

*Knowledge is Like Light – Information is Like Water*¹

The link between information or knowledge, and decision-making or development is not straightforward. An international research programme is trying to identify the factors involved.

Stephen Parker

INFORMATION IS LIKE WATER

In my previous job, at the International Water and Sanitation Centre (IRC), I had to prepare a training seminar in the principles of information management for managers of water sector institutions, most of whom had little or no previous knowledge of the subject. To help them understand the basic concepts quickly, I began by pointing out that many characteristics of information should be familiar; in many ways, information is like water, because:

- it comes from many different sources
- it may be easy to obtain, or difficult
- before it can be used, it has to be:
 - collected
 - processed
 - stored
 - distributed
- it may be used for many different purposes
- it may be polluted' through distortion or inaccuracy
- it may be lost through 'leakages'
- it flows – but, unlike water, not of its own accord; the flow of information has to be managed if it is to reach those who need it, when they need it.

The presentation noted that information may be used either to add to knowledge – the knowledge of an individual, or the sum of knowledge about a subject – or to make decisions. It emphasized that information – or knowledge – is the key to exploiting other resources, including, for example, water resources. Society cannot use resources it knows nothing about, nor make effective use of those about which it knows too little. The effective use of resources is crucial to development. Information – or knowledge – is therefore a basic resource for development.

KNOWLEDGE, INFORMATION AND DECISION-MAKING

The World Bank seems to have discovered the importance of information in development back in May 1993, when the then President of the Bank, Lewis Preston, declared at a conference in Washington that

Knowledge and ideas are critical to development. We need reliable data to inform us about how we are doing and analysis to determine which policies succeed. . . . The problem is that we don't yet have all the knowledge we need to address some of the major challenges before us . . . we need constantly to replenish and sharpen our knowledge base.²

The implied assumption that it will be possible, at some undefined point in the future, to have 'all the knowledge we need' and that only at that point we will be able to address the major challenges before us, clearly does not provide a realistic basis for tackling the problems of development. As Kate Douglas points out in a recent article on decision-making,³ while

many modern researchers . . . see rational decision-makers as supernatural beings with the logic of a supercomputer, boundless knowledge and all eternity in which to make a decision. . . . In the real world, a good decision is less about finding the best alternative than about finding one that works . . . our mental tools . . . allow us to make decisions based on very little information. . . . It's pointless trying to find out everything there is to know about a nut or a berry if we starve in the process.

She acknowledges that, in less urgent situations,

people tend to use more calculated reasoning when they can take their time.

The link between information – or knowledge – and decision-making or development is not straightforward. Simply providing more and more information relating to a problem will not ensure that it is solved. The fact that we have access to a resource – whether adequate or not – does not necessarily mean that we will make use of it, or use it effectively, or use it to the full. We may even deliberately choose not to make use of information, no matter how reliable or relevant, if we think it will lead to an undesirable result – even though others, perhaps more directly affected, may disagree.

THE IMPACT OF INFORMATION ON DECISION-MAKING: AN IDRC RESEARCH PROGRAMME

Questions such as these underlay the formulation of a major research programme on the impact of information on decision-making, funded by the International Development Research Centre (IDRC) and now being carried forward by the International Federation for Information and Documentation (FID).

The programme began in 1992 with an exploratory workshop, held at IDRC Headquarters in Ottawa, which was designed to explore the feasibility and scope of a substantive investigation into the impact of information on development. The workshop, and an ensuing computer conference, constituted Stage I of the programme, the result of which was a comprehensive report dealing with concepts, indicators, methods of data collection and approaches to assessing benefits and impact. This report formed the basis for a workshop held in Nairobi in 1993 which drafted a framework for impact assessment

and a methodology suitable for field testing. This was Stage II of the programme. Stage III, carried out under FID auspices and now nearing completion, has been concerned to implement and refine the methodology through a series of case studies and associated research. The results of Stage III are now almost ready to be presented, in early December this year, to a group of invited experts, and to a wider audience, for comment and analysis and for recommendations as to further work to be undertaken. This review process will constitute Stage IV of the programme.

