

## THE INFLUENCE OF SOCIETAL FACTORS ON THE DIFFUSION OF ELECTRONIC DATA INTERCHANGE IN THE NETHERLANDS

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### ABSTRACT

The work reported in this paper is part of a research stream to study the interaction between a nation's societal factors and the introduction of information technology. It examines the influence of four societal factors — culture, economy, infrastructure and government policy — on the diffusion of electronic data interchange in the Netherlands. This single-case study involved semi-structured interviews with participants and observers of the diffusion process in the Netherlands. Technology stimulation programs at the national and European Community levels combined with infrastructure developments have helped to shape the introduction and use of EDI in a fashion that is consistent with economic and cultural factors in the Netherlands. The results of this study provide insight into the nature of the linkage between societal influences and information technology diffusion. Further research is needed to examine these societal factors in other countries and to identify additional societal factors that influence the development and use of information technology.

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### 1. INTRODUCTION

During the 1970s and 1980s, the domain of information systems (IS) research and practice was expanded to include not only technical considerations but *organizational context* as well. (See, for example, Bostrom and Heinen 1977a, 1977b; Hirschheim 1985; Hirschheim and

<sup>1</sup>At the time this research was conducted, Dr. Trauth was a Visiting Professor at the Vrije Universiteit.

Klein 1989; Kling 1980; Manuel 1987). Banville (1991) overviews this body of literature in discussing information systems as social systems in which organizational factors are as important to system success as technical considerations about hardware and software. He argues that research into the introduction of information systems must, therefore, include the perspectives of both the systems analyst and the organizational actors.

In recent years, the movement toward globalization of industries is causing the contextual boundaries of IS research and practice to be expanded even further to include the *societal context* as well (see Figure 1). As the world comes closer together through transnational cooperation and political alliances, greater attention is being given to national factors that may inhibit or enhance the IS dimension of global endeavors. Such national factors include political, cultural and economic characteristics as well as a nation's infrastructures. For example, Cash et al. (1992), Deans (1991), Ives and Jarvenpaa (1991), Keen (1992), and Steinbart and Nath (1992) have all recently reported on IT management issues in a transnational context and have found that aspects of the societal environment are important factors to be taken into account. These research findings support the argument that, just as individual differences are considered with respect to the organizational context of information systems and technology, differences among nations represented by factors in the societal context must be accounted for as well. Porter (1990) expressed this as understanding the role that national circumstances play in the development of a nation's competitive strategy. Understanding the influence of national circumstances will enable IT managers at multinational firms to operate more appropriately in countries other than their own. The study of societal context also enables researchers, practitioners and policy analysts to better understand the factors at work in the successful introduction of new information technologies and practices in their own countries.

