The outside in: questioning the use of electronic information services in organizations
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Chapter 4

Shooting on a moving target
A meta-analysis of existing research

We have described the processes of environmental scanning and the technological developments that allow electronic information services to support this process of environmental scanning. In this chapter we investigate which factors, according to existing research, can affect the actual use of publicly available electronic information services for environmental scanning, and thus investigate if present research can point towards new directions to answer the question whether electronic information services are suited for environmental scanning.

These questions are answered by systematically reviewing existing research in a so-called meta-analysis. The meta-analysis is used to help determining the most interesting research areas and can thus be considered a prelude to our empirical research. In this chapter, we will describe what a meta-analysis is, why we have conducted one, how it is conducted and with what results.

4.1. What is a meta-analysis?

It is hard to imagine a research project without any kind of literature review of existing research: “for science to be cumulative, an intermediate step between past and future research is necessary: a synthesis of existing evidence” (Light & Pillemer, 1984). For knowledge to be cumulative, one needs to “stand on the shoulders of giants” as van den Hooft (1997) has eloquently described it. The principle of literature reviews in general and meta-analysis in particular is to build “on knowledge which was gathered by other researchers and theorists in the same field, to be able to stand on their shoulders and look just a little further.” (p. 61).

However, many of the literature reviews are characterized by its subjectivity, inefficiency and unsystematic practices (Light & Pillemer, 1984). Few formal rules exist as to where to look, what to look for, what to include and exclude from available studies and how to analyze and extract the data in the studies in order to be able to draw meaningful conclusions. A meta-analysis can overcome these traditional shortcomings of literature reviews by combining structured guidelines of literature search with systematic methods of content analysis. The literature search is guided by a precise and goal-oriented research question and is specifically focused on the extraction of relevant variables and relationships between variables. Furthermore, special attention is given (especially compared with traditional literature review) to how the analyzed articles have gathered, interpreted and analyzed their data.
A meta-analysis is thus a more or less objective, systematic and verifiable way to do a literature review. The result is a thorough overview of which relationships between variables have been researched and tested. One can easily see where the blind spots are in research efforts so far. Moreover, this kind of literature analysis can lead to new insights, because the systematic combining of different results of different studies can lead to new relationships between variables not mentioned in individual studies (Bouwman & Neijens, 1991). A meta-analysis, however, offers a stripped-down perspective on theories: theories are reduced to variables and relationships between variables. It is hard to integrate sophisticated theoretical constructs into the meta-analysis. To enrich these data an integration with more elaborative conceptual models is necessary. Therefore, the theories as presented in chapter two and three serve as building blocks and starting points for our analysis here.

4.2. Purpose of the meta-analysis on the use of electronic information services

Light & Pillemer (1984) highlight several issues that serve as guidelines for the literature search:

1) What specific question is the review trying to answer?

2) Is the review exploratory or built around specific, testable hypotheses?

3) Which studies should be included?

In this chapter an exploratory analysis of research and theory building is presented on the use of electronic information services, guided by the following research question:

which (relationships between) variables are considered to influence the use of publicly available electronic information services for environmental scanning in recent academic literature?

Not all the variables found in the examined literature will be included in the surveys and interviews with suppliers (chapter 6) and users (chapters 7). On the contrary, the main purpose of this meta-analysis is to find the most interesting areas for research, either because contradictory results exist between the different studies on specific relationships between variables, or because blind spots exists. This is also why this analysis is mainly exploratory in nature instead of a quantitative analysis of testable hypotheses; we are looking for new ways to explore the issue. A purely quantitative analysis would also disregard the fact that within the social sciences there’s little consensus on the research methods being used: both quantitative and qualitative research methods provide meaningful insights in the use of electronic information services. From both types of research (relationships between) variables can be derived and thus be integrated into one exploratory meta-analysis, but the (relationships between) variables are hard to add up to an aggregate measure of correlation.
Within this research project we have chosen to use only published articles (in academic journals or proceedings of academic conferences) and books, in so far as they are directly related to environmental scanning and/or the use of electronic information services. The articles/books are all published in the period 1990 - 1994. The articles were retrieved from several catalogues (both print, cd-rom and on-line). In total almost 50 articles were found and included in the study. We finished the meta-analysis in 1994, because the literature review was mainly meant to be a preparatory step for the research design. However, we have conducted two follow-up studies. One focused on a specific part of the research where many conflicting results exist — the accessibility of electronic information services. In another update, we wanted to see whether the emergence of the internet and the World Wide Web severely changed research interests and results (which it didn't, as we will see later on).

