign companies, setting up production facilities, for instance), licensing arrangements (granting a firm, through payment, the use of a patent or trademark), 'turn-key' projects (industrial projects in which a contracted company is responsible for the overall management of the investment project and the client only for the opera tion) and technical assistance;
- helping to provide an appropriate technological infrastructure, including an education system that is responsive to business needs, and effective public research organizations.

Suitability of policy tools, and strategies.

This depends on the stage of technological and economic development a country has reached. In countries viewed as scientifically lagging or scientifically developing where capabilities remain low, governments may choose to rely primarily on functional and horizontal policies. A functional policy is defined by the activity of it governs (e.g Mining), whilst a horizontal policy is a broad-based approach to guide the more than one specific activity, usually across similar levels of operations (e.g extractive industries). At this stage of development, horizontal ST&I policies dominate, helping to identify sustainable areas of competitive advantage in the economy. In tandem with the provision of technological infrastructure, such horizontal approaches help to endow businesses with a 'learning to innovate perspective' — that is, they encourage capacity building in the private sector as a basis for home-grown innovation.

At early stages of economic and technological development, selective interventions should be limited in number. They should focus on strategic industries such as low-skill manufacturing industries, extractive industries such as mining, and agriculture, all of which can help a country accumulate the know-how and capabilities essential for pursuing more sophisticated policies.

This approach enables political authorities to improve their understanding of how to design sectoral policies, to learn what kind of incentives work under which conditions, and to develop strategic capabilities that allow them to formulate a new policy portfolio.

funding, and effective mechanisms for implementation. And they must be formally linked to private sector stakeholders who are engaged in indigenous innovation and technology transfer.Furthermore, macroeconomic and political stability — as well as a competitive market economy based onprivate property — seem to be essential for the success of policies supporting innovation. If they are not in place, or only exist in a restricted form, companies will face uncertain expectations and high risks, and will be discouraged from investing in technological research and long-term innovation. At a higher stage of economic development, policy making can begin to rely on activities that require specialized skills and more information. This applies to the so-called scientifically proficient countries, and even to those scientifically developing countries that have evolved a more competent bureaucracy, as well as institutions that facilitate cooperation between the government and organizations in the private sector.

At this stage, vertical policies can become key ingredients in S T & I. Vertical Policies govern several tiers of government and are often more effective than horizontal policies because they cut across policy design to implementation and sometimes monitoring and evalutation. However, they are also more difficult to design and put into practice.

Effective ST&I policies must pursue clear strategic objectives, identify priorities for action, and demonstrate a high level of coherence. They usually require a range of policy instruments, sustained public funding, and effective mechanisms for implementation. And they must be formally linked to private sector stakeholders who are engaged in indigenous innovation and technology transfer. Furthermore, macroeconomic and political stability — as well as a competitive market economy based on private property — seem to be essential for the success of policies supporting innovation. If they are not in place, or only exist in a restricted form, companies will face uncertain expectations and high risks, and will be discouraged from investing in techno-



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logical research and long-term innovation.

If a country's economy is to be shifted on to a higher trajectory of development, a clear set of rules, regulations and S T &I policies is needed. Dynamic economic evolution results from systematic and continuing investments both in learning, and in applying new skills and knowledge to economic and political exchanges. This can only happen if a society is willing and able to acquire skills and knowledge in productivity-enhancing activities, to foster innovation, to act creatively and to take risks. The emergence of such characteristics cannot be directly determined by the state. But governments can support the growth of an efficient and flexible national system of innovation by establishing an appropriate governance structure — one that makes ST&I policies more effective, enhances collaboration between public and private sectors, and enforces stable, market-friendly rules and regulations.

Finally, if combined with a credible strategy for sharing the benefits of growth — as South Korea, Taiwan and Malaysia, for example, were able to pursue between the 1960s and the 1980s — ST&I policies may help in fighting poverty sustainably, facilitate the country's economic growth and enhance the prospects of under-privileged groups in society.





Quiz

1. STI means.....

- a) Science, Technology and invention
- b) Science, Training for Innovation
- c) Science, Technology and Innovation
- 2. What is the importance of STI policies to the economic development of a country?
 - a) It encourages economic growth
 - b) It promotes peace
 - c) It enhances national pride
- 3. What are the challenges in developing a national system of innovation in develop ing countries?
 - a) Lack of educational literacy
 - b) Diversity of the population
 - c) Functional and horizontal STI policies
- 4. What are the benefits of STI policies in national development?
 - a) More coordinated and effective governance
 - b) Attainment of Millennium development goals
 - c) More stable government
 - 5. Give examples of activities that could constitute R & D in a specified sector
 - a) Genetically Modified Crops in agriculture
 - b) Curriculum development for primary education
 - c) Gender empowerment programmes in health.





OVERVIEW OF NECESSARY TOOLS TO ENSURE A SUCCESSFUL STI POLICY FORMULATION

CHAPTER 2



THIS CHAPTER COMPRISE BASIC DISCUSSIONS ON THE SELECTED TOOLS FOR ACHIEVING A SUCCESSFUL STI POLICY, INCLUDING:

- DATA GATHERING TOOLS: SURVEYS, KEY INDICATORS, STATISTICS FOR PLANNING
 AND MONITORING
- POLICY MAPPING & CONTEXT ASSESSMENT TOOLS E.G. THE RAPID FRAMEWORK, STAKEHOLDER ANALYSES, WRITE-SHOPS, FORCE-FIELD ANALYSES AND SWOT ANALYSES.
- COMMUNICATION TOOLS SUCH AS COMMUNICATION STRATEGY, MESSAGE DESIGN & MEDIA RELATIONS.
- KNOWLEDGE MANAGEMENT & LEARNING TOOLS
- POLICY INFLUENCE MAPPING TOOLS SUCH AS POWER MAPPING, LOBBYING AND AD VOCACY, CAMPAIGNING AND DPSIR FRAMEWORK.

THE CHAPTER ALSO INCLUDES KEY QUESTIONS REGARDING THE EXTERNAL ENVIRONMENT, AVAILABLE EVIDENCE, THE POLITICAL CONTEXT, AND EXISTING LINKAGES BOTH FROM THE DEMAND AND SUPPLY SIDES, INCLUDING:

- WHAT THE POLICYMAKER NEEDS TO KNOW?
- WHAT THE POLICYMAKER NEEDS TO DO?
- HOW TO DO IT
- KEY QUESTIONS



Data Gathering tools: Surveys, Key Indicators, Statistics for planning and monitoring Surveys

here are many ways to get information. The most common research methods are: literature searches, talking with people, focus groups, personal interviews, telephone surveys, mail surveys, email surveys, and internet surveys. A literature search involves reviewing all readily available materials. These materials can include internal company information, relevant trade publications, newspapers, magazines, annual reports, company literature, on-line data bases, and any other published materials. It is a very inexpensive method of gathering information, although it often does not yield timely information. Literature searches over the web are the fastest, while library literature searches can take between one and eight weeks.

Talking with people is a good way to get information during the initial stages of a research project. It can be used to gather information that is not publicly available, or that is too new to be found in the literature. Examples might include meetings with prospects, customers, suppliers, and other types of business conversations at trade shows, seminars, and association meetings. Although often valuable, the information has questionable validity because it is highly subjective and might not be representative of the population. A focus group is used as a preliminary research technique to explore peoples ideas and attitudes. It is often used to test new approaches (such as products or advertising), and to discover customer concerns. A group of 6 to 20 people meet in a conference-room-like setting with a trained moderator. The room usually contains a one-way mirror for viewing, including audio and video capabilities. The moderator leads the group's discussion and keeps the focus on the areas you want to explore. Focus groups can be conducted within a couple of weeks and costs vary. Their disadvantage is that the sample is small and may not be representative of the population in general.

Personal interviews are a way to get in-depth and comprehensive information. They involve one person interviewing another person for personal or detailed information. Personal interviews can be expensive because of the one-to-one nature of the interview. Typically, an interviewer will ask questions from a written question-naire and record the answers verbatim. Sometimes, the questionnaire is simply a list of topics that the research wants to discuss with an industry expert. Personal interviews (because of their expense) are generally used only when subjects are not likely to respond to other survey methods.

Telephone surveys are the fastest method of gathering information from a relatively large sample (100-400 respondents). The interviewer follows a prepared script that is essentially the same as a written question-naire. However, unlike a mail survey, the telephone survey allows the opportunity for some opinion probing. Telephone surveys generally last less than ten minutes.



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Mail surveys are a cost effective method of gathering information. They are ideal for large sample sizes, or when the sample comes from a wide geographic area. They cost a little less than telephone interviews, however, they take over twice as long to complete (eight to twelve weeks). Because there is no interviewer, there is no possibility of interviewer bias. The main disadvantage is the inability to probe respondents for more detailed information.

Email and internet surveys are relatively new and little is known about the effect of sampling bias in internet surveys. While it is clearly the most cost effective and fastest method of distributing a survey, the demographic profile of the internet user does not represent the general population, although this is changing. Before doing an email or internet survey, carefully consider the effect that this bias might have on the results.

Key Indicators

Key indicators are essential tools for tracking progress, supporting policy evaluation and informing the public. Since the early 1990s, such indicators have gained in importance in many countries and in international fora. Environmental indicators have gained particular currency in recent years, due to global concerns about Climate Change. Many OECD countries are also increasingly interested in using a reduced number of indicators selected from existing larger sets, to inform civil society and to support wider communication with the public. To support such initiatives, the OECD identified in 2001 a shortlist of environmental indicators building on previous work and on experience gained in using environmental indicators in its policy work.

These key indicators were selected from the core indicators included in the OECD Core Set of environmental indicators and are closely related to other environmental indicators sets developed and used by the OECD. Their selection took into account: their policy relevance with respect to major challenges for the first decade of the 21st century, including pollution issues and issues related to natural resources and assets; their analytical soundness; and their measurability.

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| | OECD set of key environmental | indicators |
|----------------------|--|--|
| POLLUTION ISSUES | Available indicators* | Medium term indicators** |
| Climate change | CO2 emission intensities index of greenhouse gas emissions | Index of greenhouse gas emissions |
| Ozone layer | 2 Indices of apparent consumption of ozone depleting substances (COS) | Same, plus aggregation into one index of apparent consumption of ODS |
| Air quality | SOx and NOx emission intensities | Population exposure to air pollution |
| Waste generation | Municipal waste generation intensities | Total waste generation intensities, Indicators derived from material flow accounting |
| Freshwater quality | 5. Waste water treatment connection rates | Pollution loads to water bodies |
| NATURAL RESOURCE | & ASSETS | |
| Freshwater resources | Intensity of use of water resources | Same plus sub-national breakdown |
| Forest resources | 7. Intensity of use of forest resources | Same |
| Fish resources | Intensity of use of lish resources | Same plus closer link to available resources |
| Energy resources | Intensity of energy use | Energy efficiency index |
| Biodiversity | 10. Threatened species | Species and habitat or ecosystem diversity Area of key ecosystems |
| | * indicators for which data are available for a majority of OECD countries and that are presented in this report | ** indicators that require further specification and development levaliability of basic data sets, underlyin, concepts and definitions). |





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CLIMATE CHANGE

MAIN POLICY CHALLENGES

Main concerns relate to effects of increasing atmospheric greenhouse gas (GHS) concentrations on global dempetatives and one earth's classic, and potential consequences for ecosystems, human settlements, agriculture and other socio-economic echietee. This is techned OD- and other GHS emissions are shill growing to many countriles, deephe some progress achieved in de-crupping CO- emissions from GDP growth (weak te-cauging).

The main challenges are to finit emissions of COr and other GHG and to stabilise the concentration of GHG in the stimosphere at a large that would prevent cangerous entimpogenic interference with the ofmate system. This implies strengthening efforts to implement related national and international strengtes and to further de-couple GHO emissions from economic grawth.

MEASURING PERFORMANCE

- Environmental performance can be assessed against dimentio objectives and international communicates. The main international agreement is the United Performance Convention on Climate Change (1992). In 1907 Ryolo Protocol establishes differentiated solicenal or regional emission reduction or Similation targets for six OHG for 2008-12 and for the base year 1980. The Kyote Protocol tres base notified by 120 parties, including all but have theOD countries, but is not yet in force.
- The indicators proceeded treve relete to OHG emersions and to COL emissions from energy use. They show emission intensitive per unit of GOP and per capito for 2003, and related obsoges since 1090. All emissions prevented base are prove check emissions, emitted within the national taxtory and excluding sinks and indicat educate. GMD emissions refer to the extra of the 6 gases of the Kyoto Protocol (CO-, CH4, NO), PEOs, HEQS and Shi supresent in CO- equivalents, polar supray, 0500-374, UMPCOD;
 - When interpreting these indicators if should be noted that DOr is a major contributor to the greenhouse effect. They should be read in contractors with other indicators from the DECD Core Set and in particular with indicators on global admospheric concentrations of GFIQ, on energy efficiency and on energy prices and taxes. Their interpretation should take into account the smuoture of countries' energy supply, the relative importance of lossil fuels and of renewable energy, as well as other interpret.

MONITORING TRENDS



Instel 2 remain of DELD countries have developed that COV and doter Grid emissions from GUP grown, most countries have not subcease in meeting their can national commitments. Their anissions contributed to increase throughout the 1990s, despite gains in energy efficiency (i.e. weak de-coupling). Overall since 1990, CO-emissions from energy use have grown more slowly in DECD countries as a group than they have world-wide. However, recent data suggest that DECD grown values are now on per with those world-wide.

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CLIMATE CHANGE

Statistics for planning and monitoring Statistical Significance

What does "statistical significance" really mean?

Many researchers get very excited when they have discovered a "statistically significant" finding, without really understanding what it means. When a statistic is significant, it simply means that you are very sure that the statistic is reliable. It doesn't mean the finding is important or that it has any decision-making utility. For example, suppose we give 1,000 people an IQ test, and we ask if there is a significant difference between male and female scores. The mean score for males is 98 and the mean score for females is 100. We use an independent groups t-test and find that the difference is significant at the .001 level. The big question is, "So what?". The difference between 98 and 100 on an IQ test is a very small difference...so small, in fact, that its not even important. Then why did the t-statistic come out significant? Because there was a large sample size. When you have a large sample size, very small differences will be detected as significant. This means that you are very sure that the difference is real (i.e., it didn't happen by fluke). It doesn't mean that the difference is large or important. If we had only given the IQ test to 25 people instead of 1,000, the two-point difference between males and females would not have been significant.

Significance is a statistical term that tells how sure you are that a difference or relationship exists. To say that a significant difference or relationship exists only tells half the story. We might be very sure that a relationship exists, but is it a strong, moderate, or weak relationship? After finding a significant relationship, it is important to evaluate its strength. Significant relationships can be strong or weak. Significant differences can be large or small. It just depends on your sample size.

Many researchers use the word "significant" to describe a finding that may have decision-making utility to a client. From a statistician's viewpoint, this is an incorrect use of the word. However, the word "significant" has virtually universal meaning to the public. Thus, many researchers use the word "significant" to describe a difference or relationship that may be strategically important to a client (regardless of any statistical tests). In these situations, the word "significant" is used to advise a client to take note of a particular difference or relationship because it may be relevant to the company's strategic plan. The word "significant" is not the exclusive domain of statisticians and either use is correct in the business world. Thus, for the statistician, it may be wise to adopt a policy of always referring to "statistical significance" rather than simply "significance" when communicating with the public.