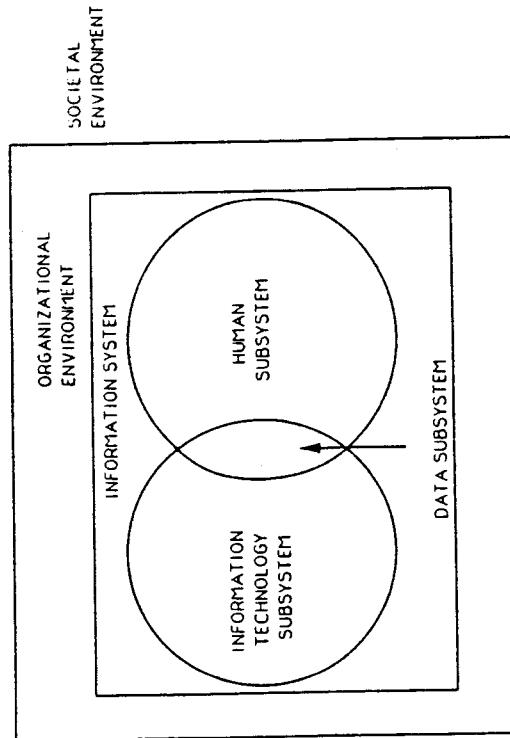


Figure 1. The Information Systems Research Domain

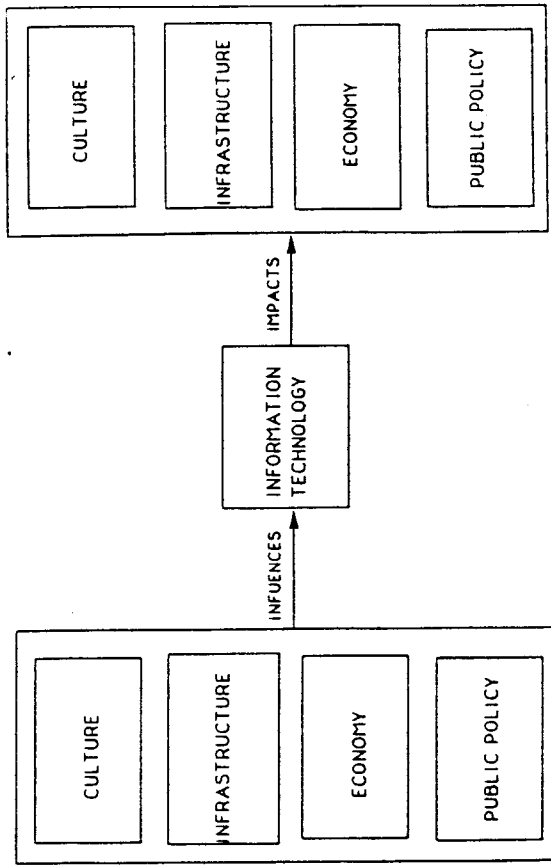


Figure 2. Interaction between Societal Context and Information Technology

An ongoing research stream of Trauth and O'Connor 1991; Trauth and Pitt 1992; Trauth 1993) focuses on the nature of the interaction between a nation's societal factors and the introduction of information technology and information work. The theoretical model (shown in Figure 2) includes both the *impact* of the information technology on the society and the *influence* of the society on the development and use of information technology. The research reported in this paper is part of this research stream. This particular study is directed at identifying aspects of a specific nation's culture, economy, infrastructures and public policy that influence the diffusion of a specific information technology.

2. RESEARCH METHOD

In this study, the technology under consideration is electronic data interchange (EDI) and the nation is the Netherlands. Using single-case study design with embedded units of analysis (Yin 1989, p. 46), data was collected during June and July 1992. The Netherlands was chosen because it is an exemplar case of a country that has made the diffusion of IT in general, and EDI in particular, a matter of national importance.

## 2.1 Respondents

Data was collected by means of semi-structured interviews of one and one-half to two hours in duration with fifteen individuals who have been involved in the diffusion of EDI in the Netherlands. Two criteria were used in selecting respondents. First, as a group, they should represent a variety of perspectives on EDI diffusion. To achieve this, four different viewpoints were identified: providers, policy makers, users, and observers. These categories resulted from previous research into technology-society interaction (Trauth 1984). The definition of each category of respondents is the following:

**Providers** Those involved with providing technological capability for electronic data interchange.

**Policy Makers** Representatives from government agencies involved in EDI stimulation efforts and standards organizations.

**Users** Firms currently using EDI or industry organizations established to promote the use of EDI.

**Observers** EDI researchers, professors and consultants who have closely followed the diffusion of EDI in the Netherlands.

The second criteria for inclusion in the study was that the respondent should be in a position to provide informed comments about the societal factors as they relate to EDI. Further information on the respondents and their qualifications is given in Appendix A.