### 4.3. Analysis of readings

All the articles were summarized. The summaries were used to extract variables and relationships between variables (always in the exact words of the original author). The aggregated list of variables and relationships were further processed during the computer-aided content analysis. The content analysis is based on the NET-method and performed with the aid of the computer application CETA (De Ridder, 1994a, 1994b). Within the NET-method messages are split into nuclear sentences in which a connection is made between two meaning objects. Nuclear sentences consist of:

- **the source** (a code for author and article, for example “au93”)
- **the subject** (variable x, the independent variable, for example “proximity of the source”)
- **the object** (variable y, the dependent variable, for example “accessibility”)
- **the connection** (the relationship between x and y, for example “is (part of) operationalization of”)

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1. The catalogues used are: Communication Abstracts, ARIST (Annual Review of Information Science and Technology), On-line catalogue of Dutch academic libraries (NCC), CD-ROM catalogues such as ABI/Inform, Econlit and LISA, and PICA Online Contents. Keywords used in all the electronic catalogues were information service, telecommunication service, information technology (always in combination with either use, organization, business or information), environmental scanning, external information, the different examples of information services such as online, CD-ROM, multimedia, audiotex, videotex and all the Dutch equivalents of these keywords.
The subject and object are described with exactly the same terms as the ones used by the author to avoid as much interpretation as possible and to stick as closely as possible to the original sentence. The connections were either characterized as causal or similarity.

Causal relationships describe to what degree x (the subject) contributes to y (the object). In CETA, it is difficult to link conditional statements to causal relationships (for example; x influences y only if x has a certain value, or x influences y only if z has a certain value). The solution to this problem is to simplify the relationships. For example, if an author would say that electronic information services are used in the intelligence phase of the decision making process only if the decision-maker is an experienced user of computers, the relationships are simplified: “intelligence phase / is linked to / use of electronic information services” and “computer experience of user / influences / use of electronic information services”. This simplifies the model, but does not conflict with our intention to explore the research area and contributes to the answer of our research question. Also, I have used the term “causal” lightly; if only a correlation is shown the relationship will still be included in the meta-analysis, with the x and y variables corresponding to the conceptual model in chapter two (that is; use of electronic information services is always a dependent variable, unless explicitly stated otherwise).

Besides causal relationships, also similarity relationships were included in the meta-analysis. Similarity relationships describe to what degree object and subject are identical or the object is a part of the subject. The sentence “intelligence / is phase in/ decision making” identifies a similarity relationships. Words as “is equal to”, “is part of”, “is a characteristic of” all point to similarity relationships (De Ridder, 1994).

A set of nuclear sentences can be represented as a network in which meaning objects are the points and an arrow represents the connection. The end-result of the meta-analysis should therefore be a model in which related variables are graphically connected. But several steps are needed between the entry of nuclear sentences within a database and the end-result of a network of connected variables:

1) Differentiation
2) Clustering
3) Conclusion

Ad 1) Differentiation.

The database consists of three separate sets of relationships each containing a particular kind of statements.
- **Empirical research**: every statement about a relationship between two relevant variables that has been "derived from systematic and, as far as possible, objective observation and evidence" (McQuail, 1987, p. 4). Thus all empirically tested relationships, both from quantitative and qualitative research, are included.

