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MAKING *a* DIFFERENCE

MEASURING *the* IMPACT of INFORMATION *on* DEVELOPMENT

Proceedings of a workshop
held in Ottawa, Canada
10 - 12 July 1995



EDITED BY
Paul McConnell

INTERNATIONAL DEVELOPMENT RESEARCH CENTRE

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Information for Policy Formulation: Latin America and the Caribbean

Fay Durrant¹

In Latin America and the Caribbean, the International Development Research Centre (IDRC) seeks to combine innovative aspects of information systems development with research into the impact of information and information and communication technologies. The current focus is on information for policy formulation, with particular initiatives aimed at assessing the impacts on the development of policies and on related development areas such as productivity and competitiveness.

Regional Trends

The waves of globalization, privatization, and decentralization are major forces affecting the socioeconomic scenario and, consequently, policies are now being formulated by groups and individuals outside the traditional government structures. The characterization of policymakers in the Caribbean done by Boissiere (1994), incorporates a sample of actors from the public and private sectors and from civil society. In some areas of Latin America, the situation is complex and dynamic and can include, for example, a greater percentage of representatives from local government and community groups as participants in the process of policy formulation.

Forms of information access and utilization have also changed significantly in Latin America and the Caribbean over the past decade. Major influences have been increasing globalization of the production and marketing of information and communication technologies (ICT), wider access to these technologies, increased capacity to manipulate more user friendly systems, and the development of models of information systems for decision-making, which are being incorporated into practical use.

These developments still impact unevenly on the population of the region. Capacity to exploit new information technologies for increased information access

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has been developed particularly by groups of information specialists and researchers and the more advanced nongovernmental organizations (NGOs). The development of data communications, particularly the subsidized access to Internet, has resulted in collaborative research and networking among some groups in the region, and across regions, and increased access to points of regional information for policy- and decision-making.

Some of these points such as CLAD's Information System for Integrated State Reform, and CEPAL's INFOPLAN, provide information to policymakers on issues of state reform in the region and are aimed at impacting on policy formulation, while REDATAM Plus is used in several countries in the region to provide objective bases for decisions and policies. Chile provides an interesting example of the use of REDATAM Plus GIS² and ARC INFO³ as the basis of determining priorities in resource allocation.

Research Issues

On the one hand, although researchers and information specialists and some business persons have been able to develop some degree of capacity to access information via the new channels, policymakers, community leaders, and small-scale business managers, on the other hand, are less able to exploit the advantages of the new information technologies. The capacity of ICTs to cross institutional barriers and to encourage community collaboration in policymaking has also not been effectively exploited. In some cases, there is an excess of information available, but there have been difficulties in accessing the crucial information and research results needed for policy formulation. Also, sometimes the problems relate to lack of connectivity to the points of information services but, in others, there is need for access to research results and analysis and syntheses of information from the variety of sources available in the region.

²REDATAM is the abbreviated form of RETrieval of DATa for small Areas by Microcomputer, and REDATAM Plus GIS (R+GIS) is a later version of REDATAM for use with Geographical Information Systems such as ARC INFO. Both REDATAM and REDATAM Plus GIS were developed and are maintained by ECLAC/CELADE. Applications are being developed in collaboration with the University of Waterloo with support from IDRC. Some 728 copies of REDATAM Plus GIS have been distributed to institutions in Africa (29), Europe (16), the Caribbean (50), Latin America (572), North America (43), Asia and Pacific (17), and West Asia (1).

³ARC INFO is the trade name for a geographical information system, a software package compatible with REDATAM.

The urgent need in Latin America and the Caribbean and in other regions is strengthening of the capacity of those who make policy in all areas to access information and research results via the most effective paths. There is also a need for policymakers at all levels to understand the potential impact of these technologies for providing access to information, to incorporate tools and methods for increasing this access, and exploiting the existing ICTs for increasing organizational productivity and access to information for policy formulation.

The models that are under development have begun to impact on policy formulation. These include the Information System on Children (SIPI), which has stimulated more effective decision-making in relation to marginalized children in Uruguay and is beginning impact also in Ecuador. Another model is the Information System for Municipal Management in Chile, which is aimed at enabling municipal managers to use information from the central government systems to inform their decision-making and management.

The important common thread in the program is the definition and analysis of the types of information required for policy formulation, implementation of appropriate channels for information delivery, and evaluation of the information use environment. Participation of policymakers in the research into these issues is, therefore, an important focus of current initiatives. The general orientation can be summarized in the following.

Objectives

General Objectives

The general aim is in developing closer, interactive linkages between information systems and the processes of policy development and policy formulation. This is being done by optimizing access to information for policy formulation and assessing and evaluating the impact of information and information and communication technologies on policy formulation.

