

**MANAGING TRANSBORDER DATA FLOWS: A STRATEGIC ORIENTED,
KNOWLEDGE BASED APPROACH**

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I. INTRODUCTION

Overview

Multinational companies, international accounting firms and other business entities (e.g., trading firms) are either currently being affected by or will be affected by the international transmission of data through electronic networks. Because these networks cross territorial boundaries of the countries wherein the various firms and entities reside, the term "transborder data flow" is used to characterize this transmittal of data. Transborder data flow need not be restricted to electronic worldwide networks and can include transmittal of data through the mails, couriers and other means but within the so-called information age, the greatest opportunities for business effectiveness and efficiency appears to be in the electronic networks which are beginning to emerge worldwide.

Although networking technology for the transmittal and sharing of data is proliferating and is becoming more common and necessary for international business transactions, its effectiveness is being constrained by the many legal barriers erected by various nations who wish to control and limit transborder data flows. There are a large number of barriers which range from restrictions on telephone lines to taxation of databases to privacy issues to software and hardware use. These barrier are complex and varied.

As the transborder data flow technology improves, the opportunities for more effective and efficient business use of this technology becomes attractive, for example, the use of international fax transmission of data from a parent in the US to a subsidiary in Europe. Difficulties exist because of the legal barriers which impede the effective utilization of the technology. Additionally, as we continue on into the information age, explicit recognition is being given to the information resource within business organizations as a key resource which needs to be managed effectively. Multinational firms with a diversity of operations often in various parts of the world, have critical information resource management needs. A major priority of the information resource management activity of multinational firms is the effective management of transborder data flows.

While some attempts are being made within various countries and within some global organizations to ease the legal restrictions on transborder data flow, progress is slow and likely outcomes are nebulous. Multinational firms and international accounting firms must find ways to utilize the information age technologies to the fullest extent desirable from a business point of view but at the same time operate within the constraints of the proliferating and changing complex regulations.

This research is concerned with three major components of the transborder data flow issue:

1. The identification and codification of some of the major issues/problems/opportunities facing multinational business firms and international accounting firms as they attempt to become more "integrated" entities through use of advanced communications and computer technologies.
2. The development of a prototype knowledge based (expert system) system to assist audit firms, multinational firms and other interested parties to assess the risk - return - opportunities tradeoffs in utilizing the information age technologies in view of the constraints. This prototype system would codify the major legal restrictions and barriers of a cross-section of countries and provide "expert guidance" on how to "best" utilize the information age technologies in view of the given country constraints.
3. The development of a prototype dynamic, strategic expert system component, when integrated with the knowledge based system in component 2 above, would suggest strategic issues to managers and auditors in view of the legal restrictions on technology. For example, this system would monitor developments in various countries with respect to pending legislation, negotiation, litigation of restrictions on transborder data flow and provide suggestions on possible scenarios that might occur if the particular legal barriers are modified or suggest actions that might benefit the firm.

Components 1 and 2 above are the primary concern of this research and will lead to a framework useful for addressing component 3. The contributions of the research are: (1) a set of guidelines and a framework for dealing with the opportunities of advanced technologies for transborder data flow when constrained by legal barriers. The guidelines and framework are developed through use of structured interviews with managers of various international and multinational firms and other methods specified in the paper. (2) A prototype expert system which audit firms, and their multinational clients can utilize to deal with the complexities brought about when trying to capitalize on the benefits of information age technologies in the management of the business. (3) The development of set of strategic issues and opportunities that will provide the basis for development of a strategic expert system to assist in managing the future operations of the multinational firms and international audits.

II. MULTINATIONAL FIRMS AND TRANSBORDER DATA FLOWS: ISSUES AND CONSTRAINTS

In the prior section legal barriers to transborder data flows were mentioned. In this section, more specific issues are described. In some countries various legal constraints apply only to electronic media such as networks, magnetic disks, tapes, computers and so on. In other countries the barriers affect not only the electronic media but also can include manual information systems such as restrictions on the mailing of data output from a manual accounting system. For example, a US based multinational may have extensive "stateside" computing and telecommunications networks in place which allow online transmission of data between various divisions, subsidiaries and other entities of the firm. Managers within the firm, auditors of the firm and others develop a culture and manner of doing business that best utilizes (audits) the technology. Difficulties may arise when these managers and auditors want to achieve the same efficiencies by attempting to "link in" the European, Brazilian and other world wide subsidiaries of the firm.