## 2.2 Data Collection and Analysis

Items discussed in the interviews were drawn from three sources: results of previous studies which considered aspects of the societal environment important to information managers operating in a global context (Cash et al. 1992; Deans 1991; Ives and Jarvenpaa 1991; Kuen 1992; and Trauth and Pitt 1992); the interview protocol developed and used in related research by Trauth and O'Connor (1991); and related research into electronic communications in the Netherlands (Verweij 1986; Wierda 1991). The interviews focused on the following embedded units of analysis: economy, government strategy, technological infrastructure, culture, and the European Community. The interview protocol is shown in Appendix B. The data obtained from each interview was content analyzed by two members of the research team using the categories in the interview protocol.

## 3. RESULTS

Electronic data interchange in its earliest form began in the late 1960s when companies such as Philips began exchanging electronic data using proprietary standards. By the early 1980s, large firms in the Netherlands were becoming involved in EDI activities. The majority of the EDI developments have only occurred in the past five years. The progress that has

occurred has resulted from the influence of economic sectors that recognized the benefits of EDI, industry and national EDI user organizations, government stimulation programs, and pressures from international trading partners.

### 3.1 The Economy

In many respects, the Dutch economy is well positioned to be receptive to EDI. It is an open economy in which trade is dominant. Thus, the progression to *electronic trading* is a natural one. Because of its international orientation, key sectors such as trade, transport, distribution and agriculture were sensitive to increased international competition due, in part, to increased use of information technology. Since these sectors are all information intensive, they have been open to improvements in information processing and transmission.

An example exists in the flower sector. The Netherlands dominates world trade in both the production and distribution of flowers and the flower industry is the leading contributor to the Dutch Gross National Product. Not only is it the largest producer of flowers but it also distributes flowers grown elsewhere. For example, flowers grown in South America and destined for markets in North America are often sold through auctions in the Netherlands. Time and speed are crucial in an industry in which the freshness of the product is paramount. At present, the entire value chain of the flower industry is highly automated: from production through auctioning to transportation. Members of the flower industry recognized the need to explore the advantages of EDI in advance of any government stimulation programs. In 1988, members of the industry established a flower industry bureau and sought funding, from a government program established to support innovative technology projects. From this and subsequent funding an organization called EDIFLOWER was created. A primary focus of EDIFLOWER has been the creation of EDIFACT messages.<sup>2</sup>

### 3.2 Government Stimulation Activities

The government approach to EDI diffusion (and IT in general) is one of indirect stimulation through industry sectors. This occurs when a technology is seen as being central to the enhancement of the Dutch economy. The government strategy is to create the necessary preconditions for the technology to flourish. This is accomplished by directing efforts at awareness, motivation, education and research. The Dutch government intends to motivate use of EDI by funding concrete projects. These projects serve two purposes. First, as in the case of the flower sector, they enable firms or industries who are already motivated to experiment with the technology. Second, these projects serve as demonstrations of effective use of EDI so that others may see for themselves its benefits.

The private sector also plays a key role in decisions regarding project funding. Leaders of industry have participated in setting priorities by targeting industries in which EDI will improve their competitive positioning. From the beginning of EDI stimulation programs,

<sup>2</sup> "Messages" or "transaction sets" define the content and structure of EDI documents.

private sector participation has occurred through analysis of issues, assistance in decisions regarding project funding, and sometimes through direct encouragement of firms to get involved with EDI.

An important component of the stimulation strategy is that the technology push cannot continue indefinitely. At a certain point, it is believed, market pull must take over if the technology is to be successful. EDI, for example, was a high priority for three years (1989-1991). It is now moving into the phase in which market forces will determine its viability. The primary government agency facilitating the diffusion of EDI is the Ministry of Economic Affairs. In the mid-1980s, it established the Informatics Stimulation Program which was concerned with stimulating the development of information technology in general along with related education and research. In 1988, the focus moved to specific applications of IT. It was during this time that the government began to recognize the national strategic advantage of EDI. In 1989, it inaugurated the three year VEDI<sup>1</sup> program to provide funding for the development of model EDI projects. Consistent with the economic strengths of the Netherlands, nearly half of the VEDI projects were in trade and transport, a third were in industry and construction, and the remainder were in service industries (*Guide to VEDI Model Projects*, p. 7).