Specific Objectives

- Assess the impact of information on policy formulation in the areas of social policy, information policy, and environmental management policy;
- Expand access to regional information on key areas of sustainable development through specialized information services to selected user groups.

- Create value-added products synthesizing research and data on priority topics in social policy environmental policy and information policy. Products and services will be developed in relation to the needs of selected user groups.
- Enhance regional capacity for electronic networking, and computer conferencing on the part of selected user groups; and
- Monitor regional developments in access to, and research on, electronic communication and the impacts of its use. This will be done with a view to informing policy options and guiding the sustainability of the electronic communication facilities in the region.

Expected Results

- Analyses of the impact of information and the use of information technology on policy formulation in the areas of environmental policy, social policy, macroeconomic policy, and information policy;
- Closer linkage between research results, other development information, and policy formulation. This will be achieved through the participation of policymakers in areas of research and the provision of information products for policymakers, community leaders, and researchers on environmental policy, social policy, and information policy; and
- Established partnerships with private sector companies providing information or information technology services with development banks and other donors in the region.

With the changes in the region, there has been a need to review the scope of policymaking activities and, consequently, the range of policymakers. In an assessment done last year on the experiences in the region, the current trend in policymaking can be seen as:

- Extending beyond the scope of central government to include local government and civil society,
- Involving processes of consultation and consensus building among government and community groups, and
- Involving a complex series of information and communication activities in which all the actors participate.

The group of potential users of information for policy formulation, therefore, includes all those who define or execute a given policy and potentially

the entire population as participants in or implementors of the policy decisions. The needs of each group in terms of data, analysis, and communication required would, therefore, need to be assessed on an ongoing basis to determine the information requirements for the policy making process.

Impact of Information and Communication Technologies

Although an important goal has been increasing access by the end users to information, the logical next step is interactive communication between the users or clientele and the information systems. The advances in technologies in the region are beginning to change the bases on which users have access and are able to interact with the information systems. In this context, electronic connectivity has begun stimulating interactive communication between users and the information systems and, therefore, moving beyond basic access.

A recently funded project "The impact of Information and Communication Technologies on the Productivity and Competitiveness of SMEs" (Ecuador and Argentina) (IDRC 1994) illustrates some of the research questions and will be identifying research solutions as they relate to increasing the competitiveness and productivity of SMEs. This research area is being developed on the assumption that information and communication technologies are a set of enabling technologies that can have widespread application across all sectors but that have particular potential for improving productivity and competitiveness. They also have significant unexploited potential at the community level.

Appropriate adoption, adaptation, transfer, and use of information technologies can only take place with informed choices and the development of user capabilities. This requires active involvement on the part of users, particularly the owner/managers of the enterprises in the identification of problems or barriers to information technologies, selection, adoption, transfer, and use and the definition of channels for overcoming policy challenges.

This area of the program is based on the need for increasing competitiveness and productivity in the region. With the focus throughout the region on market-based resource allocation, owner/managers of SMEs have recognized the need to increase their capacity to differentiate products and services and to link electronically with customers and suppliers. ICTs have been recognized as instruments of this change, but the degree of impact is still being researched at a global level. The questions relate to the degree of impact of ICTs that can be anticipated as an input to national and firm level policies.

The Universidad de Buenos Aires Maestria en Politica y Gestion de la Ciencia y la Tecnologia (UBA) and the Instituto de Investigaciones Socio-economico y tecnologicas (INSOTEC) will jointly implement a research program focused on guiding managers of SMEs in Argentina and Ecuador in determining the value of ICTs and in deciding on the effective selection of ICTs for maximizing factors for productivity and competitiveness.

In the short term, the researchers in collaboration with associations of SMEs, will analyze the factors influencing adoption of ICTs, determine the characteristics of the decision-making process that promote or hamper the adoption of information and communication technologies by SMEs and evaluate the impacts of such adoption on the productivity and competitiveness of SMEs. The development and testing of a methodology for determining the value of ICTs will be an important output of this research, and the delivery of this methodology to the participating enterprise associations will be the principal result.

The research will establish a typology of SMEs in relation to use of ICTs, and the case studies will analyze in depth the impact of ICT adoption in selected SMEs. The participation of the owner/managers, ICT suppliers, support organizations, and government officials will guide the researchers in the interpretation of the findings and in the dissemination of results. The project will be implemented in collaboration with the Camaras de Pequeña Industria de Pichincha and Guayas in Ecuador, the Union Industrial Argentina, the Camara de Industria de Procesos (CIPRA), and the Secretaria de Ciencia y Tecnica de la Nacion in Argentina. This linkage is considered essential for encouraging the participation of the enterprises in the data gathering and in the dissemination of the research.