One-Tailed and Two-Tailed Significance Tests

One important concept in significance testing is whether you use a one-tailed or two-tailed test of significance. The answer is that it depends on your hypothesis. When your research hypothesis states the direction



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of the difference or relationship, then you use a one-tailed probability. For example, a one-tailed test would be

used to test these null hypotheses: Females will not score significantly higher than males on an IQ test. Blue collar workers are will not buy significantly more product than white collar workers. Superman is not significantly stronger than the average person. In each case, the null hypothesis (indirectly) predicts the direction of the difference. A two-tailed test would be used to test these null hypotheses: There will be no significant difference in IQ scores between males and females. There will be no significant difference in the amount of product purchased between blue collar and white collar workers. There is no significant difference in strength between Superman and the average person. The one-tailed probability is exactly half the value of the two-tailed probability.

There is a raging controversy (for about the last hundred years) on whether or not it is ever appropriate to use a one-tailed test. The rationale is that if you already know the direction of the difference, why bother doing any statistical tests. While it is generally safest to use a two-tailed tests, there are situations where a one-tailed test seems more appropriate. The bottom line is that it is the choice of the researcher whether to use one-tailed or two-tailed research questions.

Procedure Used to Test for Significance

Whenever we perform a significance test, it involves comparing a test value that we have calculated to some critical value for the statistic. It doesn't matter what type of statistic we are calculating (e.g., a t-statistic, a chi-square statistic, an F-statistic, etc.), the procedure to test for significance is the same.

- Decide on the critical alpha level you will use (i.e., the error rate you are willing to accept).
- Conduct the research.
- Calculate the statistic.
- Compare the statistic to a critical value obtained from a table.

If your statistic is higher than the critical value from the table:

- Your finding is significant.
- You reject the null hypothesis.

The probability is small that the difference or relationship happened by chance, and p is less than the critical alpha level (p < alpha).

If your statistic is lower than the critical value from the table:

- Your finding is not significant.
- You fail to reject the null hypothesis.

The probability is high that the difference or relationship happened by chance, and p is greater than the critical alpha level (p > alpha).

Modern computer software can calculate exact probabilities for most test statistics. If you have an exact probability from computer software, simply compare it to your critical alpha level. If the exact probability is less than the critical alpha level, your finding is significant, and if the exact probability is greater than your critical alpha level, your finding is not significant. Using a table is not necessary when you have the exact probability for a statistic



Policy Mapping and Content Assessment Tools

The policy problem is not one of optimization; it is not feasible to specify all possible outcomes, rank them insignificantly higher than males on an IQ test. Blue collar workers are will not buy significantly more product than white collar workers. Superman is not significantly stronger than the average person. In each case, the null hypothesis (indirectly) predicts the direction of the difference. A two-tailed test would be used to test these null hypotheses: There will be no significant difference in IQ scores between males and females. There will be no significant difference in the amount of product purchased between blue collar and white collar workers. There is no significant difference in strength between Superman and the average person. The one-tailed probability is exactly half the value of the two-tailed probability.

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Policy Mapping & Context Assessment Tools e.g. the Rapid Framework, Stakeholder Analyses, Write-Shops, Force-Field Analyses, SWOT Analyses.

Policy Mapping and Content Assessment Tools

The policy problem is not one of optimization; it is not feasible to specify all possible outcomes, rank them in terms of desirability, list all possible policy alternatives and then choose among them. Policy-making is a process of successive approximation to some desired objectives in which what is desired itself continues to change under reconsideration. "A wise policy-maker consequently expects that his policies will achieve only part of what he hopes and at the same time will produce unanticipated consequences he would have preferred to avoid. If he proceeds through a succession of incremental changes, he avoids serious lasting mistakes in several ways." (Lindblom, 1959).

Based on over five years of theoretical and case study research, Overseas Development Institute's (ODI) Research and Policy in development programme has developed an analytical framework and practical tools that can help researchers to do this. The RAPID Context, Evidence Links (CEL) framework can be used as a conceptual framework to help researchers and policy entrepreneurs understand the role that evidence-based research plays, amongst other issues, in influencing policy. But for this to happen more effectively researchers need to do three things:





First, they need to develop a detailed understanding of:

- 1. the policymaking process what are the key influencing factors, and how do they relate to each other?
- 2. the nature of the evidence they have, or hope to get is it credible, practical and operationally useful? and
- 3. all the other stakeholders involved in the policy area who else can help to get the message across?

Second, they need to develop an overall strategy for their work – identify political supporters and opponents, keep an eye out for, and be able to react to policy windows, ensure the evidence is credible and practically useful, and build coalitions with like-minded groups.

Third, they need to be entrepreneurial – get to know, and work with the policymakers, build long term programmes of credible research, communicate effectively, use participatory approaches, identify key net workers and salesmen and use shadow networks.

What Influences Research to Policy Uptake? The RAPID Framework

There are many types of research which inform the policies at many levels, some are data rich, others contain informal collections of data and assessment for situational analysis. The link between research and policy, or evidence and practice, is often viewed as a linear process, whereby a set of research findings or lessons shift from the 'research sphere' over to the 'policy sphere', and then have some impact on policymakers' decisions and practical programmes. Reality tends to be much more dynamic and complex, with two-way processes between research, policy and practice, shaped by multiple relations and reservoirs of knowledge. Often it seems that researchers, practitioners and policymakers live in parallel universes. Researchers cannot understand why there is resistance to policy change despite clear and convincing evidence. Policymakers bemoan the inability of many researchers to make their findings accessible and digestible in time for policy decisions. Practitioners often just get on with things.

The traditional question 'How can research be transported from the research to the policy sphere?' has been replaced by a more complex question: 'Why are some of the ideas that circulate in the research/policy networks picked up and acted on, while others are ignored and disappear?'. ODI's theoretical, case study and practical work has identified a wide range of inter-related factors, which determine whether research-based and other forms of evidence are likely to be adopted by policymakers and practitioners.

These factors can broadly be divided into three overlapping areas:

- the political context;
- the evidence; and

• the links between policy and research communities, within a fourth set of factors: the external context. The interplay of these four areas is laid out in Figure 1.

The RAPID Framework. Framework for Research-Policy Linkages (Developed by Overseas Development Institute) Overview of necessary tools to ensure a successful sti policy formulation



Fig. 1 RAPID Framework. (Source:ordi.org.uk/rapid

Four components (PELE)

- Political context Local, national
- Evidence Credibility, communication
- Links Networks, influence, interactions
- External environment Regional, international

The framework should be seen as a generic, perhaps ideal, model. In some cases there will not be much overlap between the different spheres; in others the overlap may vary considerably. Political Context: Politics and Institutions

Research-policy links are dramatically shaped by the political context. The policy process and the production of research are in themselves political processes from start to finish. Key influencing factors include:

- The extent of civil and political freedoms in a country;
- Political contestation, institutional pressures and vested interests;



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The attitudes and incentives among officials, their room for manoeuvre, local history, and power relations.

In some cases the political strategies and power relations are obvious, and are tied to specific institutional pressures. Ideas circulating may be discarded by the majority of staff in an organization if those ideas elicit disapproval from the leadership.

Evidence: Credibility and Communication

Policy influence is affected by topical relevance and, as importantly, the operational usefulness of an idea; it helps if a new approach has been piloted and the document can clearly demonstrate the value of a new option. A critical issue affecting uptake is whether research has provided a solution to a problem. The other key set of issues concern communication. The sources and conveyors of evidence, the way new messages are packaged (especially if they are couched in familiar terms) and targeted, can all make a big difference. For example, marketing is based on the insight that people's reaction to a new product or idea is often determined by the packaging rather than the content in and of itself. The key message is that communication is a very demanding process and it is best to take an interactive approach. Continuous interaction leads to greater chances of successful communication than a simple or linear approach. However, although evidence clearly matters, there has been very limited systematic understanding of when, how and why evidence informs policy.

Links: Influence and Legitimacy

The third issue relates to the importance of links: of communities, networks and intermediaries (for example, the media and campaigning groups) in affecting policy change. Some of the current literature focuses explicitly on various types of networks, such as policy communities, epistemic communities, and advocacy coalitions. While systematic understanding remains limited, issues of trust, legitimacy, openness and the formalization of networks have emerged as important. Existing theory stresses the role of translators and communicators. It seems that there is often an under-appreciation of the extent and ways that intermediary organizations and networks impact on formal policy guidance documents, which in turn influence officials.

External Influences

Finally, a synthesis of the RAPID framework emphasizes the impact of external forces and donors actions on research-policy interactions. While many questions remain, key issues here include the impact of international politics and processes, as well as the impact of general donor policies and specific research-funding instruments. Trends towards democratization and liberalization and donor support for civil society are having an impact. Much of the research on development issues is undertaken in the North, raising concerns of relevance and beneficiaries' access to the findings. A substantial amount of research in the poorest countries is funded by international donors, which also raises a range of issues around ownership, whose priorities, use of external consultants and perceived legitimacy. As policy processes become increasingly global, this arena will increase in importance.



When Does Evidence Influence Policy?

Emerging results from ODI studies seems to indicate that research-based and other forms of evidence are more likely to contribute to policy if:

- It fits within the political and institutional limits and pressures of policymakers, and resonates with their assumptions, or sufficient pressure is exerted to challenge them;
- The evidence is credible and convincing, provides practical slutionsto pressing policy prob lems, and is packaged to attract policymakers' interest;
- Researchers and policymakers share common networks, trust each other, and communicate effectively.

But these three conditions are rarely met in practice. Although researchers and practitioners can control the credibility of their evidence and ensure they interact with and communicate well with policymakers, they often have limited capacity to influence the political context within which they work. Resources are also limited, and researchers and practitioners need to make choices about what they do. By making more informed, strategic choices, researchers can maximize their chances of policy influence.

What Can Researchers Do?

Evidence from ODI's work so far provides preliminary recommendations in four areas, which are laid out in Table 1. The four components of the framework can provide the user with in-depth and valuable information regarding policy windows, key policy actors and networks, gaps in the existing evidence, alternative means of communication and trends and changes in the external environment. Thus, it presents some of the key questions that the researcher or policy entrepreneur should answer. However, it is important to recognize that the conditions of the political context, the evidence, the links and the external factors vary greatly according to the particular situation.

Framework for Action

For each of the four components:

- 1. What researchers need to know?
- 2. What researchers can do?
- 3. How to do it?



Table 1: How to affect policy and practice

| What researchers need to know | What researchers need to do | How to do it |
|---|--|---|
| Political Context: a) Who are the policymak ers? b) Is there policymaker demand for new ideas? c) What are the sources / strengths of resistance? d) What is the policymak ing process? e) What are the opportuni ties and timing for input into formal processes? | a) Get to know the policy makers, their agendas and their constraints. b) Identify potential sup porters and opponents. c) Plan and prepare for opportunities in regular policy processes. d) Look out for - and react to - unexpected policy windows. | a) Work with the policy makers. b) Seek commissions. c) Line up research pro grammes with high-profile policy events. d) Allow sufficient time and resources. e) Reserve resources to be able to move quickly to respond to policy windows. |
| Evidence: a) What is the current theory? b) What are the prevailing narratives? c) How divergent is the new evidence? d) What sort of evidence will convince policy makers? | a) Establish credibility over the long term. b) Provide practical solu tions to problems. c) Establish legitimacy. d) Build a convincing case and present clear policy options. e) Package new ideas in familiar theory or narra tives. f) Communicate effectively. | a) Build up programmes of high quality work. b) Clear strategy for com munication from the start. c) Face-to-face communica tion. d) Action-research and Pilot projects to demonstrate benefits of new approaches. e) Use participatory ap proaches to help with legitimacy and implementation. |
| Links: a) Who are the key stake holders? b) What links and networks exist between them? c) Who are the intermediar ies, and do they have influence? d) Whose side are they on? | a) Get to know the other stakeholders. b) Establish a presence in existing networks. c) Build coalitions with like-minded stakehold ers. d) Build new policy net works. | a) Partnerships between researchers, policymak ers and policy end users. b) Identify and link up key net workers and sales men. c) Use informal contacts. |


| What researchers need to know | What researchers need to do | How to do it |
|---|---|---|
| External Influences: a) Who are main interna tional actors in the policy process? b) What influence do they have? c) What are their aid priori ties? d) What are their research priorities and mecha nisms? e) What are the policies of the donors funding the research? | a) Get to know the donors, their priorities and con straints. b) Identify potential sup porters, key individuals and networks. c) Establish credibility. d) Keep an eye on donor policy and look out for policy windows. | a) Develop extensive back ground on international, regional donor policies. b) Orient communications to suit donor priorities and language. c) Cooperate with donors and seek commissions. d) Contact (regularly) key individuals. |

Source: http://www.odi.org.uk/rapid/Links/

Who are Stakeholders?

Stakeholders are all those people who have a stake (or share) in a particular issue or system. Stakeholders can be groups of people, organizations, institutions and sometimes even individuals. Other terms sometimes used in a similar way to stakeholders are "actors" and "interest groups". The word "actors" stresses that stakeholders are active and interact with each other. The use of the words "interest groups" indicates that people can be grouped according to a common interest. Stakeholders can be at any level or position in society, from the international to the national, regional, household or intra-household level. Stakeholders include all those who affect and are affected by policies, decisions or actions within a particular system. For example Table 2 shows the different institutional levels of possible stakeholders, actors and their possible interests.

Why is a stakeholder perspective important?

Development is not a linear process, which can be carefully designed with the use of a toolbox, but a longterm multi-stakeholder process in which pull and push factors, power relations and bargaining power influence the final outcomes. Policy process often fails because the stakeholders are not given enough consideration. Each stakeholder has a different interest in the situation. Stakeholder analysis is becoming more common in policy process. It attempts to deal with stakeholders' multiple and often conflicting views, interests and objectives. The term stakeholder analysis was first used in management science for identifying and addressing the interest of different stakeholders in business.

Nowadays, stakeholder analysis is frequently used for:

- a) Policy formulation,
- b) Project formulation,



c) Implementation and evaluation as well as for understanding and analyzing complex situations in natural resource management.

Stakeholder analysis is a way of understanding a system through its stakeholders. It looks at their interest, objectives, power and relationships. Stakeholder analysis will also show existing patterns of interaction between stakeholders. It will show conflicts and can help find ways to resolve them. By understanding the system, it is possible to facilitate change. In a project setting, stakeholder analysis can help to improve performance by helping to identify trade-offs between different stakeholders' objectives, and the conflicts between them. As a result, project efficiency and effectiveness can be improved. By helping to evaluate policy and project impacts e.g. the distributional, social and political impacts of policies and projects. It can highlight the needs and interest of powerless people.

Different types of stakeholders

A distinction can be made between different types of stakeholders. Stakeholders can be either active or passive. An active stakeholder is one who is actively involved; these include decision makers in government, academics, lobbyists, donor organizations policy analysts and advisers as well as advocates. Some distinguish between stakeholders and key stakeholders, others between active and passive or between primary and secondary stakeholders. Key stakeholders are those actors who are considered to have significant influence on the success of a project.

Primary stakeholders are the intended beneficiaries of a project.

Secondary stakeholders are those who perform as intermediaries within a project.