The project team are still analysing and discussing these findings, and it would be wrong of me at this point to pre-empt their decisions, and the comments and suggestions which we hope will emerge from the December meeting. Nevertheless, I think it is permissible to give here an overview of the programme and its aims and methodology, and to at least identify some of the key questions still remaining to be answered after some 7 years of study. In making this summary, I am drawing heavily on an as yet unpublished 'metasynthesis' report on Stage III prepared by Paul McConnell, formerly of IDRC, who has been associated with the programme since its inception. The report is described as a 'metasynthesis' because it is

a synthesis and extension of several important analyses and summaries that preceded it

chief among which were seven case studies of development information projects, one report on a research project and two synopsis reports, all of which were prepared by two consultants, Noelle Boissière and Michel Menou.⁴

The main aim of the present phase was to test the Preliminary Framework developed at the Nairobi workshop by seeing how far it could be applied in an assessment of the impact of a number of IDRC-funded information projects. Although the programme initially referred to the impact of information on *development*, over the years this came to be replaced by *decision-making*. Paul McConnell's report notes that

It has also been suggested that the implied IDRC title is '... decision-making for development'

and goes on to point out that, while the two terms are related, they are not synonymous. The choice of case studies reflects the programme's initial emphasis on development, and it would be useful to conduct further studies dealing with the impact of information on decision-making in different settings.

The consultants, with support from local project staff, attempted to apply the Preliminary Framework to seven projects for the development of information systems or networks in Africa, Asia, the Caribbean and Latin America. A different methodology, Linear Structural RELations (LISREL), using path analysis, was applied in a research project which attempted to measure the relative impact of information use on small businesses in Shanghai, China. The latter was applied in only one study because the development and testing of this model is a major undertaking requiring the collection and processing of masses of statistical data, whereas the Preliminary Framework is more flexible, less dependent on quantitative data, and probably more suitable for use as an ongoing monitoring tool.

The LISREL path analysis was found to be successful in demonstrating the feasibility of quantitative measurement of the impact of information on development among small businesses in Shanghai. A statistically significant causal relationship was established between the use of information and business success, with informal sources of information being more important than formal ones. However, LISREL is a demanding model requiring substantial resources, more suitable as a tool for advancing knowledge in the field of impact studies than as a tool for routine monitoring and evaluation.

The Preliminary Framework has been described in detail elsewhere.^{5,6} In summary, it involves four stages:

1. Preparatory Steps (training team members, defining the user community, etc.)
2. Planning and Design (identifying objectives, critical factors, indicators, etc.)
3. Monitoring and Measuring (data gathering, calculating indicators, etc.)
4. Communicating the Results (presenting findings to target audience)

The development and application of indicators – identifiable qualitative and quantitative measures – is an important aspect of the application of the Preliminary Framework, which identifies and describes five types of indicator:

- Performance Indicators – relating inputs to outputs
- Effectiveness Indicators – relating outputs to use
- Cost-Effectiveness Indicators – relating inputs to use
- Cost-Benefit Indicators – relating inputs to outcomes
- Impact Indicators – relating use to outcomes.

As Paul McConnell notes in his metasynthesis:

the PF [Preliminary Framework] methodology is potentially vast in its scope and therefore challenging to apply.

In fact, changes to the methodology were introduced in all seven project case studies, and three of the local project teams asked the consultant to help them develop a more concise model. The groups working on these studies found difficulty in adjusting to two main sets of demands:

- *Operational demands* – the demands of the local participants' regular jobs, and the lack of adequate resources, made it difficult for most of them to cope with the amount of work involved in planning, interviewing, data-gathering and analysis.
- *Conceptual demands* – local team leaders had difficulty in understanding the intended distinction between 'impact' and 'user satisfaction', in assessing the many variables in the decision-making process, and in dealing with indicators.

The problems encountered in responding to the conceptual demands gave rise to a tendency in most of the case studies to measure *facilitation of decision-making* – i.e. attributes of the information products and services supplied – rather than *impact of the information content* – i.e. the consequences of the use of the information in decision-making. Even when the focus

is on impact as such, it is necessary to distinguish between impact as the *perceived* benefits, as declared by users, and *actual* benefits as revealed by objective evidence.

One important issue, already mentioned above, is the influence of other, non-information factors, on the decision-making process. One of the case studies identified a number of external factors that contribute to impact, while another identified fifteen necessary conditions which must be met before information can influence policy development in the education sector.