Other agencies involved with technology stimulation efforts are the Ministry of Telecommunication, Trade and Transport, which focuses on EDI in the transport sector, and the Ministry of Agriculture, which is involved with EDI activities in that sector. In addition, the Netherlands Office of Technology Assessment provides the necessary background research into and evaluation of new technologies.

Facilitating the diffusion of EDI has not ended with the conclusion of the VEDI program. It continues through the activities of EDIFORUM. This organization was established in 1988 as an EDI user organization for the trade and transport sectors. It has since grown to include all sectors. Its overall mission is to promote the use of EDI in the Netherlands. It does this by coordinating the efforts of various sectors and industries, undertaking research and disseminating the results, and serving as the liaison between government efforts and private sector projects. In addition, it is the locus of standards activities in the Netherlands. The example set by EDIFORUM is being followed by other European countries which are establishing similar organizations.

### 3.3 Information Technology Infrastructure

While informants have observed that it is the perception of mutual benefit that drives EDI, not the network or the infrastructure, these are, nevertheless, necessary factors for the successful diffusion of the technology. The perspective of the Dutch government is that the

<sup>1</sup>VEDI ("Voorbeeldprojecten Electronische Data Interchange" — Model Projects on Electronic Data Interchange) is a program run by the Directorate-General for Services, Small and Medium-Sized Enterprises and Planning, of the Netherlands Ministry of Economic Affairs.

telecommunications infrastructure should be the engine of economic development. It should be open and standardized but not present a barrier to innovative uses. The recent privatization of the Dutch PTT is consistent with this philosophy.

Prior to privatization, the Dutch PTT was a government agency of the Ministry of Telecommunications, Trade and Transport. It retained a monopoly on all telecommunications equipment and service provision except in-house communications systems. Bureaucratic inefficiencies that resulted in nonresponsiveness to customer needs along with the desire to promote technological innovation through greater competition led to its privatization in 1989. The Dutch government originally held all of the shares in PTT Telecom but is now beginning the process of selling up to 49% of the shares.

Under the new structure PTT Telecom is the monopoly provider of the physical infrastructure. Data and international voice transmission is open to other providers. Value added network (VAN) services are also permitted. This last aspect of the regulatory structure is very important for the diffusion of EDI since most Dutch companies utilize VANs for such transmissions. Respondents observed that a state PTT with monopolistic control of value added services can be a barrier to EDI because the absence of competition can result in higher costs and services that are not state-of-the-art.

Another aspect of the technological infrastructure important to the diffusion of EDI is the installed base of information technology and the level of technological literacy in firms that will be using it. Experience with EDI projects to date has shown that these are indeed influencing factors. For example, while the flower sector is highly automated, it is primarily in the areas of production and distribution; only 20% to 30% of the companies have automated management systems. As a result, there has been some difficulty in demonstrating the cost effectiveness of EDI since the long term benefits are to be found in the use of the electronic information involved in EDI transmissions. Companies without computer-based management systems, therefore, have found that they need to develop these computer applications before they can realize the true benefits of EDI. Another example can be found in an early EDI project in the transport sector. INTIS was established to facilitate distribution activities at the port of Rotterdam. One of the problems with implementing INTIS was that many of the small firms had completely manual operations. Resistance resulted from a lack of IT experience which led to the perception that the cost of EDI made it too risky a proposition.

A final aspect of the technological infrastructure that has influenced the success of EDI projects is standards. The absence of EDIFACT standards is a definite barrier to EDI diffusion as the INTIS experience showed. A complicating factor is the existence of multiple EDI standards throughout the world. For example, Dutch wholesalers in the flower industry who deal with the U.S. have to use as many as eight different standards.

### 3.4 Culture

At the heart of a nation's societal factors which can influence the diffusion of EDI is its culture. It pervades all of the other factors. Four words were repeatedly used by informants

when the topic of the Dutch culture arose. They are *trade, pragmatic, trust and consensus*. These characteristics help to account for the relatively rapid diffusion of EDI in the Netherlands as well as the particular way in which its diffusion has occurred.