Active stakeholders are those who affect or determine a decision or action in the system or project.

Passive stakeholders are those who are affected by decisions or actions of others.

In considering stakeholders, it is sometimes helpful to consider their importance and influence. Important stakeholders are those whose needs are important to a project or study. Influential stakeholders are those who have the power to control decisions in an activity or who can influence others in the decision making process. Importance and influence are not the same. For example, rural women farmers might have been identified as an important stakeholder for equality purposes, but they may have traditionally little influence in decision-making processes.

Identifying stakeholders

Identifying stakeholders is an iterative process. New stakeholders are often identified by existing ones. To avoid missing important stakeholders, it is important to review this regularly. Some stakeholders will be



important at the beginning of the process but not at the end. Others may not be important at the start but become more important later. The final selection of stakeholders depends on the people responsible for the assessment. There is need to develop criteria for identifying who should be considered stakeholders. Such criteria might include, for example:

- Degree of economic, social or cultural reliance on the system
- Degree of effort and interest in the management of the system
- Present or potential impact of the activities of the stakeholder on the system
- Historical and cultural relationship with the system
- Unique knowledge or skills for the management of the system or resources at stake
- Existing rights to land or other natural resource.

To carry out a SWOT Analysis, questions such as the following need to be answered:

Strengths:

- a) What advantages does your company have?
- b) What do you do better than anyone else?
- c) What unique or lowest-cost resources do you have access to?
- d) What do people see as your strengths?
- e) What factors mean that you "get the sale"?

Consider this from an internal perspective, and from the point of view of your customers and people in your market. In looking at your strengths, think about them in relation to your competitors - for example, if all your competitors provide high quality products, then a high quality production process is not a strength in the market, it is a necessity.

Weaknesses:

- a) What could you improve?
- b) What should you avoid?
- c) What are people likely to see as weaknesses?
- d) What factors lose you sales?

Again, consider this from an internal and external basis: Do other people seem to perceive weaknesses that you do not see? Are your competitors doing any better than you? It is best to be realistic now, and face any unpleasant truths as soon as possible.

Opportunities:

- a) Where are the good opportunities facing you?
- b) What are the interesting trends you are aware of?
- c) Useful opportunities can come from such things as:
- d) Changes in technology and markets on both a broad and narrow scale



CASE STUDY





Stakeholders Analysis – Approaches

1. Strategic approach

A strategic approach to stakeholder analysis – also called "stakeholder analysis" is used to support the design, implementation and evaluation of a proposed project. The main purpose of this approach is to assist in the design and evaluation of projects. Some donors now require a stakeholder analysis as an integral part of project preparation. A good example is the UK's Department of International Develop-



ment (ODA, 1995). This type of stakeholder analysis includes the drawing up of matrices or checklists which show the interests of the stakeholders and what they can contribute to the project, as well as identifying risks for successful project implementation due to conflicts between stakeholder interests and project interest. These risks can then be included directly in the logical framework of the project. Based on these risks and assumptions the desired type of stakeholder participation in the various stages of the project cycle is identified as well as strategies for consensus building.

The steps that are usually followed in this approach are:

- 1. Draw up a list of stakeholders
- 2. Identify the interests of the stakeholders identified, in relation to the project or problem area
- 3. Evaluate the importance and influence of the stakeholders, and the implications of this for the project
- 4. Evaluate the implications for cooperation between stakeholders and the risks to the project represent ed by the different interests



5. Determine which stakeholders should participate in the project, when and how.

2. Scenario approach

A scenario approach to stakeholder analysis is used to look at complex situations and predict future situations and scenarios. It looks at conflict of interest between stakeholders and trade-offs between objectives. The aim is to improve the understanding of natural resource problems, structural changes and policy issues. Rather than starting with a project, this approach looks first at an agreed problem. By exploring the stakeholders' interests and objectives, it is possible to understand their behaviour. This approach is not used to facilitate project design and implementation. The people using this approach must also take up an 'outsiders' position.

3. Participatory approach

A participatory approach to stakeholder analysis is needed if it is to be used for facilitating dialogue and negotiating among stakeholders. The analysis of stakeholders' interest, perceptions, relationships, knowledge and experience should be done by the stakeholders themselves. The researchers or staff become facilitators and have a specific role. Stakeholders can then use participatory methods to understand their different interests, views and values. They can better understand how well they are organized to deal with particular problems, or not. It also allows them to develop commitment for collective action in future.

One such approach is called RAAKS – or "Rapid Appraisal of Agricultural Knowledge Systems" (Engel and Salomon, 1997). RAAKS consists of looking at the process of innovation from the different perspectives of the different stakeholders, through a series of iterative "windows" grouped in three major phases:

- a) Defining the problem
- b) Analyzing constraints and opportunities
- c) Planning strategies and actions

The A phase - defining the problem - can be subdivided into 5 windows:

- a) Define objectives
- b) Identify relevant stakeholders
- c) Evaluate the diversity of objectives of the stakeholders
- d) Evaluate the environment
- e) Redefine the problem

The B phase – analyzing constraints and opportunities – can be subdivided into 7 windows:

- a) Analysis of impact
- b) Analysis of the stakeholders
- c) Analysis of the information networks
- d) Analysis of integration



- e) Analysis of tasks
- f) Analysis of coordination
- g) Analysis of communication
- h) Synthesis of social organization
- The C phase planning strategies and actions consists of 3 windows:
 - a) Analyzing the possibilities for action
 - b) Analyzing stakeholder potential: who can do what?
 - c) Making agreements for a plan of action.

Write shops

A write shop is a very intensive process aimed at bringing together a range of relevant stakeholders - along with desktop publishing specialists - to produce a publication in a very short time. Write shops are an excellent way of bringing together different groups (scientists, extension personnel, NGO staff, policymakers, farmers) with different perspectives on the subject. Written materials can be produced in a very short time by people who do not have the time to write extensively. With suitable preparation, it is possible to produce material ready for the printer within a few days of the end of the write shop itself. The process enables comments and revisions from other participants (analogous to the peer review in conferences).

Detailed Outline of the Write shop Process

Preparation Before the write shop, a steering committee lists potential topics and invites resource persons to develop first drafts on each topic, using guidelines provided. These participants bring the drafts and various reference materials with them to the write shop.

Draft 1

During the write shop itself, each participant presents his/her draft paper, using overhead transparencies of each page. Copies of each draft are also given to all the other participants, who critique the draft and suggest revisions. After the presentation, an editor helps the author revise the draft. An artist can draw illustrations to accompany the text. The edited draft and artwork are then desktop-published to produce a second draft. Meanwhile, other participants also present papers they have prepared. Each, in turn, works with the team of editors and artists to revise and illustrate the materials.

Draft 2

Each participant then presents their revised second draft to the group, also using transparencies. Again, the audience critiques the work and suggests revisions. After the presentation, the editor and artist) again help revise the paper and develop a third draft.





Draft 3

Towards the end of the write shop, the third draft is made available to participants for final comments and revisions.

Finalizing

The final version can be completed, printed and distributed soon after the write shop. A Good Example: The International Institute of Rural Reconstruction (IIRR) in the Philippines has produced around 20 information materials on various topics relating to agriculture, the environment and health. The write shop process was pioneered at IIRR.

Force Field Analysis (Understanding the Pressures for and against Change)

Force Field Analysis is a useful technique for looking at all the forces for and against a decision. In effect, it is a specialized method of weighing pros and cons. By carrying out the analysis you can plan to strengthen the forces supporting a decision, and reduce the impact of opposition to it.

How to Use the Tool:

To carry out a force field analysis, you can follow these steps:

- a) Describe your plan or proposal for change in the middle.
- b) List all forces for the change in one column, and all forces against the change in another column.
- c) Assign a score to each force, from 1 (weak) to 5 (strong).

Once you have carried out an analysis, you can decide whether your project is viable. Where you have already decided to carry out a project, Force Field Analysis can help you to work out how to improve its probability of success. Here you have two choices:

- 1. To reduce the strength of the forces opposing a project, or
- 2. To increase the forces pushing a project





at all the forces for and against a plan.

It helps you to weigh the importance of these factors and decide whether a plan is worth implementing. Where you have decided to carry out a plan, Force Field Analysis helps you identify changes that you could make to improve it.

SWOT Analysis

SWOT analysis came from the research conducted at Stanford Research Institute from 1960-1970. The background to SWOT stemmed from the need to find out why corporate planning failed. The research was to find out what could be done about this failure (Humphrey, 2004). The SWOT that combines internal and external influences and can be

analysis is an extremely useful diagnostic tool that combines internal and external influences and can be used for understanding and decision-making for all sorts of situations in business and organizations. SWOT is an acronym for Strengths, Weaknesses, Opportunities, and Threats (SW are internal & OT are external; for this reason the SWOT Analysis is sometimes called Internal-External Analysis). The SWOT analysis headings provide a good framework for reviewing strategy, position and direction of a company or business proposition, or any other idea. Completing a SWOT analysis is very simple, and is a good subject for workshop sessions. SWOT analysis also works well in brainstorming meetings. SWOT analysis can be used for policy planning, business planning, strategic planning, competitor evaluation, marketing, business and product development and research reports. In other words, SWOT analysis can be used for all sorts of decision-making, and the SWOT template enables proactive thinking, rather than relying on habitual or instinctive reactions. The SWOT analysis is useful when a very limited amount of time is available to address a complex strategic situation. To carry out a

SWOT Analysis, questions such as the following need to be answered: **Strengths:**

- a) What advantages does your company have?
- b) What do you do better than anyone else?
- c) What unique or lowest-cost resources do you have access to?
- d) What do people see as your strengths?
- e) What factors mean that you "get the sale"?

Consider this from an internal perspective, and from the point of view of your customers and people in your market. In looking at your strengths, think about them in relation to your competitors - for example, if all your competitors provide high quality products, then a high quality production process is not a strength in the market, it is a necessity.

Weaknesses:



Table 3: SWOT Analysis Template

Strengths

- Advantages of proposition?
- Capabilities?
- Competitive advantages?
- USP's (unique selling points)?
- Resources, Assets, People?
- Experience, knowledge, data?
- Financial reserves, likely returns?
- Marketing reach, distribution, awareness?
- Innovative aspects?
- Location and geographical?
- Price, value, quality?
- Accreditations, qualifications, certifications?
- Processes, systems, IT, communications?
- Cultural, attitudinal, behavioural?
- Management cover, succession?

Weaknesses

- Disadvantages of proposition?
- Gaps in capabilities?
- Lack of competitive strength?
- Reputation, presence and reach?
- Financials?
- Own known vulnerabilities?
- Timescales, deadlines and pressures?
- Cash flow, start-up cash-drain?
- Continuity, supply chain • robustness?
- Effects on core activities, distraction?
- Reliability of data, plan predictability?
- Morale, commitment, leadership?
- Accreditations, etc?
- Processes and systems, etc?
- Management cover, succession?

Opportunities

- Market developments?
- Competitors' vulnerabilities?
- Industry or lifestyle trends?
- Technology development and innovation?
- Global influences?
- New markets, vertical, horizontal?
- Niche target markets?
- Geographical, export, import?
- New USP's?
- Tactics surprise, major contracts, etc?
- Business and product development?
- Information and research?
- Partnerships, agencies, distribution?
- Volumes, production, economies?
- Seasonal, weather, fashion influences?

Threats

- Political effects?
- Legislative effects?
- **Environmental effects?**
- IT developments?
- Competitor intentions various?
- Market demand?
- New technologies, services, ideas?
- Vital contracts and partners?
- Sustaining internal capabilities?
- **Obstacles faced?**
- Insurmountable weaknesses?
- Loss of key staff?
- Sustainable financial backing?
- Economy home, abroad? •
- Seasonality, weather effects?





CASE STUDY

SCIENCE, TECHNOLOGY & INNOVATION (STI) POLICY RE-VIEW OF ANGOLA. A PRESENTATION TO THE COMMISSION ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT AT ITS 2008 SESSION, GENEVA. BY UNCTAD (UNITED NATIONS CONFERENCE ON TRADE & DEVELOPMENT) SECRETARIAT. HTTP://WWW.UNCTAD.ORG/SECTIONS/WCMU/DOCS/ ECN162008P15_EN.PDF

SWOT Analysis Template

| Strengths | Weaknesses | |
|---|--|--|
| • Political will | • Civil war legacy | |
| • Democracy | • Food insecurity | |
| Financial resources | • Enclave FDI | |
| Raised STI profile | • Innovation | |
| • Existing mechanisms for support | • Education system | |
| | Statistical data | |
| | | |
| <u>Opportunities</u> | Threats | |
| • Market Treands | Threats • Regional uncertainty | |
| | | |
| Market Treands | • Regional uncertainty | |
| Market TreandsVast diverse zone | Regional uncertaintyOil market volatility | |
| Market Treands Vast diverse zone | Regional uncertainty Oil market volatility Weak linkages | |



- a) What could you improve?
- b) What should you avoid?
- c) What are people likely to see as weaknesses?
- d) What factors lose you sales?

Again, consider this from an internal and external basis: Do other people seem to perceive weaknesses that you do not see? Are your competitors doing any better than you? It is best to be realistic now, and face any unpleasant truths as soon as possible.

Opportunities:

- a) Where are the good opportunities facing you?
- b) What are the interesting trends you are aware of?
- c) Useful opportunities can come from such things as:
- d) Changes in technology and markets on both a broad and narrow scale
- e) Changes in government policy related to your field
- f) Changes in social patterns, population profiles, lifestyle changes, etc.
- g) Local events

A useful approach for looking at opportunities is to look at your strengths and ask yourself whether these open up any opportunities. Alternatively, look at your weaknesses and ask yourself whether you could create opportunities by eliminating them.

Threats:

- a) What obstacles do you face?
- b) What is your competition doing that you should be worried about?
- c) Are the required specifications for your job, products or services changing?
- d) Is changing technology threatening your position?
- e) Do you have bad debt or cash-flow problems?
- f) Could any of your weaknesses seriously threaten your business?

Carrying out this analysis will often be illuminating - both in terms of pointing out what needs to be done, and in putting problems into perspective.



Communication Tools (communication strategy, message design & media relations)

Communications strategy

Communication strategy tries to document who information will be disseminated to, and received from, all stakeholders in the activity (e.g. policy, project or programme). It identifies the means/medium and frequency of communication between the different parties. It is used to establish and manage on-going communications throughout a policy process, programme or project.

Checklist of a communication strategy:

- 1) Has the information given to stakeholders met their requirements?
- 2) Has the information received from stakeholders met the programme/project owner's requirements?
- 3) Has all the necessary information been disseminated?
- 4) Have the roles and responsibilities of the individuals involved in the communication strategy been understood by them?
- 5) Have these roles been carried out satisfactorily?

Suggested content:

- 1) List of stakeholders and their information requirements
- Communication mechanisms to be used (such as written reports, seminars, workshops, videos, emails, newsletters)
- 3) Key elements of information to be distributed by the different mechanisms including frequency and information collection and collation
- Roles and responsibilities of key individuals responsible for ensuring communication is adequate / appropriate and timely
- 5) Identification of how unexpected information from other parties (including stakeholders) will be handled within the scope of the activity.