One interesting suggestion in McConnell's report is to attempt to demonstrate the role of information in decision-making by comparing groups of information users with control groups of non-users. This might be done, for example, by comparing people from a village which had a Community Information Centre with people from a village without one; but this would increase the complexity of data gathering and analysis. As a forthcoming article by Paul Sturges⁷ points out, past attempts to evaluate the effectiveness of community information projects in Africa have met with little success.

The metasynthesis report emphasizes that

Identification and measurement of impact indicators are critical tasks in the impact assessment methodology. The results of the initial experiences reported here provide a mixed message. They suggest it is feasible to find measurable characteristics that reveal the contribution that information makes to the success of decision-making. Not surprisingly, measurement typically depended on qualitative assessments, rather than quantitative approaches that would generate numerical indexes. Most of the qualitative assessment relied on subjective means – typically the perspectives of users – rather than being able to find more objective measures. The tendency, therefore, has been to settle for indicators of performance and user satisfaction rather, than impact *per se*.

Echoing problems also identified by Sturges, the report goes on

Also, the difficulty in obtaining sufficient data, ambiguity in interpreting questionnaire responses, lack of repetition to verify survey results, and other shortcomings cast doubt on the actual validity of this initial crop of indicators.

Nevertheless, 'In its way, this is pioneering work' the results of which may usefully be compared with a study on the measurement of performance and impact in respect of rural information provision in developing countries published by UNESCO in 1997.⁸ This document is also cited by Sturges as a useful tool for library and informational professionals. It provides qualitative and quantitative standards, technical guidelines and performance measures for all types of rural library and information services.

Reviewing the positive achievements of the Impact programme, the metasynthesis report notes that:

- two impact assessment methodologies have been developed and tested
- a set of valuable documented case studies has been compiled

- a considerable body of knowledge has been developed and documented, and some of it already published
- a number of professionals from five continents have been involved in this work, constituting the nucleus of a research network.

Three major challenges are also identified:

- the Preliminary Framework must be revised to make it less complex, less demanding and less confusing; this will be a major task
- a practical handbook or manual to guide people through the impact assessment process must be compiled and published
- a more comprehensive research agenda, drawing on the results achieved so far, must be developed and implemented.

The meetings scheduled to take place in London in December will provide a key opportunity to begin to consider this future research agenda.

WATER IS LIKE INFORMATION

We started out by comparing information with water. Water is a basic resource, not only for 'development', but for life itself. But it happens too often that, though water is there, we don't know where to find it. If we know where to find it, we don't always know how to get at it, or we don't have the right tools to do so. If we can get at it, it is not always fit to drink; so governments, and water authorities, and foreign agencies, and foreign experts, start projects to find clean water, to extract it through tubewells, to purify it through various treatment processes, and sometimes to deliver it direct to the consumer through new piped systems. And after all that, in many places, people will still prefer to drink the dirty water from the local river or pond because it 'tastes better'. So you can lead – not the horse, but the people – to the water, but you cannot make them drink. But those who do drink the clean water will be healthier than those who don't.

The comparison with information still applies. We don't always know what information is available, and even if we do, we can't always access it. If we can access it, we cannot always make use of it, perhaps because it is in the wrong language or the wrong format, or otherwise not suited to our needs. But no matter what efforts are made to improve the supply of information, to make it easily accessible and relevant to the needs of users, ultimately it is up to the user to decide whether or not to use the information, and if so, how. If objective evidence of the impact of information can only be determined by observation of its actual use in decision-making, the extent of impact is clearly dependent to a large extent on the user; and our first concern should be to find out why users decide to use, or not to use, information, and in what way. This may be a task for psychologists rather than information specialists.

CONCLUSION – WHAT KINDS OF KNOWLEDGE?

I would like, before closing, to return briefly to the question of knowledge. The World Bank report, the Impact study and most other discussions of the relationship between knowledge – or

information – and development seem often to concentrate on practical, usable knowledge, or ‘know-how’, and often at the level of the community, or society, rather than the individual.

But there are other kinds of knowledge which are just as important, if not more so, particularly at the individual level. The statement of aims of the journal which I edit, *Information Development*, states that the journal deals, *inter alia*, with

the role of information in personal and in national development.