The Dutch describe themselves as a trading people. This term is used to explain a tolerance of differences and an openness to new ideas and approaches. But the pragmatic feature requires that sufficient justification also be present. Thus, in order for EDI or any new information technology to be accepted, demonstrated benefits must be in evidence. The Netherlands has also been described as a trust culture in which commitment, discussion and consensus are key elements. These features have a distinctive influence on the implementation of EDI. In many business relationships, there is a dominant partner who is in a position to impose EDI on its trading partners. (In the United States, this situation has been described as the weaker partners receiving "drop dead" letters informing them that they must use EDI if they want to continue doing business.) In the Netherlands, however, the EDI negotiations are conducted not using the framework of power but of consensus. There was consistent agreement across all respondents about the following critical success factors for EDI in the Netherlands.

### 3.4.1 Trust

Trust is essential. With it, a variety of problems can be overcome. Without it, EDI will fail. For example, there are certain legal issues associated with EDI such as the absence of a signature or possible privacy invasion when the systems contain confidential personal information. The response when these issues were raised was that there has to be a trust relationship to begin with. If there is, then a "gentlemen's agreement" is sufficient and the absence of a signature or privacy is not a concern. This is not to say that everyone automatically trusts each other. In fact, one informant stated that the Dutch start with distrust. Part of the problem with the INTIS project was that not all of the players trusted each other. A concrete implication of this finding is that more effort may need to be exerted in establishing an EDI relationship in the Netherlands but once it is accomplished, subsequent difficulties may be easier to overcome here than in other countries.

### 3.4.2 Win-Win

What accompanies trust is the perception of mutual benefit. These two factors reinforce one another. Trust is necessary but is not sufficient for a successful trading partner relationship. Both partners must also see the advantages in clear, measurable terms. There must be consensus. The perception of a win-win situation, in turn, provides motivation to trust each other. It was observed that EDI will only be successful when all parties involved are motivated to engage in it. This cultural trait is clearly taken into account in the approach adopted by the government in its stimulation strategy. It takes a proactive role in supporting projects that will demonstrate the benefits and encourage EDI use rather than allowing a *laissez faire* situation in which some dominant international players might attempt to impose EDI on Dutch companies.

### 3.4.3 Management-Labor Relationship

The perception of mutual benefit must exist in the relationship between management and labor as well. Both sides must see the benefit of EDI in order for the technology to be successfully introduced. In fact, Dutch law requires the involvement of work councils when jobs are significantly affected by the introduction of technology. Consensus plays an important role here. Just as both trading partners must see the benefits, so too must labor see the benefits to the firm, the country and the economy. Since there is more harmony between labor and management in the Netherlands than in some other countries, this is a reasonable and achievable goal.

### 3.5 The European Community

The final societal factor that was examined for its influence on the diffusion of EDI in the Netherlands is the country's participation in the European Community (EC). Respondents commented that as the Single European Market increases competition, information technology in general and EDI in particular are becoming more important factors in competitive advantage. In addition, the opening of national borders, means that the burden of data gathering is shifting from the government to the firm. For example, with open borders customs data will no longer be collected. Therefore, firms in EC countries will need to collect and maintain their own statistics on transport.

This heightened need for information processing on the part of firms in member countries is being accompanied by a strong telecommunications thrust within the EC. The 1987 European Community Green Paper (*Towards a Dynamic European Economy 1987*) expresses a policy shift toward liberalization of telecommunications markets. The intent of increasing the level of competition is to improve telecommunications infrastructures and motivate providers to offer value added services. At the same time that EC policy is encouraging diversity through competition, it is also emphasizing harmonization through standards. In the case of EDI, this means that the European Community is a leading player in the development of EDIFACT — the international EDI standard approved by the International Standards Organization (ISO) in 1987. Just as the absence of standards represents a barrier to the diffusion of EDI, the EC efforts to further the development of EDI messages can be seen as stimulating EDI development.