How to write a Communication Strategy

Drawing up a communications strategy is an art, not a science and there are lots of different ways of approaching the task. What is provided below is only a guide. Whether your communications strategy is designed for a specific policy or for your organizational strategy, it should establish the following:

- a) Objectives
- b) Audiences
- c) Messages
- d) Tools and activities
- e) Resources
- f) Timescales
- g) Evaluation and amendment



Objectives Your objectives are the key to the success of your communications strategy. Your communications activity is not an end in itself but should serve and hence be aligned with your objectives. Ask yourself what you can do within communications to help you achieve the core objectives. Aligning your communications and objectives will also help to reinforce the importance and relevance of communications and thereby make a convincing case for the proper sourcing of communications activity within your operational framework that would otherwise be put towards communicating with key stakeholders.

Messages

Strategic targeting and consistency is the key to your messages. Create a comprehensive case covering all the key messages, and emphasize the different elements of the case for different audiences. To maximize impact you should summarize the case in three key points which can be constantly repeated. Remember that communications is all about storytelling: use interesting narrative, human interest stories and arresting imagery.

Tools and activities

Identify the tools and activities that are most appropriate to communicating the key messages to the audiences. These will be suggested by your audiences, messages, or a combination of the two. For example, an annual report is a useful tool in corporate communications whereas an email newsletter lends itself well to internal communications. Ensure that you tailor your tools and activities to the level of time and human and financial resources available.

Resources and timescales

The key rules to observe are always to deliver what you promise and never over promise. Use your resources and timescales to set legitimate levels of expectations and outline the case for more dedicated resources. Evaluation and amendment Consider performing a communications audit to assess the effectiveness of your strategy with both your internal and external audiences. You should use open questions with appropriate prompts and benchmarks and, if possible, get someone independent to do the work. Consider and discuss the results carefully and use them to amend your strategy.

Examples of audiences to consider are your staff, funders, key political targets and media. Questions you should consider asking are:

- a) What do you read/see/hear?
- b) What works/doesn't work?
- c) What do you want to see more of?





- d) What information do you need that you are not currently supplied with?
- e) How often do you want us to communicate with you?
- d) What information do you need that you are not currently supplied with?
- e) How often do you want us to communicate with you?

While drawing up your strategy, you should involve your team, and on a smaller scale, the entire organization. Feed the communications strategy into the organizational strategy to ensure maximum alignment and efficiency.

Audiences

You should identify those audiences with whom you need to communicate to achieve your organizational objectives. The best audiences to target in order to achieve an objective may not always be the most obvious ones, and targeting audiences such as the media may not always help achieve your objectives. Everyone would like a higher media and political profile, yet activities aiming towards this may ultimately be self-serving and only communications driven, with no wider impact. They can even have a negative effect if you dedicate resources

Message design tips

According to Metcalfe (2002) there are three questions we find useful when shaping messages, whatever the communication tactic – from signage to presentations to media releases:

What do you want to get across to a particular audience?

This is the objective and content – and often as far as many people get in designing their message. If you really want to deliver messages that are both useful and clear then the next two questions are critical. What does your audience want to know about your topic? How will they benefit from listening to you? You may need to do some audience research to answer this question properly, but it will ensure that what you say is relevant. What could the audience get wrong about your topic unless you stress the correct information? Exploring this question will help you to clarify your message and avoid misinformation. When you have considered your answers to the above three questions (your answers to questions 2 and 3 should shape what you originally wrote), you are ready to design your core messages.

Shaping your message

• Find out what people want to know: What you think is important, and what others think is im portant may differ greatly. Communicating information you consider critical is important but you need to



consider the concerns of affected or interested groups.

- Acknowledge uncertainties: This will help your long-term credibility as well as helping to educate people about the nature of the issue, and technical information available.
- Put information into perspective: It is important not to raise expectations beyond what can be deliv ered or to minimize risks. People require enough information to enable them to make personal deci sions.
- Take care when simplifying information: A fine balance needs to be maintained between providing too much complex information and providing too little.

Public and Media Relations

Before you learn more about public and media relations, you should get a basic impression of what they are. According to McNamara (2008) public relations includes ongoing activities to ensure the organization has a strong public image. Public relations activities include helping the public to understand the organization and its products. Similar to effective advertising and promotions, effective public relations often depends on designing and implementing a well-designed public relations plan. The plan often includes the following:

- description of what you want to convey to whom,
- how you plan to convey it,
- who is responsible for various activities and by when, and
- how much money is budgeted to fund these activities.
- Similar to advertising and promotions, a media plan and calendar can be very useful, which specifies



what media methods that are used and when.

Often, public relations are conducted through the media, which include newspapers, television, magazines, Internet, etc. Organizations usually have little control over the message in the media, at least, not as much as they do in advertising. Regard-

ing publicity, reporters and writers decide what will be said. Regarding public relations, consider:

- What groups of stakeholders do we want to appeal to and how?
 - What impressions do you want each of your stakeholders to have?

ublic Relations Professional's Brain Circa 2009



- What communications media do they see or prefer the most?
- What media is most practical for you to use in terms of access and affordability?
- What messages are most appealing to each stakeholder group?

Consider advertising, collaborations, annual reports, networking, TV, radio, newsletters, classifieds, displays/ signs, posters, word of mouth, direct mail, special events, brochures, neighborhood newsletters, etc.

Knowledge Management & Learning Tools

What is "knowledge"?

Knowledge can be defined as a body of information. The body of information might consist of facts, opinions, ideas, theories, principles, and models (or other frameworks). Knowledge also refers to a person's state of being with respect to some body of information. These states include ignorance, awareness, familiarity, understanding, facility, and so on.

Knowledge can be categorized in many different ways. Knowledge may be classified according to form—for example, as scientific/technical knowledge or organizational/managerial knowledge, as well as codified/explicit (which is knowledge that has been written down in the form of scientific articles, books, and patents = information) and tacit/implicit knowledge (which is the knowledge people acquire during their life, education and at their job) (Hall, Sulaiman, Clark, Sivamohan, and Yoganand, 2002). Knowledge economy requires trained / skilled people at all levels (farmers, scientists, policymakers) that are continuously learning & innovating.

In traditional perceptions of the role of knowledge in business organizations, tacit knowledge is often viewed as the real key to getting things done and creating new value. Not explicit knowledge. Thus we often encounter an emphasis on the "learning organization" and other approaches that stress internalization of information (through experience and action) and generation of new knowledge through managed interaction. Sources of knowledge - Knowledge is not only created through formal research but also gained from experiences. Knowledge sources may be external to a given agent within an innovation system—for example, a scientific journal article documenting a laboratory breakthrough, or a neighbour who introduces one to a new way of achieving something. Others include public research organizations, private laboratories, universities, practices and behaviors of individuals, households, and civil society organizations (Clark, 2002).

Dimensions of Knowledge

Different frameworks for distinguishing between knowledge exist. One proposed framework for categorising the dimensions of knowledge distinguishes between tacit knowledge and explicit knowledge. Tacit knowledge represents internalised knowledge that an individual may not be consciously aware of how he or she accomplishes particular tasks. At the opposite end of the spectrum, explicit knowledge represents knowledge that



the individual holds consciously in mental focus, in a form that can easily be communicated to others (Alavi & Leidner 2001).

A second proposed framework for categorising the dimensions of knowledge distinguishes between embedded knowledge of a system outside of a human individual (e.g., an information system may have knowledge embedded into its design) and embodied knowledge representing a learned capability of a human body's nervous and endocrine systems.

A third proposed framework for categorising the dimensions of knowledge distinguishes between the exploratory creation of "new knowledge" (i.e., innovation) vs. the transfer or exploitation of "established knowledge" within a group, organisation, or community. Collaborative environments such as communities of practice or the use of social computing tools can be used for both knowledge creation and transfer.

What is knowledge management?

According to Barclay and Murray knowledge management can be defined as a business activity with two primary aspects:

- a) Treating the knowledge component of business activities as an explicit concern of business reflected in strategy, policy, and practice at all levels of the organization.
- b) Making a direct connection between an organization's intellectual assets both explicit [recorded] and tacit [personal know-how] and positive business results.

In other words knowledge management (KM) comprises a range of practices used to identify, create, represent, distribute and enable adoption of insights and experiences. Such insights and experiences comprise knowledge, either embodied in individuals or embedded in organisational processes or practice. In practice, knowledge management often encompasses identifying and mapping intellectual assets within the organization, generating new knowledge for competitive advantage within the organization, making vast amounts of corporate information accessible, sharing of best practices, and technology that enables all of the above.

KM efforts typically focus on organisational objectives such as improved performance, competitive advantage, innovation, the sharing of lessons learned, and continuous improvement of the organisation. KM efforts overlap with Organisational Learning, and may be distinguished from by a greater focus on the management of knowledge as a strategic asset and a focus on encouraging the exchange of knowledge. KM efforts can help individuals and groups to share valuable organisational insights, to reduce redundant work, to avoid reinventing the wheel per se, to reduce training time for new employees, to retain intellectual capital as employees turnover in an organisation, and to adapt to changing environments and markets (McAdam & McCreedy 2000; Thompson & Walsham 2004).

Why do we need to manage knowledge?

Ann Macintosh of the Artificial Intelligence Applications Institute (University of Edinburgh) has written a "Position Paper on Knowledge Asset Management" that identifies some of the specific business factors, including:

a) Marketplaces are increasingly competitive and the rate of innovation is rising.



- c) Competitive pressures reduce the size of the work force that holds valuable business knowledge.
- d) The amount of time available to experience and acquire knowledge has diminished.
- e) Early retirements and increasing mobility of the work force lead to loss of knowledge.
- f) There is a need to manage increasing complexity as small operating companies are trans-national sourcing operations.
- g) Changes in strategic direction may result in the loss of knowledge in a specific area.

To these paraphrases of Macintosh's observations Barclay and Murray added that:

- a) Most of our work is information based.
- b) Organizations compete on the basis of knowledge.
- c) Products and services are increasingly complex, endowing them with a significant information com ponent.
- d) The need for life-long learning is an inescapable reality.

In other words, knowledge and information have become the medium in which business problems occur. As a result, managing knowledge represents the primary opportunity for achieving substantial savings, significant improvements in human performance, and competitive advantage

Categorization of knowledge management approaches

There are many ways to slice up the multi-faceted world of knowledge management. However, it's often useful to categorize them. In a posting to the Knowledge Management Forum, Karl-Erik Sveiby identified two "tracks" of knowledge management:

- a) Management of Information. To researchers in this track, according to Sveiby, "... knowledge = Ob jects that can be identified and handled in information systems."
- b) Management of People. For researchers and practitioners in this field, knowledge consists of "... proc esses, a complex set of dynamic skills, know-how, etc., that is constantly changing."

However, Barclay and Murray made important distinctions in approaches to organizational knowledge management. They proposed a three-part categorization:

(1) Mechanistic approaches,

- (2) Cultural/behaviouristic approaches, and
- (3) Systematic approaches to knowledge management.

Mechanistic approaches to knowledge management

Mechanistic approaches to knowledge management are characterized by the application of technology and resources to do more of the same better. The main assumptions of the mechanistic approach include:



- 1. Better accessibility to information is a key, including enhanced methods of access and reuse of docu ments (hypertext linking, databases, full-text search, etc.)
- 2. Networking technology in general (especially intranets), and groupware in particular, will be key solutions.
- 3. In general, technology and sheer volume of information will make it work.

Cultural/behaviouristic approaches to knowledge management

Cultural/behaviouristic approaches tend to view the "knowledge problem" as a management issue. Technology — though ultimately essential for managing explicit knowledge resources — is not the solution. These approaches tend to focus more on innovation and creativity (the "learning organization") than on leveraging existing explicit resources or making working knowledge explicit.

Assumptions of cultural/behaviouristic approaches often include:

- 1. Organizational behaviors and culture need to be changed. In our information-intensive environ ments, organizations become dysfunctional relative to business objectives.
- 2. Organizational behaviors and culture can bechanged, but traditional technology and methods of attempting to solve the "knowledgeproblem" have reached their limits of effective ness. A "holistic" view is required. Theories of behavi uor of large-scale systems are often in voked.



- 3. It's the processes that matter, not the technology.
- 4. Nothing happens or changes unless a manager makes it happen.

Systematic approaches to knowledge management

Systematic approaches to knowledge manag ment retain the traditional faith in rational analysis of the knowledge problem: the problem can be solved, but new thinking of many kinds is required. Some basic assumptions:

- 1. It is sustainable results that matter, not the proc esses or technology or your definition of "knowl edge."
- 2. A resource cannot be managed unless it is mod eled, and many aspects of the organization's knowl edge can be modeled as an explicit re source.
- 3. Solutions can be found in a variety of disciplines and technologies, and traditional methods of analy sis can be used to re-examine the nature of knowledge work and to solve the knowledge problem.
- 4. Cultural issues are important, but they too must be evaluated systematically. Employees may or may not have to be "changed," but policies and work practices must certainly be changed, and technology can be applied successfully to business knowledge problems themselves.



5. Knowledge management has an important management component, but it is not an activity or disci pline that belongs exclusively to managers.

Policy Influence mapping Tools: [power mapping, lobbying and advocacy, campaigning, and DPSIR framework.]

Power Mapping:

Someone who is interested and involved in promoting positive social changes, through service, advocacy and other vehicles, often needs to think about context and relationships within the spheres she/he works. Power mapping is a framework for addressing issues and problem solving through leveraging relationships and networks. It is a conceptual strategy of determining whom you need to influence, exactly who can influence your target, and whom you can actually influence to start the dominoes in motion. This framework is based on the assumption that networks of relationships (between individuals, organizations, institutions, etc.) are critical resources, and that stronger networks yield stronger solutions. It is a valuable tool for individuals actively working with communities, providing a simple framework and a set of tools to better understand and leverage relationships and networks. This process helps to teach participants the value of relational power as an important dynamics in social organizing.

Steps to Power Mapping (Source: Bonner Curriculum: Power Mapping).

- **Step 1: Problem location:** You can map around a problem, policy or a person or institution you think can solve a problem. Identify a particular problem, policy or issue.
- **Step 2: Map major institutions:** Identify key decision-making institutions or associations that are related to that problem. Write these names on the newsprint in a ring around the problem.
- **Step 3: Map individuals associated with the institutions:** Put the names of 2-3 individuals who are associat ed with each of those institutions in the second ring (moving out concentrically) around the problem.

These can be people you know or don't know.

- **Step 4: Map all other associations with these individuals:** Think about people they know connected to these key individuals. The purpose of this is to help identify easier ways to access the individuals or institu tions that could help solve the problem, by tapping into existing relationships between people. At this step, you can note any relationships that members in the group have with the people listed and any information you have about them.
- **Step 5: Determine relational power lines:** The next step is to step back and conceptually review the networks that the group has mapped out. You can do this by drawing lines connecting people and institutions that have relations to each other. Some people will have many connections while others may not have any.
- **Step 6: Target priority relationships:** Analyze some of the relationships and connections elaborated and make some decisions. One way to do this is to circle the few people that have the most relational



power lines drawn to them. Another thing to consider may be a person or institution in the map that doesn't necessarily have many different relational lines running to him/her/it but nonetheless has a few critical ones and seems to hold a lot of influence.

Step 7: Make a plan: The next step is to create some action steps for what to do. What will people do next? Create 3-5 steps.