- **Theoretical statements.** In this database the following statements have been included:
  
  - relationships first formulated by others, including empirical ones (thus secondary sources citing earlier research findings, e.g. "environmental uncertainty will lead to organization differentiation (see: Lawrence & Lorsch, 1967)");
  
  - relationships formulated as testable hypotheses (but not actually tested), e.g. "H22. the use of electronic information services is positively related to the quality of decision making";

- **Expert suggestions.** This database contains especially assumptions underlying more specific statements (e.g. "in general, the higher in the organization, the more people will need external information; therefore we will examine the information behavior of top managers") and preliminary suggestions to explain anomalies of existing research (e.g. "this hypothesis is not verified, but maybe it's because ....")

The distinction between these databases is not only made to avoid comparing apples with oranges, but also to see if there are any discrepancies between the three databases. For example, which statements are taken for granted (in the database with expert suggestions) but hardly ever tested (not in the database with empirical research)?

**Ad 2) Clustering of variables.**

Because the meaning objects are not entered as a predetermined set of variables under which all data has to resort - but instead are used as they are phrased in the original article - many different meaning objects describe basically the same variable. Even if these meaning objects are renamed into one meaning object, the networks of variables will be too complicated, simply because of the amount of relationships involved (in total, over 200 relationships are listed in the database) as can be seen in figure 4.1.
It is therefore necessary to create broader clusters which are based on the general framework as outlined in chapter two. We distinguished the following clusters of variables:

- the use of electronic information services, also including the terms "databases", "sources", "systems" and "media" when they are used to describe the kind of services we have labeled "electronic information services", and specific forms of electronic information services;

- environmental scanning, including sub-dimensions of it, such as "amount of scanning", "content of scanning", "time used for scanning", but also more general terms such as "boundary spanning activities", "acquisition of external information", "need for external information" and "external orientation", and specifications of it, such as "type of scanning" (e.g. active versus passive) and "access method" (e.g. access by end-user versus access through intermediaries);

- Effects split into quality of information processing (including "better access to information", "less time needed to find information", "recall of information", "accuracy", "comprehensiveness" etc.) and task performance (such as "quality of task", "quality of decision", "productivity" etc.);

- Environmental characteristics

- Organizational characteristics
Ad 3) Formulating conclusions

The clustered models of relationships between variables should help us in drawing conclusions about the results so far and the implications for our research design, including the operationalization of variables and the formulation of hypotheses.

4.4. The empirical results

The general, clustered model of the empirical database is displayed in figure 4.2.

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**Legend:**
- ++ = clearly positive
- ++ = weakly positive
- 0 = no relationship
- + = clearly negative
- +/- = ambiguous

Each symbol represents a relationship in the database. The thicker the arrow, the more relationships found.
It is clear that environmental characteristics are among the most researched variables in relation to environmental scanning and the use of electronic information services. There is a clear relationship between \textit{environmental uncertainty} and environmental scanning. But there is a bit more ambivalence in the relationship between uncertainty and the use of electronic information services. For example, Choo & Auster (1993) and Auster & Choo (1993) in two different studies (one a meta-analysis, the other a survey among managers of telecommunication companies) argue that media characteristics (such as \textit{quality of the source} and \textit{accessibility of the source}) are more important than uncertainty. Also, they argue that electronic information services are not suitable in uncertain situations. The argument is made that in situations of uncertainty, managers tend to use personal sources (such as colleagues or consultants) instead of impersonal ones (such as electronic information services).

In all, environmental characteristics have received much attention in recent studies. Almost all environmental characteristics are related to (perceived) environmental uncertainty, or specific dimensions of it. Broekmate et al. (1993), for example define three types of dynamic environments: \textit{product dynamics}, \textit{technology dynamics} and \textit{market dynamics}. The more dynamic each of these areas, the more small and medium-sized companies (the focus of their study) search information on these areas with the only exception being market dynamics; even if market dynamics are low there is still a moderate to large felt need to search information. Broekmate et al. (1993) also define a new variable - \textit{strength of the value chain} - which is closely related to the theory of resource dependency. The more long lasting relationships an organization has with its suppliers and/or buyers, the less it will feel the need to use external sources to find information. Instead, these organizations will look inside the value chain for new information.