Further EDI stimulation is occurring through a number of programs directed at technology development in general and EDI development in particular. The TEDIS program is directed at EDI stimulation through promoting projects, creating awareness and developing standards. (The EDIFACT Secretariat for Western Europe is within TEDIS.) The first phase of TEDIS which ended in 1991, was similar to the Dutch VEDI program: stimulation through the funding of model EDI projects. The intent was to heighten awareness and motivation by highlighting successful EDI implementations. The second phase, begun in 1992, is directed at stimulating EDI platforms on a European scale and harmonizing legal rules.

#### 4. CONCLUSION

The results of this study provide evidence to support the linkage between societal influences and information technology diffusion. In particular, this research has identified four key factors that have influenced the adoption of EDI in the Netherlands: the economy, government policy, technological infrastructures, and culture. The dominant economic activity in the Netherlands — trade — has been shown to be a key motivator for engaging in EDI. The role that a government can play has been illustrated by the active though indirect role of Dutch governmental agencies in encouraging firms to implement this new technology. As a member of the European Community, the Netherlands has also been influenced by EC initiatives. Through the establishment of stimulation programs and leadership in the EDIFACT standards process, the EC is helping to further the diffusion of EDI in member countries. The importance of a nation's technological infrastructure has been demonstrated by the role that telecommunications regulations can play in either enhancing or hindering network applications such as EDI. In the Netherlands, as competition in the provision of telecommunications services has grown, so too has EDI. The importance of the technological infrastructure within firms and within industries has also been observed. Firms with little knowledge about or exposure to information technology have been hesitant to move toward EDI. The influence of cultural traits on the diffusion of IT is subtle yet pervasive. In the Dutch case, pragmatism, trust and consensus emerged as key cultural factors in the successful adoption of EDI.

Although this case study is specific to a certain country and technology, the findings contribute to the theoretical model underlying this research area. The results also provide greater detail about the aspects of the four societal factors in the model. In doing so, they add to the growing body of knowledge about the way in which features of the societal environment help to shape the diffusion of any new information technology. In general, this work contributes to research that identifies and explores societal factors that should be taken into account when planning the introduction of information technology.

There are three audiences for research into societal context as it relates to information systems and technology: researchers, practitioners, and government policy analysts. For researchers this represents a new and relatively unexplored area of research. It involves incorporating work from sociology and anthropology just as organizational context research incorporates the disciplines of psychology and organizational behavior. These research results can be used to educate practitioners in multinational firms about critical success factors for information technology implementation in countries other than their own. For practitioners operating in their own countries, these results can help to shed light on previously unexplored factors that may have bearing on system success and failure. Finally, government policy analysts can learn about key societal variables that should be taken into account in developing policies regarding information technology innovation and stimulation.

The research to date by these authors and others is at the exploratory stage. Further research is needed to apply the factors identified in this study to other countries and other technologies. Further research is also needed to identify additional societal factors that could have an influencing effect on IT adoption and the circumstances in which they do so.

"In the 1990s, social and cultural factors regarding technology will play a much more important role than in the past," replied Professor Zegveld of the Netherlands Office of Technology Assessment when asked about the relative importance of societal factors in information technology diffusion. The results of this study are consistent with this perspective. While examination of the interaction between societal factors and technology has been ongoing in the sociological literature (for example, Forester 1987; Ferrolle 1987), these authors argue that greater attention to this topic needs to be paid by the information systems community. Just as organizational factors will influence the design and ultimate acceptance of information technology within a single firm, so too will political, cultural and economic factors help to shape the rate and path of IT diffusion in a nation.