Lobbying

Lobbying is the practice of influencing decisions made by government. It includes all attempts to influence legislators and officials, whether by other legislators, constituents or organized groups. A lobbyist is a person who tries to influence legislation on behalf of a special interest or a member of a lobby (Random House Unabridged Dictionary, 2006).

It can be argued that lobbying is undesirable because it allows people with particular interests which represent a minority to gain special access to law-makers and through contributions and favors have controversial relationships with representatives. This is a danger to democracy as described in Article 22 of the Federalist Papers. Though many see lobbying as a potential corruption to the system, others disagree. According to CTA (2002) lobbying and advocacy mainly aim to convince government officials and members of parliament to make changes in laws, or to influence public opinion about an issue.

Advocacy

Advocacy is the pursuit of influencing outcomes — including public-policy and resource allocation decisions within political, economic, and social systems and institutions — that directly affect people's current lives. Therefore, advocacy can be seen as a deliberate process of speaking out on issues of concern in order to exert some influence on behalf of ideas or persons. However, advocacy has many interpretations depending on the issue at stake, which can be different from this initial value-neutral definition. Forms of advocacy There are several forms of advocacy. One of the most popular forms is social justice advocacy. Although it is true, the initial definition does not encompass the notions of power relations, people's participation and a vision of a just society that promoted by social justice advocates. For them, advocacy represents the series of actions taken and issues highlighted to change the "what is" into a "what should be".

Those actions, which vary with the political, economical and social environment in which they are conducted, have several points in common. They:

- question the way policy is administered
- participate in the agenda setting as they raise significant issues
- target political systems "because those systems are not responding to people's needs"
- are inclusive and engaging
- propose policy solutions
- open up space for public argumentation.

Some of the other forms of advocacy include:

- 1. Ideological advocacy: in this approach, groups fight, sometimes during protests, to advance their ideas in the decision-making circles.
- 2. Mass advocacy: is any type of action taken by large groups (petitions, demonstrations, etc.)
- 3. Interest-group advocacy: lobbying is the main tool used by interests groups doing mass advocacy. It is a form of action that does not always succeed at influencing political decision-makers as it requires



resources and organisation to be effective.

- 4. Bureaucratic advocacy: people considered "experts" have more chance to succeed at presenting their issues to decision-makers. They use bureaucratic advocacy to influence the agenda, however at a slower pace.
- 5. Legislative advocacy: legislative advocacy is the "reliance on the state or federal legislative process" as part of a strategy to create change.
- 6. Media advocacy: This is the strategic use of the mass media as a resource to advance a social or public policy initiative. In Canada for example, the Manitoba Public Insurance campaigns illustrate how media advocacy was used to fight alcohol and tobacco-related health issues.
- 7. In a legal/law context: An 'advocate' is the title of a specific person who is authorized/appointed (in some way) to speak on behalf of a person in a legal process.
- 8. In a political context: An 'advocacy group' is an organized collection of people who seek to influence political decisions and policy, without seeking election to public office.
- 9. In a social care context: Both terms (and more specific ones such as 'independent advocacy') are used in the UK in the context of a network of interconnected organisations and projects which seek to ben efit people who are in difficulty (primarily in the context of disability and mental health).
- 10. In the context of inclusion: Citizen Advocacy organisations (citizen advocacy programmes) seek to cause benefit by reconnecting people who have become isolated. Their practice was defined in two key documents: CAPE, and Learning from Citizen Advocacy Programs. See Citizen Advocacy organisa tions.

Advocacy groups

Advocacy is led by advocates or, when they are organized in groups as is the case most of the time, advocacy groups. Advocacy groups are different from political parties which "seek to influence government policy by governing." They are "any organization that seeks to influence government policy, but not to govern." This definition includes social movements, sometimes network of organizations which are also focused on encouraging social change.

Social movements try to either influence governments or, like the environmental movement, to influence people's ideas or actions.

- a) Today, advocacy groups contribute to democracy in many ways. They have five key functions:
- b) Give a voice to (misrepresented) citizen interests



- c) Mobilize citizens to participate in the democratic process
- d) Support the development of a culture of democracy
- e) Assist in the development of better public policy
- f) Ensure governments' accountability to citizens.

Transnational advocacy

Transnational advocacy refers to advocacy beyond countries' borders. The phenomenon of globalization draws a special attention to this type of advocacy. The core existence of networks such as World Advocacy or the Advocacy Institute demonstrates the increasing importance of transnational advocacy and international advocacy. Transnational advocacy networks are more likely to emerge around issues where external influence is necessary to ease the communication between internal groups and their government.

Campaigning

Campaigns have been defined in various ways, but basically a campain involves coordinated use of different methods of communication and education aimed at focusing attention on a particular problem, and its solution, over a period of time. A campain may take many forms (such as the charity campaign, sales campaign, political campaign or image –type campagn).

Outline for a Campaign Plan

- a) Analysis :
 - a. Topic;
 - b. Situation;
 - c. Audience;
 - d. Sponsoring organization
- b) Statement of Objectives
 - c) The Plan:
 - a. Massage content
 - b. Media and methods
 - c. Timing
 - d. Schedule of activities and responsibility
 - e. Evaluation strategies (during and after the campaign)
 - f. Budget

The following media can be used for campaigns:

- a. Newspapers: 'Africa-the garbage dump for Europe'
- b. Posters: 'Deadly danger to our health, our producers, our economy'
- c. Audio-visual documentary and 'white paper'
- d. International seminar
- e. Advocacy and lobbying activities
- f. Mobilization-collective action
- g. Pre-election timing

Campaign message

The message of the campaign is what ideas that the candidate wants to share with the audiance. For instance,



in political campaigns, the message often consists of several talking points about policy issues. The points summarize the main ideas of the campaign and are repeated frequently in order to create a lasting impression with the audience.

DPSIR framework for State of Environment Reporting.

According to the Global International Water Assessment (GIWA) (2001) The DPSIR (Driving Forces-Pressures-State-Impacts-Responses) framework is used to assess and manage environmental problems. Driving forces are the socio-economic and socio-cultural forces driving human activities, which increase or mitigate pressures on the environment.

Pressures are the stresses that human activities place on the environment such as waste water. State, or state of the environment, is the condition of the environment such as assessment of water or air quality.

Impacts are the effects of environmental degradation such as biodiversity loss or economic damage. Responses refer to the responses by society to the environmental situation such as cleaner production, regulations.



This graphic below explains the DPSIR process

The DPSIR Framework

(Driving forces-Pressures-State-Impacts-Responses)

Driving Forces

Socio-economic and socio-cultural forces driving human activities, which increase or mitigate pressures on the environment. Pressures



Stresses that human activities place on the environment (eg. wastewater)

State of the Environment (SoE)



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Responses by society to the environmental situation (eg. cleaner production, regulations).



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Impacts



Source : Global International Water Assessment (GIWA), 2001, European Environment Agency (EEA). Copenhagen



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INSTITUTIONAL ASPECTS OF STI POLICY MAKING IN AFRICA

THIS CHAPTER WILL DISCUSS NECESSARY INSTITUTIONAL ARRANGEMENTS FOR SUCCESSFUL STI POLICY FORMULATION IN AFRICAN COUNTRIES;

- KEY SECTORS TO CONSIDER (RESEARCH, INDUSTRY, EDUCATION, INFRASTRUCTURE, THE ENVIRONMENT, ETC.) AND THE INTERACTIONS BETWEEN THEM;
- FROM SECTOR BASED POLICIES TO INNOVATION SYSTEMS BASED POLICIES; CON STRAINTS AND OPPORTUNITIES, ETC.
- INTERACTIVE QUESTIONS AND ANSWERS DESIGNED TO TEST THE TRAINEES' COM PREHENSION OF THE INSTITUTIONAL ARRANGEMENT FOR STI POLICY, KEY ACTORS AND THE SHIFT FROM SECTOR BASED POLICIES TO INNOVATION SYSTEM.



Institutional arrangement for successful STI policy formulation

nstitutional arrangements refer to agreements and organizational structures both within science, technology, and innovation (STI) agencies and between them. This can include forums that regularly bring together STI planners and operations practitioners as well as agreements that promote involvement of management and operations practitioners in planning processes, or that promote a regional or inter-



agency planning perspective within an operations environment. Institutions include rules and regulations guiding STI policy formulation

New institutional arrangements are created for a number of reasons. This can include:

- the occurrence of a seminal event such as major national events;
- the introduction of new STI programs and policies;
- the response to new State or Federal mandates on STI; or
- to take advantage of new innovation of S&T.

Africa's sluggish progress in meeting with formidable STI policy and Millennium Development Goals has been attributed to inadequate capacity and poor institutional support systems (ATPS, 2007). The important questions that could be used to address institutional issues in STI policy making in African context are:

- What are the basic needs, strengths and resources of the region/country as the case may be?
- How can S&T be applied to harness a country's material base and wealth?
- Which sectors and in what order should a country stake it's financial and S&T resources?
- What are a country's most urgent priority areas for technological skills and which are the best models and facilities to provide?
- How can S&T assist a country rationalize the scarce resources and balance its socio economic impera tives?
- What strategies should a country's government and private sectors employ to enhance development of science and technology?



Building Institutional Arrangements

Some common strategies have emerged for building institutional arrangements that can better link planning and operations of agencies involved in STI. Changing institutional relationships and behaviour is a tremendous challenge and requires a sustained effort. But laying the groundwork for such change is very important. Centers of excellence can be virtual institutions, encompassing networks of scientists from different institutions in the same country or even from different countries. The important point is that scientists join forces to work on a common set of problems. Physical facilities to support the work will undoubtedly be required. But this is not the same as expecting that every scientist and researcher affiliated with a center of excellence has to reside in the same



place or work in the same laboratory. Nor does it mean that only those scientists affiliated with a specific institution can be considered part of a center of excellence.

It makes little sense to build STI capacity if the legal, institutional, regulatory, financial, and economic conditions deter farmers, entrepreneurs, and investors from investing and innovating (World Bank, 2008). According to the US Department of Transportation (2008), the following approaches can highlight opportunities for existing institutions to better coordinate planning and operations and prompt leaders to consider where new institutional arrangements may be needed in STI policy making.

Designate an STI Stakeholder Forum on Regional Management and Operations

An increasing number of STI Stakeholder Forum could support interagency committees that deal directly and regularly with the management and operations of regional STI systems. In hosting such committees, the STI Stakeholder Forum facilitates a vital forum where inter-jurisdictional coordination, funding strategies, and data sharing can be addressed. In addition, the STI Stakeholder Forum can use the committee's diverse operations expertise to inform management and operations issues in national/regional planning documents and in the STI Stakeholder Forum's annual work program.

Attract Stakeholders with Specific Regional Operations Programs

One way to achieve greater stakeholder participation in Stakeholder Forums is to focus discussions on specific operations concerns. This makes it clear to both operations practitioners and policy makers when the forum is within their area of expertise. Different agencies involved in STI shall be responsible for the achievement of specific mandates.

Having identified the key stakeholders and organizations in STI policy making process, other issues to consider in the system mapping will include; the roles they should play, their skills and competencies; the missing link (actor and or competence); policies required to change the role of the public sector or to encourage others to play different roles or play existing roles more effectively; the extent of linkage between organizations, the nature of the linkage and how they support each other.

Capacity building in STI needs to be revived and incorporated into agriculture and rural development, environment, education, training, private sector development, and infrastructure programs.







Involve Regional/National Operations Forums in the Planning Process

There is the need to involve both regional and national STI operations collaborations which increasingly offer forums for integrated operations in policy making. They often provide a unique opportunity to bring together the public and private agencies that assist in planning and decision-making in issues relating to STI. Beyond offering a forum for coordination on operations issues, regional operations collaborations could ensure coordinated inter-agency operations in STI planning process to address challenges over the longerterm. These organizations could function in integration of personnel from multiple agencies into focused STI program implementation teams; integration of equipment through sharing of infrastructure, equipment, personnel, data, and other transferable resources; and source of funding for coordinated operations activities, both through pooled funds from participating agencies and through direct State, Federal, and Regional funding awards.

Reinforce Institutional Links by Integrating Operations into Project Design and Decision-making Process

Key stakeholders and operations practitioners in STI should be involved in project design and decisionmaking process at the earliest possible stage in order to ensure that policies that emanate thereof are most rational, practicable, and do not conflict with regional/national operations strategies. Institutional relationships between planning and operating agencies are supported when practitioners collaborate during the early stages of the project development process.

Key sectors to consider in STI policy and the interactions between them

Research

Research, which is a human activity based on intellectual application in the investigation of matter, aims at

the discovering, interpreting, and development of methods and systems for the advancement of human knowledge on a wide variety of scientific matters of our world. The key role of research in STI policy therefore will be in the development of critical mass of science, technology and innovations suitable and relevant to the varied needs of humanity and which will be sustainable.

Industry

Industry refers to any kind of economic manufacturing or production of goods and services for benefits to mankind. Four key industrial economic sectors include: the



primary sector, largely raw material extraction industries such as mining and farming; the secondary sector, involving refining, construction, and manufacturing; the tertiary sector, which deals with services (such as law and medicine) and distribution of manufactured goods; and the quaternary sector, a relatively new type of knowledge industry focusing on technological research, design and development such as computer programming, and biochemistry. The key role of the industry therefore will be mainly in the production of STI in form of goods and services for the betterment of humanity.

Education

Education is the process by which society deliberately transmits its accumulated knowledge, values, and skills from one generation to another through institutions. This could be achieved through the different levels of education including primary, secondary, tertiary, adult, alternative, and indigenous education. Education's role in STI is therefore to communicate and inform a wide range of audience on issues of STI which is transferred from one generation to another. It is therefore a very critical stakeholder in STI policy.

Infrastructure

Infrastructure refers to the basic physical and organizational structures needed for the operation of a society or enterprise, or the services and facilities necessary for an economy to function. These structures support a society and may include roads, water supply, sewers, power grids, telecommunications, schools, markets, hospitals and so forth. Infrastructural facility is therefore a critical factor in STI policy because they provide the necessary structures on which other stakeholders can function. Infrastructure provides a foundation for business development as well as technological innovation (AAAS, 2009).

Environment

The environment encompasses all living and non-living things occurring naturally on earth or some region thereof. It primarily refers to the ecological dimensions, but can also take account of social and economic dimensions. STI policy can therefore only function under a conducive environment where actions are deliberately taken (or not taken) to manage human activities with a view to prevent, reduce or mitigate harmful effects on nature and natural resources, and ensuring that man-made changes to the environment do not have harmful effects on humans.

Government

Another major actor in the STI policy is the government which has authority and function to make and the power to enforce laws, regulations, or rules. This singular role makes them significant in STI policies of any country or region. Typically, government refers to a civil government - local, state, or national but can also include commercial, academic, religious, or other formal organizations that are governed by internal bodies. Need for interaction between Actors



All the key actors do not function in isolation. For an effective and efficient STI policy to be in place there is need for linkages and synergies between all the key actors. This is because an actor may depend on another actor in order to achieve its objectives. For example, infrastructure facilitates the production of goods and services. More specifically, roads (infrastructure) enable the transport of raw materials to a factory (industry), and also for the distribution of finished products to markets. The industry and research sectors depend on manpower produced by the educational sector in order to function while the industry depends on the research sector for their innovations, all interacting in a given human and material environment and under the ambient of government laws, rules and regulations.