The influence of environmental characteristics on environmental scanning and the use of electronic information services seem more or less in line with theory as presented in chapter 2. This can not be said of organizational characteristics. Their impact on environmental scanning and the use of electronic information services seem rather ambivalent. In the adoption of videotex and commercial databases \textit{size} doesn't matter, according to Grover et al. (1993). Broekmate et al. (1993), however, found a moderate relationship between size and the efforts (in terms of time, money and people) put in searching external information. The \textit{age of an organization} and the \textit{amount of financial resources} show the same ambivalent or weak relationships. One study found no relationship between \textit{the strategy of the organization} and the amount of environmental scanning (Hambrick, in Choo & Auster, 1993). This is explained by stating that organizations with different strategies might possess the same information but simply act differently on it. An interesting new variable is \textit{heterogeneous functionality} as introduced by Verhoeven (1994). General practitioners who work in more diversified practices tend to use external information sources less, compared to their colleagues who are on their own, because the former can rely on their direct colleagues to give them information. Finally, Grover et al. (1993) found a positive relationship between the \textit{centralization} of the implementation of electronic information services (and other telecommunication technologies) and the adoption of it. Important to note is also that the use of electronic information
services is only related to individual effects (e.g. the quality of individual information processing and task performance), rather than effects on organizational design or organizational performance.

Media characteristics are by far the most researched factor within the literature studied. The biggest controversy in the research on the use of electronic information service concerns the question whether quality of information source or accessibility of the information source is the most important determining factor for use of electronic information services. Verhoeven (1994) - in his study on the use of information sources by general practitioners - found that accessibility was more important than quality, and online information services were not considered very accessible. Kraemer et al. (1993) do not differentiate between the two variables in terms of impact on the use of information sources. Auster & Choo (1993) showed that accessibility is less important than quality. To explain this empirical result (which conflicts with earlier research) they suggest (but not test) that quality is especially important when the organizational environment is more turbulent. When environmental scanning really matters (because of perceived uncertainty), quality of the source is more important than accessibility. This is the only study in which the dominance of either one is suggested to be related to contextual factors such as the organizational environment or particular tasks (no studies were found in which this was actually tested). Part of accessibility may be comparability. A general presumption of innovation studies, states that the more an innovation resembles old practices, the more adoption of the innovation will be likely (van den Hooff, 1997). LaRose & Atkin (1992) show the use of electronic information services is strongly related to the use of functionally related technologies (especially other information sources) and technically related technologies (especially telephone-based services).

Another important dispute concerning the accessibility of information sources concerns the role of intermediaries. Information services are sometimes directly used by end-users (the ones who actually use the information) or used by intermediary users such as librarians or members from a support staff who search these services for other people who do not have the time or the skills to use these services. DeRiemer (1992) considers access through a librarian as a barrier and found negative relationships with frequency of use of an online information service. Hart & Rice (1991) show - in a qualitative (48 interviews) and quantitative study (N=81) in four organizations - that this finding is dependent on the type of database. Source databases are often directly used while reference databases are indirectly used. Hart & Rice also have verified their hypothesis that people with equivocal tasks tend to directly access databases themselves while people with routine tasks do this indirectly through librarians. Direct access is not necessarily positively related to improved task performance. It saves time to find information but it doesn't directly improve effectiveness of work. Kraemer et al. (1993) have shown that public managers (N=260) who are indirect users of computer-based information (among which information from external databases) value this information as more useful - that is, helpful in enhancing their work performance - than direct users. But the use of electronic information service does lead to the reduction of intermediary nodes (less indirect access) and to a more active search strategy.
Besides the dispute between direct access and intermediary access, hardly any link has been empirically established between environmental scanning and the use of electronic information services. Both phenomena have been studied from very different and mutually excluding perspectives. A focus on electronic information services within the broader context of organizational and environmental characteristics was hardly found.