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#### 6. REFERENCES

- Banville, C. "A Study of Legitimacy as a Social Dimension of Organizational Information Systems." In H.-E. Nissen, H. F. Klein, and R. Hirschheim (Eds.), *Information Systems Research: Contemporary Approaches and Emergent Traditions*, Amsterdam: North-Holland, 1991, pp. 107-129.
- Bostrom, R. P., and Heinen, J. S. "MIS Problems and Failures: A Socio-Technical Perspective Part I: The Causes." *MIS Quarterly*, Volume 1, September 1977a, pp. 17-32.
- Bostrom, R. P., and Heinen, J. S. "MIS Problems and Failures: A Socio-Technical Perspective Part II: The Application of Socio-Technical Theory." *MIS Quarterly*, Volume 1, December 1977b, pp. 11-28.
- Cash, J. I., McFarlan, F. W.; McKenney, J. L.; and Appelgate, L. M. "Multinational IT Issues." In J. I. Cash, F. W. McFarlan, and J. L. McKenney, *Corporate Information Systems Management: The Issues Facing Senior Management*, Third Edition, Homewood, Illinois: Business One/Irwin, 1992, pp. 547-570.
- Deans, C. "International Concerns of MIS Executives in U.S.-Based Multinational Corporations." In M. Khosrowpour (Ed.), *Managing Information Technology in a Global Society, Proceedings of the 1991 Information Resource Management Association International Conference*, Harrisburg, Pennsylvania: Idea Group Publishing, 1991, pp. 70-81.

- Forrester, T. *High-Tech Society: The Story of the Information Technology Revolution*. Cambridge, Massachusetts: The MIT Press, 1987.
- Guide to VEDI Model Projects*. Amsterdam: Bakkenist Management Consultants, March 1991.
- Hirschheim, R. A. *Office Automation: A Social and Organizational Perspective*. Chichester, England: John Wiley & Sons, 1985.
- Hirschheim, R. A., and Klein, H. K. "Four Paradigms of Information Systems Development." *Communications of the ACM*, Volume 32, October 1989, pp. 1199-1216.
- Ives, B., and Jarvenpaa, S. "Applications of Global Information Technology: Key Issues for Management." *MIS Quarterly*, Volume 15, March 1991, pp. 33-49.
- Keen, P. W. "Planning Globally: Practical Strategies for Information Technology in the Transnational Firm." In S. Palvia, R. Palvia, and R. Zigli (Eds.), *The Global Issues of Information Technology Management*. Harrisburg, Pennsylvania: Idea Group Publishing, 1992, pp. 575-607.
- Kling, R. "Social Analyses of Computing: Theoretical Perspectives in Recent Empirical Research." *Computing Surveys*, Volume 12, January 1980, pp. 61-110.
- Manuel, T. "Social Factors, Information Systems and Industrial Society." In R. A. Buckingham, R. A. Hirschheim, F. L. Land, and C. J. Tully (Eds.), *Information Systems Education: Recommendations and Implementation*. Cambridge: Cambridge University Press, 1987, pp. 224-238.
- Perrotte, J. A. *Computers and Social Change: Information, Property and Power*. Belmont, California: Wadsworth Publishing Company, 1987.
- Porter, M. *The Competitive Advantage of Nations*. New York: Free Press, 1990.
- A *Review of Electronic Data Interchange (EDI) Developments in Europe*. Brussels: Euronautica S.A., 1988.
- Steinbart, P. J., and Naih, R. "Problems and Issues in the Management of International Data Communications Networks: The Experiences of American Companies." *MIS Quarterly*, Volume 16, March 1992, pp. 55-76.
- Towards a Dynamic European Economy: Green Paper on the Development of the Common Market for Telecommunications Services and Equipment*. No. COM(87) 290 final. Brussels: Commission of the European Communities, 1987.
- Trauth, E. M. "Educating Information Technology Professionals for Work in Ireland: An Emerging Post-industrial Country." In M. Khosrowpour and K. Loch (Eds.), *Global*