The issues raised in this project have resulted from regional consultations held in 1993, which were aimed at shaping a regional program on information technology policy research. IDRC supported two regional consultations. The first examined the question of ICT policy in the Latin American and Caribbean region and concluded that the most effective focus for the Centre would be ICT policies related to SMEs. The second consultation was based on analysis of studies of the ICT policy experience in Argentina, Brazil, the Caribbean, and Ecuador and facilitated discussions among representatives of organizations that support SMEs. The results have provided the basis for the orientation of this project and preliminary analyses of the problems to be researched.

Although there were several possible areas of appropriate focus, the regional meeting, held in April 1993, agreed that an important one would be small- and medium-scale enterprises and organizations as the key agents for increasing productivity and for stimulating competitiveness in the region. Areas

of focus agreed on were the effectiveness of policymaking relating to information technologies. The subsequent analyses for Argentina, Brazil, the Caribbean, and Ecuador concluded that there are research gaps between the micro- and macroeconomic analyses on technology adoption and the implications of adoption on company profitability and competitiveness.

The regional consultation of December 1993 made recommendations for sector-specific studies to examine the contribution of ICTs to the international competitiveness of SMEs. The problems in measuring productivity impacts of ICTs on SMEs were recognized and suggested for further research. Norman Girvan's paper on the Caribbean (Girvan 1994) suggested that the impacts be examined in relation to increased capacity to differentiate products and services, market penetration and customer reach and services. The "critical success factors" identified in the discussions were:

- Strategic planning
- Commitment of the owner managers
- User participation
- Willingness to change work procedures
- Adequate staff capacity and training

In concluding the study on Argentina and Ecuador, Carlos Correa (Correa 1993) identified the impact on competitiveness of adoption of different types of ICTs as one of the least explored areas. Weisman and MacMillan (1994) also highlight some of the avenues for using information systems as competitive weapons. The methodological difficulties of such analyses were also recognized, and are also identified in the proposal.

These difficulties include the need to :

- Isolate the impacts of ICTs from other micro and macro economic factors that affect productivity and competitive advantage;
- Define competitive advantage in terms that are relevant and operative vis à vis the research (such as increased market share); and
- Appropriately define productivity in the context of computerized systems.

With a view to clarifying where models for measuring impact exist and have been tested, a literature survey was commissioned by the Centre via a contract with specialists in this field. Louis A. and Elizabeth Lefebvre of the Ecole Polytechnique, Université de Montréal, have completed a study analyzing and evaluating, via the literature, methodological models used in Canada and in some of the OECD (Organisation for Economic Co-operation and Development) countries for the measuring the adoption and impact of information and

communication technologies on the productivity and competitiveness of SMEs (Lefebvre and Lefebvre 1995). The study particularly address:

- Identifying and analyzing the adoption of information and communication technologies,
- Determining the characteristics of the decision-making process (i.e., the way in which the decision to adopt these technologies is made) that promote or hamper technology adoption, and
- Evaluating the impacts of such adoption.

The Lefebvre study has researched various aspects related to adoption, diffusion, and impacts of ICTs with particular focus at the firm level. The main purpose was not only to identify the issues but also the measures and constructs that ultimately allow the design of data-collection tools.

The study first defines information and communication technologies according to different models and examines the rate of diffusion of these technologies in different countries. It then analyzes the internal and external factors affecting the adoption of these technologies, and discusses the characteristics of the decision-making process — considered a prime adoption factor. Finally, it assesses the relationship between ICTs and productivity, the impacts of information and communication technologies on key competitive dimensions, performance, work and employment, and operational measures for the impact of ICTs.

The Lefebvres conclude that data collection tools should be designed for or adapted to the broader research objectives pursued, the specific environments to which they are addressed and the internal validity of the pertinent dimensions to be included in a specific study. This analysis of the literature will be used by the researchers as a support for developing the details of the methodology and the data-collection tools to be used in undertaking the research project.

The effective implementation of ICTs within SMEs requires firm-level policies. In this, the owner/managers are the major players. At the same time, effective implementation at the firm level is enhanced by industry-level policies, such as technical assistance, cooperative purchases, subsidies etc., which are implemented by industry associations such as the associations linked to the research groups, or by industry support organizations such as INSOTEC.

The support for redefinition of policies at the national level depends on lobbying by groups such as the industry associations and the implementation of policies for adequate compatible cross-sector infrastructure, including labour. These policies, in the form of laws, special grants, and exemptions, are defined by agencies such as the Secretaria de Ciencia y Tecnica de Argentina and are implemented by public or private development banks or equivalent agencies.