4.5. Theoretical results

Naturally, the theoretical model which has resulted from our meta-analysis looks more complicated than the empirical model and resembles - even in its aggregated format - more the Indian war with arrows shooting in all directions (see figure 4.3).

The effects of media-use on an organizational level have come on the theoretical agenda. Especially Huber (1990) hypothesized various effects of the use of electronic information services which both relate to individual task performance as well as organizational changes, such as a reduction of hierarchical level, a diversification of decision units, a more uniform distribution of decision-making (centralized organizations will decentralize and vice versa), and a reduction of...
intermediat ee  node s  (which will lead to less distortion of information but also to information overload for the decision-making unit). Hart & Rice (1991) also argue that indirect access - or, in other words, the use of intermediate nodes - will reduce the chance for information overload. Other theoretical organizational effects are improved organizational intelligence, competitive response, organizational effectiveness, competitive advantage and participation/motivation of employees. Perrow (1986) also emphasizes the downsides of using electronic information services. He argues that too much of the good thing can be harmful as well. Th e higher the amount of sources the less chance on consensus which slows the speed of decision making. Furthermore, the improvement of access to information can improve organizational intelligence but can also be irreconcilable with the bounded rationality of people (and can thus lead to information overload).

Another striking difference with the empirical model is the direct relationship between environmental characteristics and organizational change as an explicitly articulated alternative for environmental scanning. Perrow (1986) offers an alternative to deal with interdependencies, namely isomorphism (conforming to the dominant values of others). Daft (1992) also offers organizational alternatives for environmental scanning in situations of environmental uncertainty: besides isomorphic behavior, the organization will probably differentiate, will become less formal and will become more organic. Also, in order to decrease the degree of resource dependency, several alternatives are mentioned such as lobbying with government, the change of environmental domain, involvement in trade associations and coalition-building with others.

Finally, compared to the empirical model more attention is given to the interrelationship between certain variables. For example, the connection between task characteristics and media characteristics refers to the importance of accessibility. When decision-making is in its intelligence phase accessibility of a particular medium is an important feature. Saunders & Jones (1990) show a nice catch-22 in relating different stages of decision-making to the use of information sources. Media allowing patterned, passive viewing will tend to be used in the early stages of problem recognition. Also, these sources will have to be more accessible than sources later in the decision-making process, because the decision-maker is not yet willing to put too much effort in searching, since one does not know the relevance of the outcome yet. Moving along in the decision-making process to design and choice, internal sources will be used more frequently compared to external sources. One can wonder where electronic information services fit in. Based on content they are more suitable for problem recognition, but they are often not considered very accessible and they often do not allow for passive viewing. Especially Zerbinos (1990) argues that videotex because of its hierarchical structure encourages active, purposeful seeking of information (instead of passive viewing). Equally conflicting demands arise from the hierarchical level of individuals. The higher in the organization, the more one needs external information, but this does not automatically lead to a more active scanning of the environment. Because the higher in the organization, the more managers have the authority to delegate information-search activities to subordinates (Kraemer et al. 1993).
New variables are mentioned concerning the accessibility of electronic information services. Training of users and user friendliness of interfaces can increase the use of electronic information services, the proximity of a terminal (the purely physical accessibility) influences the use of electronic information services. Finally the individual knowledge of the system (how the system works) and the domain (understanding the content of the system) influences environmental scanning and the use of electronic information services (Kiestra, 1994).

4.6. Expert suggestions

The literature for practitioners and business professionals on the use of electronic information services hardly relates the use of electronic information services to organizational and individual characteristics and not at all to environmental characteristics (see figure 4.4.).