Sheehy(1986) reports several examples of the kinds of legal barriers that can impede effective business operations:

- (1) The 1980 Canadian Banking act requires that banks doing business in an da must do all of the data processing of their customer's records in Canada. ontrast thi with several U banks who process domesti banking transactions overseas to gain better cost efficiencies.
- (2) Brazil has restrictions on multinational firms with respect to the kinds of data that can be transmitted out of the country and requires the local purchase of computer hardware and software.
- (3) Some European countries have database privacy laws and database axation laws.

Other barriers include ex remely high costs for use of telecommunications lines, registration of imported software, restrictions on the use of privately leased data line for transmitting data, restrictions of the classes of data that can be transmitted and so on. Much of the initial motivation for these types of constraints were concerns with invasion of privacy through misuse of business or personal information and perceived vulnerability of sensitive national data to access by other governments or foreign business firms. More recently, many developing nations as well as established nations see opportunities to develop their own information service industries and thus become more visible in the international information services market place. Thus barriers are being developed by nations to protect these information service industries and by so doing places severe restrictions on transborder data flows.

These barriers present increasingly severe obstacles to multinational firms attempting to manage their businesses more effectively. For example, suppose that a US based multinational firm wants to develop a centralized database at the corporate headquarters in the US which would contain personnel information on its 125000 employees world wide so that better management of the personnel function worldwide could take place. Depending on where the various subsidiaries are located, this well might become an impossible task since many countries limit the transmittal (in any form) of personal data to countries that have privacy laws equivalent to the local privacy laws of the country from which the data is being requested. US privacy laws primarily pertain to Federal agencies and are generally not perceived to be equivalent to most other countries' privacy laws and thus personal data on employees may not be able to be transmitted to the US database. This then forces alternative courses of actions such as decentralized, non-distributed databases which can only be managed at the local country level.

III. Research Methods

The major objectives of the research as presented in the introductory section are to:

1. Identify and codify some of the major issues/problems/opportunities facing multinational business firms and international accounting firms as they attempt to become more "integrated" entities through use of advanced communications and computer technologies.
2. Develop a prototype knowledge based (expert system) to assist audit firms, multinational firms and other interested parties to assess the risk - return - opportunities tradeoffs in utilizing the infor-

mation age technologies in view of the legal constraints. This prototype system would codify the major legal restrictions and barriers of a cross-section of countries and provide "expert guidance" on how to "best" utilize the information age technologies in view of the given country constraints.

3. Develop the basis from which a prototype dynamic, strategic expert system component of the knowledge based system above could be developed. The resultant system would suggest strategic issues to managers and auditors in view of the legal restrictions on technology. For example, this system would monitor developments in various countries with respect to pending legislation, negotiation, litigation of restrictions on transborder data flow and provide suggestions on possible scenarios that might occur if the particular legal barriers are modified or suggest actions that might benefit the firm.

Methods for accomplishing each of these objectives are now described.

Interviews

Other than the somewhat general description of the legal issues presented above, there is not a great deal of collected knowledge on the problems and issues really faced by multinational firms with respect to transborder data flows. Therefore, one essential component of this research is the codifying of such knowledge and from it developing a set of common issues that may face multinational firms. To accomplish this task, personal interviews of appropriate level managers of European firms were accomplished during the summer of 1989. Interviews were held with managers and government officials in Europe, Korea, Japan and the Soviet Union. A structured interview instrument was developed to assist in obtaining consistency of the interviews. An open-ended, more issues oriented component was also part of the interview. In addition, information was obtained from the Organization of Economic Cooperation and Development (OECD) in Paris and the United Nations in Geneva (the General Agreement on Tariffs and Trade commission).