The areas of testing agreed upon at the project development meeting in January 1995 were:

- Lessons to be learned in relation to the adoption of ICTs by SMEs.
- Decision-making mechanisms used by SMEs for selection of ICTs.
- Procedures for implementing ICT systems in SMEs.
- Productivity impacts of adopting ICTs.
- Competitiveness impacts of adopting ICTs.

The two research groups will be working with manufacturing- or industry-related service companies. They will both focus on applications in management (accounting and finance, production control and management, and communication). This focus agreed upon at the project development meeting will provide the areas of commonality and will enable comparisons between the developments in the companies studied in Argentina and Ecuador.

The grouping of potential participating enterprises is exceedingly varied, and it was agreed at the project development meeting that, although there is a core group of leaders that can be expected to play major innovative roles in the process of increasing competitiveness, the best strategy would be to network a mix of enterprises covering the leaders, both active and traditional.

The project recognizes the difficulties when designing the detailed methodology. These relate to the need to isolate the impacts of ICTs from other factors that affect productivity and to define productivity and competitive advantage in relevant terms. The application of productivity indicators has been outlined in the proposal and in the development of the detailed methodology these indicators will be assessed as a means of selecting productivity indicators to be incorporated into the analysis.

As a result of the consultations between the two groups and with the Centre, the sectors to be studied will include the major sectors of:

- Food and drink
- Textiles, apparel, and the leather industry
- Chemical substances and chemical products
- Metal products machinery and equipment

As the project focuses on the impact of the ICTs, it was agreed that the ICTs to be studied will be those used by the majority of SMEs, thus providing a basis for analysis of experience rather than of potential. There will be an initial survey that will provide baseline data on the areas of study, and then the results will provide a base for selecting firms for the case study. The SMEs for the survey will be drawn from the membership of the associations and will include adapters and nonadapters of ICTs. A strong element of the methodology is also the participation of the enterprises at several stages of the research and the link with

the SME associations that will stimulate the interchange of issues and concerns and will provide ready channels for the dissemination of the results.

The resulting evaluation of the use of ICTs in the samples will permit an identification of: the level of incorporation of these technologies in the enterprises, the existence of cooperative relations between SMEs and other enterprises that influence the access to and application of ICTs, the areas of enterprise management in which there is greater utilization of ICTs, and the range of ICTs available for SMEs.

The project's impact is anticipated on two levels: on the researchers who will have tested a methodology for measuring productivity and competitiveness in this context, and on the enterprises and participating industry associations. In the case of Argentina, collaboration with the Union Industrial Argentina, la Cámara de Industria de Procesos (CIPRA), and the Secretaría de Ciencia y Técnica del la Nación are the main links between the research with future implementation. In the case of INSOTEC, the Cámaras de Pequeña Industria de Pichincha and Guayas will be the main collaborators. Impact will, therefore, be at the level of the chambers and INSOTEC as a service provider for SMEs.

Information and Policy Formulation

Two other projects relating to information for policy formulation in Latin America and the Caribbean and that will be presented in these proceedings are "Impact of Information Policy Formulation in the Caribbean" (Chambers and Boissiere, this volume) and "Information for Decision-Making in the Caribbean Community" (Collins, this volume). They illustrate several of the objectives that guide the current program and the scope for assessing the impact of information and information technology on policy- and decision-making. They focus on a range of user groups, emphasize complementary areas of information services, and will provide complementary results from their case study components.

Another project supported in this area is the "Network of Networks: Latin America," which links information providers and researchers and has as its general objective increasing access by the end user to the information held by 17 regional networks. Electronic communication and dissemination of the databases on CD-ROM has enabled the information provided to be more widely disseminated, whereas some users have been able to interact electronically with the information providers and with some information systems.

The next phase is expected to extend the aspect of interaction among users, information specialists, and systems. The developments in Internet access now make this kind of interaction much more widespread than would have been the

case in 1991 when the current phase was being developed. Users and information specialists are now able to be more selective about what they retrieve and to move toward the definition and creation of value added products. As Negroponte (1995) points out in his recent work "Being Digital," hypertext removes the limitations of the printed page and enables users, be they information scientists or clients, to create a new meaning from information that might have been structured by the original producer in a different way.

As a first step, these three projects will try to isolate the "benefits" of information use in the context of policy formulation. The area that I think needs further research and analysis is the definition of the impacts on specific areas of policy formulation. Tracking the flow of information and matching it with any number or range of policies will need incorporation, in each research activity, of relevant policies on which the impact of information can be assessed.

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