![Diagram of Expert Suggestions]

Only the relationship between media characteristics and the use of electronic information services is very explicit. Within the literature used in this section, many authors discuss the supply side of electronic information services (such as Boskamp & Bouwman, 1991; CEC, 1993; Boumans, 1993, Bouwman, 1993; Rosenbrand, 1988) or are rooted in the discipline of library and information science (such as Groeneveld, 1994; Hoonhout et al, 1994; Kiestra, 1994; Sieverts et al, 1994;
Taylor, 1986). This naturally puts emphasis on media characteristics. Again, accessibility and quality are the dominant variables, with related variables such as computer literacy, ease of use, costs, complexity of source and diversity of source.

The main contribution of the expert suggestions model concerns the relationship between environmental scanning and the use of electronic information services. Again, this is probably caused by the dominance of the library and documentation community in the literature used. For example, the structure of the scanning unit (often the business library) is considered as an important variable influencing the use of electronic information services (Sieverts et al., 1994) as is type of scanning (active or passive) and direct access. The relationship between environmental scanning and quality of information processing refers to access by end-users. The more end-users directly access electronic information services, the less efficient the search is supposed to be (Groeneveld, 1994), although the author goes on to say that this will probably be less so in the near future. Finally costs has conflicting relationships with the use of electronic information services. Naturally, the higher the costs the less willing people are to use these services, but the more one will access it directly to make sure the user gets exactly what he or she wants.

4.7. Accessibility: A follow-up

Accessibility has proven to be one of the most dominant research themes (with contradictory results) in this meta-analysis on the use of electronic information services. Especially the dispute whether quality or accessibility of information source is the most important factor and the conflicting results about the consequences of direct or intermediary access have received attention of academics in this field. In another study (Bouwman, Nouwens, Slootman & Baaijens, 1996) we investigated the accessibility of electronic government information by conducting a meta analysis. The meta-analysis was specifically focused on government information, but some of it is especially useful for our next chapter about electronic publishers, because the meta-analysis specifically links the concept of accessibility to the information chain (the production process by electronic publishers).

Some initial remarks have to be made about the literature used. Little additional empirical research was found. Most articles were written in a political context and showed perspectives from specific interest groups, such as commercial publishers, the library community and government officials. Both commercial publishers and librarians try to defend their position by defending the essential role they play in improving accessibility of government information.

It doesn't make much sense to construct the same kind of models as in the meta-analysis described above. First of all, there isn't much empirical research conducted in this area and second, the frequency in which certain relationships occur in the meta-analysis doesn't say much about the importance of the relationship or the evidence concerning a relationship. Because of the political context in which most articles have been written, the frequency of relationships is more an
indication of the relative strength or persistence of a particular interest group. But the study does give us more ammunition in the debate on intermediate access or direct access.

About intermediaries it is stated that they are more able to deal with complex search structures but less knowledgeable about the specific lingo of professional users and knowledge domains (such as law, or business) (Ebersole, 1994). Also, intermediate usage does not allow for end users to browse the available information, but do allow for more structured searches (Christian, 1994). However, some intermediate usage may be necessary, because not everybody has direct network access or is fully aware of the capabilities and limitations of the needed hardware and software environment. Christian argues that casual users and those lacking network access will be served through intermediaries. In any case, the role of intermediaries will change because the end user is increasingly becoming the initiator (Boiler & Firestone, 1995). Those that serve these new initiating users by “agenting, filtering, integrating, analyzing, contextualizing, and authenticating information are likely to be the successful new intermediaries in our society” (Boiler & Firestone, 1995). In making government information accessible not only librarians are mentioned as intermediaries but also the press, consultancy firms and/or branch organizations. Librarians and other intermediaries are not only helpful in searching the specific databases but can also help to select the best databases or make people aware of the existence of certain databases. Many stress the role of libraries as a safety net for the information have-nots or the unsophisticated customers (OTA, 1993; Sprehe, 1993; McClure, 1993; Perritt, 1994, Hermon & McClure, 1993 and the OMB, 1994). The information industry association embraces the library system for its contribution to a diversity of sources through which government information can be made accessible (IIA, 1995). Some of these authors also stress the importance of user/customer support, through help desks, courses, clear manuals, etc. The advantages of direct versus intermediate access thus seem to depend on the specific wishes and capabilities of end users, although many of the currently existing information services probably still need professional users (such as librarians) or people who use the service frequently, because of their complexity.