Therefore, bringing innovative ideas to market involves complex inter-linkages among industry, research, infrastructure, academia, and government within multiple overlapping "innovation ecosystems" (NAS, 2009). This ecosystems approach emphasizes the importance of creating and improving institutions to interweave the different parts of a nation's innovation system. In the context of African countries, innovation can provide a channel to both increase growth and reduce poverty. By applying knowledge in new ways to production processes, more, better, or previously unavailable products can be produced at affordable prices. Public policies to enhance pro-growth STI include improving higher education and creating new public–private partnerships as well as pursuing broad economic reforms that create the appropriate environment for investment in and commercialization of research.

Shift from Sector based policies to innovation systems based policies; constraints and opportunities

Sector-based policies are characteristically noted for their unilateralism and are reductionist in approach. This makes it difficult to accommodate and consider what is done in other sectors no matter how closely related or inter-dependent they are. The approach has been the case of many African countries and has affected their overall performance and outputs. Innovation system stresses that the flow of technology and information among people, enterprises and institutions is key to an innovative process. It contains the interaction between the actors who are needed in order to turn an idea into a process, product or service on the market.

The innovation system model synthesizes and defines the core elements of innovation, their behavior and interaction. The power of this model makes it easier to understand complex issues and dynamics of innovation, separate its elements and examine them is greater depth. It establishes a framework that helps to demystify the innovation process and its driving forces, to reveal the unique innovation practices of market champions and understand what makes them so successful and unique. In order words, innovation systems policies seeks to consider actors in the system, their characteristics, and what it takes them to function optimally in a synergistic manner.

Institutional aspects of STI policy making in africa

In an African context, moving from the sector based approach to the innovation system based approach will dislodge some structures in the short term but will achieve much that is desired in the long run. This is because the transition to promoting innovation systems requires a total change in mindsets and in strategies for doing the usual business. In most cases, African managers are not prepared to embrace this change because of the imminent status change that accompanies the restructuring. Again, some capabilities are usually required to accomplish this change and in some cases are lacking or inadequate in our system. Also, to change from the sector based approach to the innovation system approach, policies at the sector level will need to be merged, changed entirely, or discarded in order to achieve the later vision. This might generate some show of power and authority among the different sectors involved even when such policies have only been duplicated before.

For example, policies that promote the production of goods and services in the agricultural sector might just be the same for policies that equally promote the production of goods and services in the industry sector. Therefore, harmonizing these policies in an innovation system approach will definitely lead to better interactions and production of goods and services by the different sectors.





CHAPTER 3 QUESTIONS

Q1. WHAT IS INSTITUTIONAL ARRANGEMENT?

ANS1. INSTITUTIONAL ARRANGEMENTS REFER TO AGREEMENTS AND OR GANIZATIONAL STRUCTURES BOTH WITHIN SCIENCE, TECHNOLOGY, AND INNOVATION (STI) AGENCIES AND BETWEEN THEM.

Q2. WHY DO YOU NEED INSTITUTIONAL ARRANGEMENTS IN STI?

ANS2. FOR SEMINAL EVENT SUCH AS MAJOR NATIONAL EVENTS; THE IN TRODUCTION OF NEW STI PROGRAMS AND POLICIES; THE RESPONSE TO NEW STATE OR FEDERAL MANDATES ON STI; OR TO TAKE ADVANTAGE OF NEW INNOVATION OF S&T.

Q3. WHAT ARE THE KEY STAKEHOLDERS IN STI POLICY?

ANS3. KEY STAKEHOLDERS IN STI POLICY INCLUDE RESEARCH, EDUCA TION, INDUSTRY, INFRASTRUCTURE, GOVERNMENT, TRAINING, PRIVATE SECTORS, ENVIRONMENT, NGOS, ETC.

Q4. WHAT IS INNOVATION SYSTEM?

ANS4. THE CONCEPT OF THE INNOVATION SYSTEM STRESSES THAT THE FLOW OF TECHNOLOGY AND INFORMATION AMONG PEOPLE, ENTERPRISES AND INSTITUTIONS IS KEY TO AN INNOVATIVE PROCESS. IT CONTAINS THE INTERACTION BETWEEN THE ACTORS WHO ARE NEEDED IN ORDER TO TURN AN IDEA INTO A PROCESS, PRODUCT OR SERVICE ON THE MARKET.

Q5. WHY DO YOU NEED INNOVATION SYSTEMS APPROACH RATHER THAN SECTOR BASED APPROACHES?

ANS5. INNOVATION SYSTEMS POLICIES SEEK TO CONSIDER DIFFERENT ACTORS IN THE SYSTEM, THEIR CHARACTERISTICS, AND WHAT MAKES THEM FUNCTION OPTIMALLY IN A SYNERGISTIC MANNER?












THIS CHAPTER DEALS WITH THE FOLLOWING:

- OBJECTIVES OF PUBLIC ENGAGEMENT
- BASIC PRINCIPLES OF PUBLIC INVOLVEMENT
- TYPES OF PUBLIC INVOLVEMENT
- STANDARDS FOR PUBLIC INVOLVEMENT
- BENEFITS OF PUBLIC INVOLVEMENT
- CHALLENGES TO PUBLIC INVOLVEMENT
- VALUE OF PUBLIC INVOLVEMENT IN EVALUATION

What is Public Engagement or involvement?

ublic engagement or involvement is the process of two-way communication between citizen and government by which government officials give notice and information to the public and use public input as a factor in decision making. The model assumes that public input into the assessment of needs and solutions is a key factor in most decision making. Hence the need to obtain documented input from the public, interest groups, environmental agencies, and citizen groups, elected officials and others who have participated in the planning processes, and a structure for providing responses to issues, concerns, and questions raised by individuals and groups. In general, the purpose of the Public Involvement Program (PIP) in STI policy formulation is to identify ways in which the public may participate in the STI policy formulation planning process.

Evidence of public concern about science, technology and innovation has a long history (see, for example, Mitcham and Mackay 1983; and Holton 1993). However, the need to involve the public more explicitly in decision making has been increasingly recognised (see, Irwin 1995; Buckingham-Hatfield and Percy 1999). To date there is no one, accepted, correct method to ensure effective public engagement in policy formulation.

However, all these innovative forms of public involvement and dialogue share two characteristics:

- 1. They are deliberative: participants interact, engage in considered debate and modify their views based on information, shared views and respect for different perspectives.
- 2. They are inclusive: that is they seek out the views of all that stand to be affected by the deci sion, in particular, opinions are canvassed from previously excluded or hard to reach groups.

Ensuring that public engagement is effective rests on three main elements:

- 1. Objectives: setting out why public involvement is being sought. Where objectives are clearly stated and agreed the process engenders greater trust and is more likely to have a positive outcome. Some institutions have been accused of engaging in dialogue simply because they felt they ought to do so, equally there is a suspicion that dialogue is at times used cynically to legitimize previously determined ends.
- 2. Legitimacy: ensuring the process is acceptable. It is important that the process adopted is seen as fair by all participants. Too often participants suspect that their views may be ignored. Con sequently it is important that clear links be established between public involvement and deci sion making.



3. Evaluation: identifying the quality of the process. The process of public involvement adopted should fit its purpose. It is important that consensus not be forced and that dialogue should take place at an appropriate time in the decision making cycle. Public engagement should involve appropriate people. This hinges on the objectives of the particular public involvement process. For example, there may be a particular need to involve the disabled or other difficult to reach groups. Successful dialogue also appears to require an appropriate skills base and sufficient resources. To be effective, there must be enough trained process designers and facilitators, and clients with the information necessary to recognize their own needs and work effectively with practitioners. Public involvement can take time and imposes financial costs.

However failure to engaging public heightens the risk of political, environmental, economic, ethical and social disasters, so that the cost of inaction may easily outweigh any other costs involved. (Twenty-five years of work by the United States Protection Agency, to develop environmental indicators was subsequently discarded as a result of the rejection of the indicators by the public. The work was subsequently re-initiated with public dialogue.

Objectives of Public Involvement in STI Policy Making

Although the practice of public involvement is evolving, during the past two decades consensus has emerged about some fundamentals of good practice, including objectives, guiding principles, and general notions about how to select tools for particular processes.

We often focus on process when we discuss public involvement, but the key objectives of good public involvement revolve around outcomes. Ultimately, the reason to use a decision model that incorporates public involvement in STI policy making is to improve the decisions. In this context, a good decision is one that not only incorporates good planning and engineering practices and results in efficient use of resources but also best reflects the interests of all stakeholders.

One important objective of a good public involvement process is the extent to which the process builds consensus on the path to decision. In exchange for participation in a fair and open process, citizens often are willing to support the outcome of the process even if their preferred alternative is not selected. This result, sometimes known as "informed consent," is the desired outcome on highly controversial projects. It allows projects to move forward even though all stakeholder desires are not accommodated. Involving citizens without informing them is dangerous.

Another objective of a good public involvement process in STI policy making is to inform citizens about issues, projections, the planning process, and budgetary and engineering constraints.



A good public involvement process must also have as an objective the incorporation of citizen input into the decision process. A "black box" that has public involvement inputs but no clear effect on the outputs is not a successful public involvement program. The STI policy decision-making process must be open and clear and must reflect citizen input.

Basic Guiding Principles of public involvement (Principles for successful application of public involvement techniques in STI policy making)

Several general principles guide a successful public involvement effort in STI policy making. These include the followings:

- 1. When designing a good STI public involvement programs, distinguish public involvement from public relations and public information. Although the three are linked, their purposes are different. A public information campaign is a form of one-way communication between the agency and the public, generally striving to inform the public about ongoing issues or developments. Public relations programs usually involve the dissemination of information, but their emphasis is on the promotion of a particular policy or solution.
- 2. STI public involvement programs include many elements of both public information and public relations, but they add another dimension. Essential to a good STI public involvement program is dynamic two-way communication, which promotes public feedback and uses that feedback to trans form the decision process and outcome. Ideally, a public involvement practitioner acts as an "hon est broker"—informing citizens about various options and constraints, providing opportunities for citizens' voices to be heard, and mediating differences. Practitioners who keep these distinctions in mind can avoid the pitfalls involved in "selling" a policy or a program. They also can avoid violating legislative or agency structures against advocacy or lobbying.
- 3. STI public involvement programs should be inclusive, involving decision makers and all interested stakeholders. STI public involvement programs should include as many groups and individuals in the community as practicable. Many of these groups and individuals will surface easily because they are interested in the decision outcome. Some groups and individuals are more difficult to reach because of cultural or economic isolation or because they are users of the facility who do not reside in the immediate project area. The good practitioner of public involvement knows the community and is proactive, seeking out groups and individuals, particularly those who will be affected significantly. This inclusiveness almost always includes a heavy emphasis on partnering—achieving mutual understanding of the problem and formal or informal agreements to work together to find and implement a solution. Partnering activities can be conducted with other agencies, units of govern ment, metropolitan planning organizations, toll agencies, neighborhood associations, and other



third-party groups, such as chambers of commerce and environmental organizations. Partnering makes sense conceptually and practically. In a world where resources are limited, partnering can rep resent an efficient and effective approach to gathering citizen input and developing an implement able solution.

- 4. Communication with participants should be respectful. The attitude of public involvement practition ers, agency officials, and members of the public should be one of mutual respect. Practitioners should perfect the art of listening to constituents. All opinions should be given serious consideration, and input always should receive prompt and respectful replies.
- 5. STI public involvement activities should begin early and be proactive and ongoing through out the plan or project development. One key to a successful STI public involvement effort is to begin the process of public dialogue early. The temptation to save time and resources by initiating public involvement activities midway through the process should be avoided. Such an approach engenders public distrust and often requires re-examination of some decisions. Appropriate public notice should be given for all decisions; the notice should conform with or exceed local and federal regulations.
- 6. The STI decision process should be defined, structured, and transparent. The decision process should be clearly delineated at the start of each project. Participants should understand the process and be aware of critical decision points where they can have influence. Of particular importance is communicating to the public and advisory committees that public involvement is only one input into a complex decision process. However, decision processes should be structured so that outcomes reflect public input.
- 7. Agencies involved in STI policy formulation should provide appropriate leadership to public outreach efforts. Whereas these agencies should ensure that public involvement programs are struc tured as "honest brokering" programs with no predetermined outcomes, they also must give ap propriate leadership to the process. An agency spokesperson or "champion" must be available to articulate agency policy, perspectives, and operating procedures throughout the process. Ensuring provision of adequate resources for public involvement, including staff time and budget for information materials and other outreach expenses, is also an essential aspect of agency leadership. When agencies involved in STI policy formulation fail to take leadership; the public process flounders, and neither the public nor the agency is well served.

Types of Public Involvement

The most common (but often least effective) form of public involvement in policy making process is the public hearing. Here, government representatives give a presentation on a proposed decision, and then the public is asked to stand up and give short (1-3 minute) speeches indicating their thoughts on the proposal. Typically, only critics come to such hearings. Although the government agency can get a feel for the extent and nature



of the opposition, public hearings rarely give a good indication of overall public opinion, nor do they yield good information about why people feel the way they do.

Thus, they do not contribute effectively to problem solving or mutual cooperation. Other forms of public participation may yield more helpful information, but they are all slower and/or more expensive. Advisory committees made up of citizens can better measure public opinion, though they require a level of commitment from the members that few people can provide. Also, citizen members often have different values than expert committee members. These value differences often lead to infighting, which may detract from the committee's effectiveness. Even though public participation can slow the decision making process down, it is often legally required, and can avoid costly lawsuits at the other end if unpopular decisions are made without adequate public input.

Ballot initiatives are another form of public participation, which have greatly increased in popularity in the United States over the last decade. Ballot initiatives are proposed laws or constitutional amendments that are initiated and voted upon by the public, not by a legislative body. While the ability to act as a legislature gives the public much more power over public decisions, as the number of initiatives increases, more and more people are voting on things they do not really understand. In addition, ballot initiatives often oversimplify problems and do not weigh different priorities against each other. While a legislature may have to balance funding for education, health care, law enforcement, and other priorities, the public tends to look at initiatives on a case-by-case basis, without considering that choosing one thing may take away funds from something else. For that reason, ballot initiatives often do not yield effective remedies to problems, despite their popular support.

Standards for Public Involvement Processes

- i. The International Association for Public Participation lists seven standards for public participation:
- ii. The public should have a say in decisions about actions that affect their lives.
- iii. Public participation includes the promise that the public's contribution will influence the decision.
- iv. The process communicates the interests and meets the process needs of all participants.
- v. The process seeks out and facilitates the involvement of people potentially affected by the pro posed decision.
- vi. The process involves participants in defining how they will participate--thus how the process will be structured.



- vii. The public participation process provides participants with the information they need to par ticipate in a meaningful way.
- viii. The public participation process communicates to participants how their input affected the decision.

Other standards, suggested by the Co-Intelligence Institute include:

- i. Involve all "relevant" parties.
- ii. "Empower the people's engagement"--in other words, get them feeling "involved."
- iii. Utilize multiple "forms of knowing." This includes rational, scientific methods, narrative (story-telling methods), intuitive methods, etc.
- iv. Ensure high-quality dialogue.
- v. Establish and on-going participatory process (as opposed to, for instance, a one-shot public hearing).
- vi. Move from positions to interests, needs, and mutual solutions.
- vii. Help people feel fully heard.[2]

Public Participation, Democratization, and Civil Society

Increasing public participation in governmental decision-making is also becoming a large part of democratization processes and the strengthening of civil society in regions trying to recover from violent conflict and/or to make a transition to a more democratic form of government.