The role of information in personal development – in the development of an individual’s own knowledge and capabilities – seems often to be overlooked; yet that individual’s ability to use information for decision-making ultimately depends, not only on the availability of the appropriate information, but also – and even more importantly – on his or her ability to evaluate that information, to put it in context, and to use his own judgement as to how, when and where – and to what extent – it should be applied. But personal development implies much more than the ability to make decisions or solve problems; it implies both a deepening and a broadening of a person’s knowledge, understanding and appreciation of the world in which he lives. This calls for education, for schools, for literacy – and for libraries.

More years ago than I care to remember, I was involved in setting up, from scratch, the national library service in Botswana. There was a lot to be done, few staff to do it with, and a government bureaucracy to contend with; but finally the headquarters of the service, which was also the public library for the capital, was opened. One of the most rewarding sights for me, at the end of a long day, was to see, from my office window, a line of children leaving the new children’s library and walking home, all carrying new books on their heads. They may have been story books, or picture books, or books of poems; books of no ‘practical’ value whatsoever; but those children were in the process of enriching their minds, broadening and deepening their understanding, and so – however indirectly – equipping themselves to be better people, better citizens, and even, perhaps, better decision-makers, in the future.

References

1. The World Bank’s *World Development Report 1998/99: Knowledge for Development*, published for the World Bank by Oxford University Press, 1998, opens with the following: ‘Knowledge is like light. Weightless and intangible, it can easily travel the world, enlightening the lives of people everywhere. Yet billions of people still live in the darkness of poverty – unnecessarily. . . . Poor countries – and poor people – differ from rich ones not only because they have less capital but because they have less knowledge.’ (Overview, p. 1)
2. *World Bank News*, May 6 1993, quoted in: *Information Development*, vol. 9, no. 3, September 1993, p. 125.
3. Douglas, Kate. Basic Instinct. *New Scientist*, 4 September 1999, 32–35.
4. The final report on the project was published by FID in April 2000: Horton, Forest Woody (ed.), *Defining and assessing the impact of information on development: building research and action agendas*. The Hague, FID, 2000. ISBN 92-66-00-720-X. FID Publication no. 20. FID Occasional Paper no. 16. xii, 136 pp. Pbk. Paul McConnell’s Meta-synthesis and the proceedings of the meetings held in London in December 1999 are included as annexes to the report.
5. Menou, M.J. (1993). *Measuring the impact of information on development*. IDRC, Ottawa. 188 pp.
6. McConnell, P. (1995). *Making a difference: measuring the impact of information on development*. IDRC, Ottawa. 246 pp.
7. Sturges, Paul and Suzanna Wallis. Performance measurement and project evaluation for African rural information services. *Information Development*, vol. 15, no. 4, December 1999 (forthcoming).
8. Correa, A.F., et al. (1997). *Rural information provision in developing countries: Measuring performance and impact. Prepared for UNESCO on behalf of IFLA*. UNESCO, Paris. 116 pp. (CII-97/WS/11).

Abstract

Paper presented at the 9th General Conference of the European Association of Development Research and Training Institutes (EADI) Paris, France, 22–25 September 1999, in a session of the EADI Information Management Working Group. Discusses the relationship between knowledge, information and decision-making in the context of a research programme on The Impact of Information on Decision-Making, funded by the International Development Research Centre (IDRC) and carried out by the International Federation for Information and Documentation (FID). Describes the aims and achievements of the programme and identifies a need for a more comprehensive future research agenda, due to be discussed at a meeting in London in December 1999. Compares the problems of managing and using information and water. Concludes by emphasizing the importance of information in personal development.

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MORE ON INFORMATION IMPACT**Approaches to the measurement of the impact of knowledge management programmes.**

W.J. Martin. *Journal of Information Science*. 26 (1) 2000, pp. 21–27. refs.

Many organizations are finding that traditional measures of organizational performance are insufficient for the task of managing intangibles. In trying to measure the value of knowledge inputs and outputs, such metrics as return on investment or the practice of consigning intangibles to the accounting category of goodwill need to be supplemented by alternative approaches. Examines the problem of knowledge measurement and, in reviewing some of the current alternatives, argues for the importance of metrics to the overall process of knowledge management. The significance of knowledge measurement to the information science community is emphasized. (The author may be contacted by electronic mail at bill.martin@rmit.edu.au.)