- Information Technology Education: Issues and Trends*, Harrisburg, Pennsylvania: Idea Group Publishing, 1993.
- Trauth, E. M. "Telecommunications in an Era of Deregulation: A Framework for Understanding the Future." Boston: Boston University Information Systems Research Center Working Paper, December 1984.
- Trauth, E. M., and O'Connor, B. "A Study of the Interaction between Information Technology and Society: An Illustration of Combined Qualitative Research Methods." In H.-E. Nissen, H. K. Klein, and R. Hirschheim (Eds.), *Information Systems Research: Contemporary Approaches & Emergent Traditions*, Amsterdam: North-Holland, 1991, pp. 131-144.
- Trauth, E. M., and Pitt, D. C. "Competition in the Telecommunications Industry: A New Global Paradigm and Its Limits." *Journal of Information Technology*, Volume 7, March, 1992, pp. 3-11.
- Vervest, P. *Innovation in Electronic Mail: Towards Open Information Networks — Perspectives on Innovation Policy*. Ph.D. Dissertation, Delft: Technical University, 1986.
- Yin, Robert K. *Case Study Research: Design and Methods*, Volume 5. Newbury Park, California: Sage Publications, Inc., 1989.
- Wierda, F. W. *Developing Interorganizational Information Systems*. Ph.D. Dissertation, Delft: Technical University, 1991.

## APPENDIX A: RESPONDENTS

## Providers

- F. H. B. Alink, Jr., Manager of Network Systems and Services, IBM Nederland N.V.
- H. W. I. Bol, Jr. MBA, Office of Network Systems and Services, IBM Nederland N.V.
- F. Bonsel, Jr., Business Development Project Manager, Telematics Systems and Services, PTT Telecom
- T. Hagen, EDI Marketing Services, IBM U.K.
- W. J. Nicuwenhuizen, Jr., Director of Innovation and Business Development, Telematics and Systems Services, PTT Telecom.
- R. C. van Olmen, Drs. MBT, Marketing Development, Office for Network Systems and Services, IBM Nederland N.V.

## Policy Makers

- W. J. de Jong, Senior Advisor, EDIFORUM (Dutch umbrella organization to promote EDI use and standards and the representative of Dutch interests in international EDI forums).
- A. E. C. de Meulder, Drs., Policy Analyst, Directorate General for Services, Small and Medium Enterprises, Ministry of Economic Affairs (Dutch agency responsible for developing EDI initiatives).
- J. J. van Scheijven, Drs., Director of Services, Directorate General for Services, Small and Medium Enterprises, Ministry of Economic Affairs.
- W. Zegveld, Prof. Ing., Steering Group Chairman, Netherlands Office of Technology Assessment

## Users

- A. J. L. Alkemade, Senior Advisor, Agritocht Advics B.V. and Project Leader, EDIFLOWER (flower industry organization promoting EDI standards and use).
- G. Goodwin, Information Manager, Wavin Building Products, Ltd. (Representing EDI usage in the construction industry.)
- R. Haanstra, Central Information Office, ANWB Koninklijke Nederlandse Toeristenbond (Royal Dutch Tourist Board). (Representing EDI use in the transportation and tourist industries.)

## Observers

- P. Vervest, Prof. Dr., Managing Director INTERCAL Telematics Consultants. (One of the first scholars to study EDI in the Netherlands, has worked with EDI in industry and currently consults internationally on EDI and electronic communication issues.)
- P. van der Vlist, Prof. Ir. Partner, Bakkenist Management Consultants and Project Manager, VEDI Project. (Responsible for first government-sponsored EDI stimulation project).

## APPENDIX B: INTERVIEW ITEMS

1. Economy
  - Industry sectors
  - National economic strategy
2. Government Strategy
  - Innovation policy
  - IT/EDI stimulation programs
  - Telecommunications and information policies
3. Technological Infrastructure
  - In country as a whole
  - Within firms
  - Status of PTT
  - Regulation of value added network providers
4. Culture
  - Aspects that encourage/inhibit IT/EDI adoption
5. European Community
  - Standards development
  - IT/EDI stimulation programs