Public participation at the national level does not refer only to voting. It implies an open dialogue in which citizens have a voice in the decisions that affect them. International law grants the right to public participation. However, in a report from the United States Institute of Peace, Vivien Hart writes, "This right packs a moral punch but it lacks legal teeth and effective enforcement."

However, even though governments may not be legally required to solicit public participation, it is often in their best interest to do so. Public participation can be a powerful tool for legitimizing a new government. Hart writes: "A claim of necessity for participation is based on the belief that without the general sense of "ownership" that comes from sharing authorship, today's public will not understand, respect, support, and live within the constraints of constitutional government."

A striking example of this is in Zimbabwe, where the government short-circuited their democratization process by failing to take advantage of public participation. In 1999, under pressure from opposition groups, President Robert Mugabe reluctantly established a commission to draft a constitution. From a distance, it appeared to be a model process complete with public hearings, an outreach program of town hall meetings and other community activities, a multilingual media campaign, scientific polling, and an international confer-



Institutional aspects of STI policy making in africa

ence. But, in reality, the president's party controlled the constitutional commission. The commission drafted the document and sent it to President Mugabe with no opportunity for further public comment. Mugabe quickly forwarded it for a referendum vote without possibility of amendment. The electorate rejected the constitution by 54 to 46 percent. Hart writes that, "immediately after the vote Lewis Machipisa editorialized in Africa News that this "no' vote is also a 'no' vote against the arrogance that we experienced from the government. They didn't treat us as people who mattered."

The example of Zimbabwe illustrates a problem that is often seen with public involvement in new democracies. Governments and institutions are capable of opening space for participation as a way to silence their critics. A report from the Institute for Development Studies-Participation Group warns of the "policy mirage, where the rhetoric around opportunities for policy change attracts many people to engage, but at the end of the day much energy has been spent and the policy is still eternally postponed. "

Hart writes, "Genuine public participation requires social inclusion, personal security, and freedom of speech and assembly. A strong civil society, civic education, and good channels of communication between all levels of society facilitate this process. Only a considerable commitment of time and resources will make genuine public participation possible."

When seriously pursued, public participation can be remarkably helpful for democratization. The classic example of this is South Africa:

In all, it took seven years, from 1989 to 1996, to achieve the final constitution... Throughout these years, outbreaks of violence threatened the process...From 1994 through 1996 the South African process became a full-scale demonstration of participatory constitution making. Until that time, the public had had no direct role in constitution making. Now their elected representatives in the assembly reached out to educate them and invite their views.

The educational effort included a media and advertising campaign using newspapers, radio and television, billboards, and the sides of buses; an assembly newspaper with a circulation of 160,000; cartoons; a web site; and public meetings; together these efforts reached an estimated 73 percent of the population. From 1994 through 1996 the Constitutional Assembly received two million submissions, from individuals and many advocacy groups, professional associations, and other interests.

Many argue that this effective use of public involvement smoothed South Africa's transition from apartheid to democracy. Hart concludes, "At its best, participatory constitutionalism works and counteracts the arguments in support of elite negotiation as the sole effective mode. At its worst, as in Zimbabwe, it provides only



another guise for the exercise of raw power".

Benefits of Public Involvement

There is general agreement that a well-conceived and well-implemented public involvement program can bring major benefits to the STI policy process and lead to better decision outcomes. Beneficial results include the following:

- 1. Public ownership of policies/sustainable and supportable decisions: By involving citizens in the assessment of needs and solutions and identifying troublesome issues early, public involvement can promote citizen "ownership" of STI policies. Although some science, technology and innovation projects have some negative effects, citizens are more willing to accept these when they accept the need for the policy or project, participate in develop ing the alternatives, and understand the technical and regulatory constraints. To the extent that citizens are involved in the decision, their support will be sustained over time.
- Decisions that reflect community values: The public involvement model involves consultation with many segments of the community. Because this is a more collaborative process, decisions inevitably are more reflective of community values.
- 3. Efficient implementation of decisions: Decision makers understand the concerns of the public and can be more sensitive to those concerns in the implementation process. The model strives to reduce the risks of litigation and avoid revisiting decisions, thereby significantly reducing costs.
- 4. Enhanced agency credibility: The process of public involvement often transforms STI agency culture by forcing agency decision makers to interact with their constituents. As a result, stakeholders develop a better understanding of STI agency operations, and agency officials have a better understanding of public thinking. This mutual education improves the agency's relationship with the public.

Challenges to Public Involvement

The practice of public involvement in STI policy formulation continues to evolve and public involvement practitioners must effectively address a number of challenges to develop best practices.

1. Removing Institutional Barriers. STI agencies must do more than give lip service to the importance of public involvement. STI agencies must make serious commitment to include the public when making decisions and change their organizations and practices to reflect that commitment. At a minimum, this means developing consistent policies that validate the legitimacy of public involvement, dedicating budget and staff to public involvement. They also must commit to partnering with the public and other agencies



2. Ensuring a Broad-Based Audience and Improving Communication Tools. Some audiences are difficult to reach for economic or cultural reasons. Some stakeholders live outside the project area and are not targeted for involvement. Others choose not to participate because of lack of interest or time constraints. The growing trend to require public involvement in STI decision making in both the public and the private sectors is beginning to overload the public's ability to respond. Many agencies are in the habit of structuring public involvement opportunities around public meetings.

This concentration of resources on public meetings can lead to the overweighting of the voices of activists and the distortion of community voice. Improved techniques must be developed to respond to stakeholder time constraints, provide information to help people accurately assess the importance of the issues to their quality of life, and attract and communi cate effectively with a broader audience. These include the use of electronic tools, mass communication techniques, public opinion surveys, and baseline research.

- 3. Dealing with Complexity. As technology and financing mechanisms become more complex, communicating clearly becomes more difficult. In an age of sound bites and limited attention spans, public involvement practitioners must develop ways to capture and maintain public attention and convey complex information, as well as receive complex feedback. In particular, the Internet and new multimedia programs present promising options to communicate complex information effectively and widely.
- 4. Dealing Effectively with Issues of Timing. A number of timing issues are obstacles to conducting successful public involvement efforts; developing effective ways to deal with these issues will be critical in the future. These issues manifest themselves in a variety of ways. STI policies typically are developed over long periods, and solutions take years to implement. The length of time required for decisions on many projects makes it difficult to focus public attention on critical issues, particularly in high-growth areas. These problems present a twofold challenge.

Public involvement practitioners need to develop innovative ways to sustain public interest in STI information. Currently, many agencies involve the public only on a project-specific



basis. Agencies need to develop more effective ways of conducting ongoing outreach for longer-term issues. In addition, STI agencies must continue their efforts to streamline the planning and decision processes. The need to address critical STI problems is driving this effort. But collapsing the time horizon for the decision process also will make it easier for the public to have an effective voice. Several quantitative evaluation processes that focus on meas uring the performance of alternatives against a broad range of public values offer high potential in this arena.

- 5. Developing Standards and Assessment Tools. A challenge to the profession is to develop commonly accepted methods for evaluation of public involvement programs. STI agency heads and managers consistently and correctly question the benefits of costly public involvement programs, which sometimes drive up the cost of planning and design. Typically, public involvement practitioners argue that public involvement expenditures are justified in that they prevent delays, lawsuits, and costly reassessment of policies. But such a response has been insufficiently quantified. If public involvement programs are to become a routine part of how agencies do business, consistent assessment methods must be developed. Performance measures for public involvement should relate to how well the expectations of participants were met, costs in relation to benefits, and effects on decision making.
- 6. Developing Professional Standards and Training Programs. Practitioners of public involvement come from a wide variety of backgrounds. The practice must continue to draw strength from all of these contributors, and establishing basic standards to which all public involvement practitioners can be assumed to adhere will be necessary. Training programs or professional credentials or certification likely will be necessary to implement these standards. The goal should be to ensure adherence to a consistent set of best practices.
- 7. Designing Strategies and Choosing Tools. Many resources are available to use in public involvement programs. A key challenge for the practitioner is to assess the needs and audience for each project and strategically choose the most appropriate tools. Every public involvement effort should begin with a project assessment by the study team. What are the objectives of the plan or project? Who is the likely audience? What will be the level of impact on the community? Any special barriers to communication should be assessed at this time. Frequently it is useful to supplement the knowledge of the agency and the consulting community with the input of public officials and community leaders. On more important point is that it is often appropriate to conduct a series of community interviews. Research to identify issues that should be addressed also can be helpful at this

stage. Once this information is collected, a public involvement plan can be formulated. The plan should specify the tools and techniques most appropriate to the audience and the allocation of resources needed to support those tools and techniques. The plan should be sen sitive to the differentiation within the audience and consideration should be given to the ap propriate level of detail. The level of controversy of a policy will affect the techniques used.

Value of public involvement and Evaluation

1. Involving interested members of the community generally results in overall better STI planning. Gathering input from the public can help staff develop better technical information that, in turn, can help policymakers make better-informed STI policies on behalf of the community or region they represent. It is important that the community understands how the planning process works and how they can contribute to the Long Range Plan and the Unified Planning Work Program.

The public's role is important in providing information that will help to avoid errors in or omissions of important facts.

Whenever interaction or outreach occurs, a mechanism for evaluating the effectiveness of the discussion needs to be provided. Several methods that can be used to obtain feedback from participants include:

- a) comment forms at meetings,
- b) workshops and displays;
- c) meeting evaluation forms,
- d) citizen letters (and responses),
- e) telephone comments,
- f) internet email and recorded comments at public meetings.

All of this information should be maintained and made readily available to the public for on-going educational purposes and to establish an historical record. Programs and processes must be understood to develop trust between the numerous "planning partners". On-going evaluation of how well public involvement activities are performing shows which measures are ineffective and should be discontinued.

More effective types of interaction can be implemented or expanded in scope as the process evolves. The STI policy formulation process must be a dynamic process that establishes accountability to the public.

In Summary the public involvement in STI policy formulation process should observe the followings:

Type of involvement

- A continuum --- shallow to deep communications, consultations, engagement
- Engagement deliberative process working through of issues searching for common ground mutual listening and public learning values, values-based choices



Who to involve

- Citizens contribute values, priorities, choices
- Experts contribute technical knowledge, not values
- Stakeholder groups contribute technical knowledge; buy-in required

How to involve: Depends on stage of policy-making -

- Agenda-setting: experts and stakeholders dominate
- Problem definition: engaging citizens can help frame the issues, propose options, map the boundaries of where change is possible (e.g. African STI) Policy development
- consult with stakeholders and experts: the domain of the governing party Implementation
- communicate the choices, links to input from citizens
- consult stakeholders Evaluation: communicate with citizens, invite their feedback

Engagement is relevant when..

- Genuine role for citizens
- Policy-makers ready to invest in learning and listening
- Big conflicted choices and tradeoffs
- At stages of Problem Definition and setting of Broad Directions
- Value in Public learning ...conditions and opportunities have to be created no pre-deter mined outcomes

Agricultural InnovationSystem





VISION FOR THE NEXT DECADE

As we move into the next century, the demands of the public to be involved in policy decisions will become more insistent. Decision makers need to apply the lessons learned during the past 20 years as we attempt to include the public in the complicated and technical process of arriving at policy solutions. Public involvement programs should become a routine part of the development of all STI policy—not just project-specific, but routinely and seamlessly incorporated into the way STI agencies do business.

As practitioners design public involvement strategies for STI policy formulation, there should be a common set of expectations about what constitutes good practice. STI agencies should routinely set aside budgets for conducting public involvement programs within accepted parameters.

Citizens should accept their responsibilities—to put in the time and energy to understand the needs of and solutions to STI projects that affect them and their communities, and to accept the results of a fair and open process. This new paradigm of a mutually respectful, fair, and open process constitutes the core of the committee's vision for STI policy decision making for the next decade.



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KEY STAGES IN STI POLICY FORMULATION



THIS CHAPTER PRESENTS:

- THE BASIC STEPS IN STI POLICY FORMULATION.
- THE BASIC CYCLES IN STI POLICY DEVELOPMENT THAT CAN HELP OVERCOME THE PROBLEM OF INVOLVING THE END-USERS ARE PRESENTED.
- TWO POLICY FORMULATION MODELS ARE PRESENTED.



n formulating public policies, especially those dealing with science and technology, three aspects are frequently overlooked in building the capacity of local communities to apply it to local problems.

- First, local communities must be active participants in the technology development process and not merely passive recipients of technology developed for them by outsiders.
- Second, entrepreneurship and marketing skills are critical but often overlooked capacities re quired for successful diffusion of appropriate technologies. Without them, technically superior solutions will not be widely adopted and, therefore, will be of little use.
- Finally, STI capacity building must fit into broader efforts to build the productive capacities of countries because this puts STI capacities into use.

Without this demand, increasing the supply of appropriate technologies and technically proficient workers will have little lasting impact. Local involvement, entrepreneurship, and effective demand may seem like commonsense ingredients, but experience suggests they are frequently overlooked, to the detriment of effective STI capacity building efforts.

The basic cycles in STI policy development that can overcome these defects include:

- A. Isolating the problem: At this stage, the agency developing the policy decides which societal needs, the proposed policy will address. For instance, it could be the problem of institutional changes in STI policy making. The agency then articulates how the changes can contribute to improvement in STI policies, especially in making it more relevant to the needs of the people. The agency sets system goals that will use institutional changes, for instance, to target perceived deficiencies, identifies areas in which more knowledge is needed to evaluate performance, and decides on specific remedies such as accountability, quality and improvement.
- B. Consulting Widely: In conjunction with other STI institutions, explore the causes of previously reported deficiencies. Ask businesses, public and private organizations, and other STI leaders, about reasonable expectations regarding the proposed changes, and incorporate ideas into policy goals.
- C. Articulating Vision and Strategy: The STI leaders reveal its proposed policy decisions to STI community, policy makers and the general public. The purpose and end-goals of the policy are shared and specifics for implementation given, including resource requirements, timelines, roles and responsibilities of various groups, and intermediate steps if any.
- D. Gaining support of STI and Political leaders: Share details of the plan with STI related institutions and political leaders. Approach the leaders by demonstrating how the policy change can achieve state objectives. Ascertain the potential contribution of leaders regarding the policy development and then define tasks to be achieved and lines and rules of communication among these groups.
- E. Educating the public: Present expected costs and benefits to the state, private and public institutions,



- F. Disseminating Ideas: Distribute policy rational, guidelines, procedures, findings and outcomes with all STI community and the larger society. Hold frequent dialogue with them to share their concerns and be prepared with a plan to counter resistance if any.
- G. Pilot testing and Trials: Identify aspects of the policy for a limited implementation. Phase-in parts of the policy change and its requirements (programme requirements, required funds and the number of indicators) over the first few years.
- H. Examining and Reporting Results and Findings: Study the process of implementation and report on successes, linking process to outcomes. Incorporate feedback into analysis and distribute findings through a progress report.
- I. Statewide Dialoguing: Dialogue with institutions, leaders and stakeholders and consult widely on the impacts and benefits of the policy. Revisit the implementation and changes necessary to successfully enact the policy change statewide.
- J. Implementing policy change: Enact the new policy- expand all the indicators statewide and institute additional funding requirements if necessary.
- K. Evaluating and Reviewing: Establish system for ongoing and periodic review and revision of the policy.