An investigation of the impact of information and communication technologies in sub-Saharan Africa.

L. Adam, F. Wood. *Journal of Information Science*. 25 (4) 1999, pp. 307–318. il. tbls. refs.

Information and communication technologies (ICT) have been in use for over 30 years in Africa, but the impact of ICT on users in the region is not well documented. Reports results of a study to examine the impact of ICT in sub-Saharan Africa, based on a study using a grounded theory approach. Four main aspects of the impact of ICT were identified: actual impact; potential impact; constraints; and actions centred around users and their reactions. Results indicate that an understanding of ICT users' iterative and adaptive behaviour and their day to day difficulties in coping with problems of ICT in the local context is necessary for impact assessment. The constructionist behaviour in which individuals, organizations, professionals and groups map their world and situation and the complex action and interaction between them imposes the structure of ICT use. Discusses the impact of ICT in the context of its use and the concrete circumstances of the individuals involved and the tasks undertaken, together with historical and environmental perspectives. (The author may be contacted by electronic mail at adam2@un.org.)

Information as the fourth element and its impact on cultural development. [Informacie ako stvrty zivotny element a ich vpliv na kulturu ludi.]

E. Curras. *Kniznice a Informacie*. 31 (1) 1999, pp. 1–8. refs.

Examines the effect of information on the cultural development of society. Claims that there is evidence that information exchange in the form of interactions of different cultures (nations) has had a considerable impact on cultural development throughout the world.

Information dimension, information overload and decision quality.

M.I. Hwang, J.W. Lin. *Journal of Information Science*. 25 (3) 1999, pp. 213–218. il. tbls. refs.

The impact of information load (both under and overload) on decision quality is an important topic, yet results of empirical research are inconsistent. These mixed results may be due to the fact that information load itself is a function of information dimension. Reports results of a meta analysis of 31 experiments reported in 18 empirical bankruptcy prediction studies to test the effect of two information dimensions: information diversity and information repetitiveness. Results indicated that both information dimensions have an adverse impact on decision quality: provision of either diverse or repeated information can be detrimental to prediction accuracy. The findings have implications for information suppliers and researchers who are interested in improving the quality of human decision making. (The author may be contacted by electronic mail at mark.hwang@cmich.edu.)

MORE ON INFORMATION IMPACT continued

Measuring the impact of information systems on organizational behavior.

R.W. Headrick, G.W. Morgan. *Journal of End User Computing*. 11 (4) Oct-Dec 1999, pp. 16-21. il. tbls. refs.

Information systems design's traditional concentration on short term, readily quantifiable functional factors has resulted in the development of systems that are usually quite capable of manipulating data in the desired manner to produce the required output, but often fail to promote the general behavioural climate objectives of the organization. Failure to consider such behavioural objectives in the design process can result in information systems that have an impact that is intrusive in nature on the organization. To design information systems that not only meet functional objectives, but also promote objectives related to the organization's behaviour, their impact on organizational behaviour must be understood and quantified. Toward that end, a methodology that can measure the impact of an information system on the behavioural climate of the organization has been developed and tested. Utilizing pre- and post-implementation assessments of an organization's behavioural climate, this methodology enables information systems developers to identify specific potential design criteria which, when implemented, will increase the degree to which the organization's behavioural goals and objectives are met. Consideration of such organizational behaviour goals and objectives when designing information systems can result in significant progress toward ensuring the acceptance and long term survival of those information systems.

Meta-information, and time: factors in human decision making.

M. Higgins. *Journal of the American Society for Information Science*. 50 (2) Feb 1999, pp. 132-139. tbls. refs.

Reports on experiments examining the impact of source credibility on subsequent dissemination of the information. Information provided by organizations of varying levels of credibility was used in decision making tasks. The effects were examined under 2 conditions: when there was ample time and when there were severe time constraints. Results confirmed that both source credibility and time influenced decisions, but when time and credibility were analyzed concurrently the effects of source credibility weakened. Offers explanations for this outcome.

(From *Library and Information Science Abstracts*)