It is important to note that accessibility of an electronic information service is not only dependent upon the experience and skills of its users or the complexity of its search engine. The study for the Rathenau Institute clearly showed the direct links between the organization of the information value chain (as described in chapter three) and the accessibility of an information service (as can be seen in figure 4.5). The accessibility is not only improved by support during use (as is done by intermediaries). Also during other links in the value chain, providers can improve the accessibility of the information service. During distribution it is especially a matter of marketing, making people aware the service is available (Ebersole, 1994; Hermon & McClure, 1988). Equally important is the chosen point of access (BIOS-3, 1995; OTA, 1993), which can be among others at the desktop at home or in the office, at a laptop, at a shared terminal (e.g. a terminal at the business library) or a public terminal (e.g. the public library). Finally one of the most frequent mentioned actions to improve the accessibility of electronic information services concerns the decentralized development of services (as close to the content-owner as possible) followed by a diversified distribution of
services (Massant, 1994; Jones, 1995; IIA, 1995; Christian, 1994). Information should be stored media-neutral, after which it can be distributed via different media and channels. To customize the information service to the capabilities and wishes of potential users, a diversity of sources should be used (Sprehe, 1993); some will be only able to use the information on the internet, others want it on interactive teletext, etc. etc. Finally, these diverse sources need to be integrated into one-stop-shopping servers or locations in which different services are bundled and presented to the customer as one service (BIOS-3, 1995; IIA, 1995). Finally, these one-stop-shopping centers should have clear search engines or finding aids to help identify which information is available and to increase the efficiency of dissemination (OMB, 1995).

![Figure 4.5. Actionable variables within the information value chain](image)

In order for providers to be able to integrate their individually developed information services into a one-stop-shopping center, they do not only need to create standardized interfaces and inter-organizational agreements at the distribution phase of the value chain. They already need to make adjustments during the collection and processing phases of the information value chain. Editorial adjustments have to be made in order to enable users to manipulate the data. The structure of the database has to be synchronized with the search strategies of the users. In order for the search engines to be truly helpful, it is important that different databases within these engines describe their data in the same way. During the collection and creation of information databases, providers especially have to synchronize their goals with those of the public. Often databases are initially created for internal use only, and after a while they are made available to the public. This often will have to lead to major adjustments in the content and structures of the database because of the different skills and information needs these public users have (Jones, 1995; BIOS-3, 1995).
Finally, during all phases of the information chain, providers need to deal with costs and price structure (among others Ebersole, 1994; Hernon, 1989; Guthrie & Dutton, 1992; Sprehe, 1993), technical and organizational standardization and cooperation (among others OTA, 1993; IIA, 1995; OMB, 1994; Reekie, 1995), and especially user participation and involvement in the development of the information service (McClure, Bishop & Doty, 1989; Guthrie & Dutton, 1992; Massant, 1994; OTA, 1993). User participation does not only involve end users but also intermediate users (like the library community) and other publishers who wish to manipulate existing information and add value to it for its particular customer base (IIA, 1995). Sprehe (1993) postulates an interesting thesis by stating that the degree of potential user participation depends on the development phase of the information service itself. If the information has only recently been available to the public, the users do not know the possibilities yet and can hardly articulate their recommendations.