Alternatively, the STI policy development can go through the following cycles:

A. Screening – this has to do with verifying whether the proposed STI policy will have adverse impacts on the proposed beneficiaries. Screening process should determine whether a full impact assessment is necessary or not. It should be part of policy development process and should be done before the new policy is formally adopted.

Screening should in general involve::

- Policy team's knowledge and experience including a lead officer
- previous consultations regarding the proposed STI policy change
- previous complaints, comments, evaluations and monitoring
- research and reports
- library and internet searches
- advice from internal and external specialists
- staff with previous involvement on direct implementation of a similar STI policy.

Before starting the assessment it is important that time is spent in determining the purpose and the aims of this policy. This should include consideration of any specific objectives and how these will guide the operation or implementation of the policy. The following questions may be helpful:



- What are the aims, purpose, or objectives of the STI policy?
- Are there any other outcomes associated with the policy?
- Who defines or defined the policy?
- Who carries out the policy?
- What are the policy trying to achieve and for whom?
- Who are the main stakeholders, what do they want?
- Do the outcomes conflict with other objectives of the STI community?
- Who or what might contribute or detract from the community's ability to meet these out comes?
- Are there any customer groups or communities who are currently or might be prevented from benefiting from the policy?

B. Scoping – This is used to identify the key issues of concern at an early stage in the policy development process. Scoping should be carried out at an early stage in order to aid the identification of possible alternatives. The scoping process should involve all stakeholders in the STI policy. The results of scoping will determine the scope, depth and terms of reference to be addressed within the STI policy development. Scoping is generally carried out to identify the key issues and concerns of the interested parties to the STI policy such as:

- Who is concerned?
- What are their concerns?
- Why are they concerned?
- What is the threshold of concern where change becomes unacceptable?
- When ineffective scoping occurs delays are caused by additional time being required to assess unidentified impacts.

Scoping should be an ongoing exercise throughout the course of STI policy development and implementation.

C. Impact analysis - this is the process of identifying the full consequences of change before the change takes place. This gives one the ability to spot problems before they arise, so as to develop contingency plans to handle issues smoothly. This requires a detailed assessment of the issues involved, so as to forecast the characteristics of the main potential impacts.





Impact analysis can be broken down into three overlapping phases:

Identification — to specify the impacts associated with each phase of the policy development process and the activities undertaken. This process begins during screen ing and continues through scoping, which

identifies the key issues and classifies them into impact categories for further study. In the next phase, the likely impacts are analysed in greater detail in accordance with terms of reference specifically established for this purpose. Over time, a number of simple methodologies and tools have been developed for use in impact identification. These simple methods are of proven value for undertaking a systematic approach to impact identification.

The most common formal methods used for impact identification are:

- checklists;
- matrices;
- networks;
- overlays and geographic information systems (GIS);
- expert systems; and
- professional judgement

Prediction — to forecast the nature, magnitude, extent and duration of the main impacts. Once all the important impacts have been identified, their potential size and characteristics can be predicted. Impact prediction or forecasting is a technical exercise. It utilises physical, socio-economic and cultural data to estimate the likely characteristics and parameters of impacts (e.g. magnitude, spatial occurrence etc.). A range of methods and techniques may be employed.

These can be a continuum from simple methods for impact identification (described earlier) to advanced methods, often involving the application of mathematical models. Examples of commonly used impact prediction tools are same as given under impact identification.

Evaluation — to determine the significance of residual impacts after taking into account how mitigation will reduce a predicted impact. Once the impacts have been analysed, they are evaluated to determine their significance. As noted earlier, the attribution of significance begins early, during screening and scoping, and extends throughout the STI policy development process. Following impact identification and prediction, impact evaluation is the formal stage at which a 'test of significance' is made.

A systematic process should be followed in evaluating significance, distinguishing between 'as predicted' and 'residual' impacts. While step one involves evaluating the significance of 'as predicted' impacts to define the requirements for mitigation and other remedial actions, step two involves evaluating the significance of the 'residual' impacts, i.e. after mitigation measures are taken into account. This test is the critical measure of whether or not a proposal is likely to cause significant impacts.

D. Monitoring and evaluation: Establish system for ongoing and periodic review and revision of the policy. In the words of the multi-award winning Harvard scientist, Professor Edward O. Wilson...

"Thanks to science and technology, access to factual knowledge of all kinds is rising exponentially while dropping in unit cost. It is destined to become global and democratic. Soon it will be available everywhere on television and computer screens. What then? The answer is clear: synthesis. We are drowning in information, while starving for wisdom. The world henceforth will be run by synthesisers, people able to put together the right information at the right time, think critically about it, and make important choices wisely." Wilson, E. (1998) Consilience: the unity of knowledge, Abacus, London, p 300.



The Six Challenges of Aid M&E: Problems arise at each stage of the M&E data cycle

Research shows that even though everyone agrees that doing M&E is a good idea, in practice, problems arise at each stage of the M&E Data Cycle. The cycle can stop turning for any one of six common reasons...

2. The problem with M&E data identification...

Right from the planning stage of new projects, the identification of what performance data is required is conceptually difficult. More often than not, project planners delegate the detailed M&E planning to the implementation team, assuming that they will have more clarity on what performance data is relevant once they are on the ground. However, implementation team members tend to be technical people whose primary role is the delivery of project outputs. The definition of indicators and other performance data is not their core business. They frequently see M&E as an additional responsibil ity...an imposition!

3. The problem with M&E data capture...

Even if the critical step of identifying appropriate performance data can be taken, M&E plans are frequently unsuccessful because of staff non-compliance with reporting protocols. In situations where overstretched staff are faced with ambiguous reporting requirements or complex/difficult tools, data capture tends to become a low priority.

4. The problem with M&E data analysis...

A surprisingly common situation occurs where captured data is accumulated but is never analysed to draw out meaningful features and trends in the data. The main reason for this is reported to be the skill required for data analysis, and for critical reflection.

5. The problem with M&E information dissemination...

Analysing captured data is pointless unless the analysis is disseminated to people who can benefit from it. While this seems obvious, M&E systems frequently fail because the mechanisms for moving information around tend to be cumbersome. The paper-based reports required by many stakeholders often require the same information to be bundled up over and over in different formats on different schedules.

6. The problem with M&E information utilization...

Unless M&E information can be used for learning or accountability, the preceding steps in the M&E Data Cycle have wasted time and resources. But for information to be used by busy people it must be made available in a timely and relevant form. It must be clear how it can help them do their job better. The incentive for using the information must be clear.

7. The problem with M&E system assessment...

Research suggests that not only is M&E of a project rarely done well, but M&E of M&E systems is rarely attempted at all. This 'meta-M&E' is necessary if we are to ensure that our M&E activities are useful, but it is unlikely to occur unless our organizational culture values critical inquiry and reflec tion.



CASE STUDY: THE BIOSAFETY BILL IN KENYA

On December 9, 2008 the Kenyan Parliament passed the 2008 Biosafety Bill, comprehensive legislation that governs research, field testing, commercialization and imports of bioengineered crops. USAID supported a coalition of stakeholders led by the USAIDfunded Program for Biosafety Systems (PBS) that worked to advance the bill through Parliament. PBS and local partners reviewed the bill, conducted a series of outreach activities to members of parliament and other key policy makers, including study tours and policy briefings, and helped launch a National Biotechnology Awareness Strategy. PBS also helped develop biosafety regulations and guidelines that will be implemented under the bill and provided training to Kenyan regulators.

Kenya is the most advanced country in East Africa in terms of GMO research, with crops engineered to be insect or virus-resistant already in the pipeline. Any biosafety law eventually adopted in Kenya should also help neighbouring countries optimise their own biotechnological practices. Indeed, many were relying on a 'wait and see' approach to biosafety regulation - looking to Kenya to take the first steps.

As host to the meeting at which the Cartagena Protocol on Biosafety was opened for signature in 2000, Kenya was the first country to sign up. Ratification followed in 2003, and the Biosafety Bill was drafted in 2005 to bring Kenya's law and practice in line with the protocol. Meanwhile, three countries in Africa now grow and use GM crops, this is according to the latest report on the global status of commercialized biotech/GM crops 2008, which shows that the number of countries planting biotech crops in Africa have marginally grown to three from one country, South Africa in 2007. In 2008, Burkina Faso (Bt Cotton) and Egypt (Bt Maize) joined the exclusive clubs of countries growing and commercializing biotech crops.

Globally, the number of countries planting biotech crops have soared to 25 and the global hectarage of biotech crops rose by 9.4% above previous year or 10.7 million hectare increase, reaching 12.5 million hectares. This rise is 74-fold hectares rise since 1996, making biotech crops the fastest adopted crop technology. 2008 also saw a new biotech crop, RR sugar beet become first commercialized in the US and Canada. Egypt, Burkina Faso Bolivia, Brazil and Australia introduced for the first time biotech crops that have been commercialized in other countries. The number of crop farmers increased by 1.3 million in 2008, reaching 13.3 million globally in 25 countries, notably 90% or 12.3 million were small and resourcepoor farmers in developing countries.



To support the development and implementation of national biosafety systems, PBS works through a variety of partner–driven activities and initiatives including training workshops, a competitive grants program, biosafety policy analysis and policy development, and consultative guidance on biotechnology product development. These activities are designed and implemented in close collaboration with PBS regional coordinators and partners located in Asia and Africa. To help our partner countries meet their national goals for agricultural production and food security, public health, biodiversity conservation, and economic growth, PBS

- provides assistance as those countries de velop and implement effective biosafety policies and procedures,
- helps strengthen their existing capacity for conducting scientifically sound risk assess ments,
- fosters science-based decisionmaking at each stage of product development and use, and
- encourages regional collaboration and information exchange among stakeholders involved in biotechnology and biosafety and helps increase understanding of bio technology applications and issues.

While PBS gears its strategic objectives on the needs and goals of its specific partner countries, it focuses on four overarching global components:

Policy Development and Implementation

Evaluating the implications of different country

and regional regulatory approaches for genetically modified organisms (GMOs) by developing decision models to assist regulatory agencies. Working to generate new information, provide analysis of practical problems and cases, and make recommendations regarding national and regional regulatory systems and decisionmaking.

Capacity Building & Communication

Maintaining an active program of training, education, and capacitybuilding activities in biosafety to ensure that the people involved in biosafety decisionmaking are competent and confident enough to use the best available science to assess planned releases of GMOs and genetically modified (GM) food products.

Risk Assessment Research

Providing a mechanism for competitive grants on biosafety research in Asia and Africa through the Biotechnology-Biodiversity Interface (BBI) grants facility.

Regulatory Approval Strategies

Providing biosafety guidance for product development and helping institutions comply with regulatory requirements; working with regulatory agencies to assist them in developing review, approval and inspection processes, and in creating global resources for training and outreach.

PBS is an IFPRI-managed program that supports our partner countries in Africa and Asia in the responsible development and safe use of agricultural biotechnology. PBS effectively addresses biosafety through an integrated program of research, capacity development, and outreach. PBS is funded by the U.S. Agency for International Development (USAID).





QUALITIES OF A GOOD SCIENCE INNOVATION POLICY



This chapter identifies the characteristic of a good STI policy

Innovation perspective to generation of knowledge and information by science represents a significant change from the conventional linear approach to research and development. It builds on complex relationship among heterogeneous agents, social and economic institutions and endogenously determined technological and institutional opportunities. Science innovation system is an interactive process in which enterprises/organizations/institutions in interaction with each other and supported by organization and institutions play key roles in bringing new products, processes, new forms of organization into social and economic use. It employs several assumptions such as;

Innovation takes place everywhere in the society and therefore brings elements of a knowledge system and connecting them around common goals promote economic development;

- Innovation is an interactive process and is embedded in the prevailing economic structure and this determine what is to learnt and where innovation is going to take place.
 - Heterogeneous agents are involved in innovation process, and formal research is a part of the whole innovation processes;
 - Innovation takes place where there is continuous learning and opportunity to learn is a func tion of the intensity of interaction and others. Innovation feeds into policy and on the other hand is influenced by policy. Policy is therefore an important component of innovation process. It is crucial for learning and innovative process as they provide conducive, regulated and stable atmosphere. Policy environment determine not only the operations and innovative performance of agents/actors, but significantly influence the behaviours, attitude, interaction and cooperation among actors/agents in science innovation process. Therefore formulating a good and favourable science innovation policy is an imperative.

Given the above scenario, the development of science innovation policy is primarily an inter active process which encapsulates in sharing of information, ideas, formulating concepts and framework, utilizing research and evaluation and a range of relevance analysis. Ideally, it ex plores interdepend ence and relationship of disciplines, myriad of inputs and related policies. Thus a good science innovation policy is characteristically.

Evidence base: Synthesized and credible science, technical knowledge and information should inform science innovation policy formulation: The fact that innovation takes place at different places, at different time and space leaves the challenge of ensuring credibility and ac curacy (in terms of source and validity) and sufficient articulation to direct course of action by policy makers. This is department on effective linkages between researchers/stakeholders and policy maker. A cooperation and advocacy style is usually adopted to foster the process.

Borne out of consensus among stakeholders (consensus-base): Policy environment for science inno vation is a democratic and decentralized one. Science innovation process is not represented by one individual or organizations and this means a wide range of opinion, and ideas as to the required response and appropriate cause of action. Each actor/ organization does not represent the view/opin ion of the others. Consequently policy makers are presented with an overaheling volume of information and sorting them out to know which information is most appropriate in addressing a particular issue could be challenging. Consensus is achieved with group of scientist/stakeholders coming together on stakeholder platform to debate on pertinent issues based on available evidence. Consultation, advising and advocating tools is best employed in arriving at a consensus.

Problem-oriented: Focused and clearly stated: A good policy is specific in terms of what it is, what it has to addressed and how the policy addresses the issues: It is presented in simple and succinct terms, void of ambiguous words that could lead to variance in interpretation and compliance.



- Incorporates policy instrument: Science innovation policy should essentially incorporate polic instruments (programs, projects, framework and strategies) to facilitate implementation and evalua tion of its impact/benefit.
- Public advocacy: Inputs and support from the public/society is crucial for effective policy formulation and implementation. Generally, people tend to ignore policies that they are do not know or have par ticipated in.
- Context specific; Innovation processes are context specific and historically determined. A good sci ence innovation is formulated and implemented around the prevailing socioeconomic, socio-political, trade conditions and natural resource base.
- Create, foster links and strengthen stakeholder innovativeness: Policy is linked to action facilitating networking, information and knowledge sharing, interactive learning, access to funding, market development and entrepreneurship. Multi-stakeholders capacity building should be advocated and interaction between research, private, civil society organizations and others should be emphasized and nurtured from onset.
- Role specification: Innovation process is a multi-stakeholders process represent varied interest values and capability. A good science innovation policy should delineates and streamline roles, alliances and partnership; and framework requisite for stakeholder participation in implementing policy.
- Inclusive: A good science innovation policy adopts holistic approach to addressing issues. Often issues are addressed in isolation resulting to partial solution to identified prob lems/priority

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