Knowledge-Based System

The development of a prototype knowledge based (expert system) to assist in the assessment of the risk - return - opportunities tradeoffs in utilizing the information age technologies in view of the legal constraints is the objective of this phase of the research. This prototype system would codify the major legal restrictions and barriers identified in the interview phase of the research and provide "expert guidance" on how to "best" utilize the information age technologies in view of the given country constraints. For example, if a merger/acquisition decision were being either considered or implemented, one of the key strategic issues might be to what extent could the information systems of the parties to the acquisition/merger be merged to gain economies of information processing. The knowledge based system could provide answers relating to the feasibility of such considerations and could provide guidance on how "best" to go forward given the existing constraints. From an internal point of view, managers could use such a system to assess proposals and potential for distributed processing, networking, telecommunications links and so on. As stated earlier, the recognition of information as a key resource within the organization and the need to manage this resource effectively, helps justify a knowledge based system that will allow more effective management of the worldwide transborder data flows to which the firm most certainly will need to be involved in.

Knowledge Based Components

At this point only a general description of the structure of the knowledge based system is described.

We envision the following components:

1. factual knowledge base - legal restrictions - will contain the published legal restrictions of transborder data flows for a selection of countries representative of world markets, for example, Europe, Pacific Basin, Eastern Bloc, China, Australia, the Middle East, Canada and Latin America. This knowledge base will most likely be developed using hypertext representation techniques to facilitate more effective retrieval by the expert system.

2. expert knowledge base - legal restrictions - will contain the expertise of several selected experts who will provide "expertise" on how the published legal restrictions of component 1 above are applied. Thus the factual knowledge component is the "letter of the law" or stated law and the expert knowledge component is the "spirit of the law" or applied law. These experts will be selected from among the subjects interviewed and subjected to indepth knowledge acquisition techniques appropriate for the situation.

3. factual knowledge component - information technologies - will contain details of existing information technologies that are appropriate for transborder data flows.

4. blackboarding component - to be utilized to manage the multiple knowledge bases.

5. hooks to external decision support tool - for decision making component. This will allow the conclusions and intermediate results of the knowledge based system to be passed to a decision support system which might be used for cost-benefit assessments of the conclusions reached by the system.

6. inference engine - to facilitate the prototyping effort, an expert systems shell will most likely be utilized which contains a built in inference engine.

7. other - other components will be added as necessary based on the needs established through the interview phase of the research.

Scenario Generation

This phase of the research will be concerned with providing a framework and basis for developing a strategic component for the expert system in future research. This will be in the form of a scenario generator. Barras (1986) argues that one way firms can accelerate the removal or modification of legal barriers to information technologies is through use of strategic plans aimed to demonstrate feasibility and acceptability of new technologies. For example, if demand for a service, say fax transmission, is great enough by the business sector of a country where certain restrictions on external (to the country) telecommunications exist, this demand can put enough pressure on the policy making powers to amend or develop new legal requirements that are less restrictive. Thus, a strategic component of the expert system may identify opportunities where the firm could emphasize or develop new technologies or information services to put pressure on the policy making powers to make the legal climate more amenable for transborder data flows.

The framework will be developed from the interviews in phase I of the research. The scenario generator will not be developed in this research due to scope issues.

IV. ANTICIPATED RESEARCH RESULTS

The contributions of this research should include the following:

1. Codification of a number of complex legal requirements into the form of a knowledge base with hypertext representation.

2. Development of a prototype expert system which utilizes the codified knowledge and contains expertise on how to "best" use that knowledge for managing transborder data flows. This prototype could be the basis for firms wishing to develop their own support systems in this area.

3. Development of a framework to lead to the development of a scenario builder to enable strategic utilization of the knowledge base to further improve the environments for transborder data flows.

All of the above outcomes basically lead to the major contribution of providing a means of more effective information management in the environment of advanced technologies which potentially make the business easier to control and manage but where severe constraints exist to prevent the technology from being effectively utilized. This research provides an interim type solution to the problem by providing a means of dealing with the complexities of the environment while finding strategic ways in which to help modify or remove the barriers to effective business and information management. However, we recognize that as technology continues to advance at exponential rates, some of the legal barriers may be unimportant, e.g., facsimile transmissions to China during the student demonstrations.

VII. REFERENCES

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