In all, the meta-analysis shows that accessibility is not only influenced by the network or computer literacy of end users, but also by barriers existing at or created by electronic publishers. A summary of variables which can be influenced by electronic publishers is presented in table 4.1.

| Organizational conditions for accessibility | • Budget  
|                                          | • Outsourcing (added value, public/private partnerships)  
|                                          | • Interests of stakeholders  
|                                          | • Role of intermediaries  
|                                          | • User participation in organization of the value chain  
|                                          | • User perceptions  
| Actionable variables for improving accessibility | Entire information chain:  
|                                                 | • Financial aspects  
|                                                 | • Organizational aspects (development, management and commercial use of databases)  
|                                                 | • Technological aspects  
| Collection:  
|                                                 | • Organizational aspects  
| Packaging:  
|                                                 | • Technological aspects  
| Distribution:  
|                                                 | • Marketing  
|                                                 | • Technological aspects  
| Servicing of use:  
|                                                 | • Promotional activities  
|                                                 | • (Intermediary) support of use |

Table 4.1. A summary of relevant variables which are actionable for electronic publishers

4.8. An Epilogue

It is hard to shoot at a moving target. A major disadvantage of the meta-analysis we have conducted is that it can only be a snapshot of the current state of affairs in academic research and theory-building on the use of electronic information services. Since we have finished the first meta-analysis, the internet (and in our study, especially the World Wide Web) has become one of the dominant information services. Much has changed in the internal networks of organizations with Intranets as potential vehicles to integrate external information services within internal
infrastructure and software. Much has changed in the ways electronic information services are used (they seem no longer to be the exclusive domain of experienced computer users) and how they look (more multimedia, more hypertext, more graphical user interfaces). The main purpose of our first two meta-analyses was to prepare ourselves for the empirical research of suppliers and users of electronic information services and to explore in which areas this research can contribute most.

To check if new insights have occurred since the end of 1994, a new meta-analysis has been conducted by students in their final year of communication studies (University of Amsterdam), with a major in studies on organizational communication and the use of information- and communication technology. They were asked to select 10 journal articles which described an empirical research on factors influencing (the effects of) the use of electronic information and communication services. Students could focus on electronic information services (such as WWW, cd-roms, online databases), or electronic communication services (such as E-mail, IRC, bulletin boards, etc.) or a combination of both in closed-user groups (such as Intranet, Lotus Notes, Groupware, Executive Information Systems, etc.). They had to select articles in the Dutch or English language, published after 1994, and describing an empirical research. Twenty-two students came up with 167 different articles of which 29 were actual empirical articles about the use of electronic information services. Naturally, these 29 do not give a comprehensive overview of the empirical research being done recently, but they do give insight in what has changed since our first meta-analysis on the use of electronic information services. We will discuss some of the new concepts and variables introduced in the remaining part of this chapter

The most important conclusion based on a quick scan of these 29 articles is that not too much has changed. Still most articles focus on the rather de-contextualized human-computer interaction. The main independent variables are individual characteristics such as computer skills, age, gender, etc. and the main dependent variables focus on user satisfaction or system evaluation. This is the case in studies of Gluck (1996), Nahli & Tenopir (1996), Bergeron et al. (1995) and Covi & Kling (1996) - although the last two also incorporate respectively workgroup influence and organizational structure, Dimartino & Zoe (1996) who put special emphasis on the influence of computer skills and training as do Torkzadeh & Dwyer (1994) and Wu & Zhao (1994). The role of gender is researched by Mundorf, Westin & Dholakia (1993) and several authors study the role of computer anxiety (such as Anderson, 1996, Igbaria, Schiffman & Wieckowski, 1994). These two variables are probably becoming more dominant because of the boom of internet and the emergence of more and more end-users (and thus inexperienced users).

Hardly any empirical article found by the students discusses the role of organizational or environmental characteristics and again in the consequences of use, most articles focus on user satisfaction or at best improvements in individual task performance. No article was found that investigated the consequences for organizational performance and the interaction between organizations and their environments.
Probably also related to the rise of internet is the increased attention in interface design and the consequences multimedia interfaces have on user performances and user satisfaction. Dimitroff et al. (1995) compare different kind of hypertext database in their consequences of system evaluation. Hertzum & Frokjaer (1996) do the same for different retrieval modes (browsing, boolean, Venn diagrams, or a combination of all). Manglano Bosch & Hancock-Beaulieu (1995) study Graphical User Interfaces; Molnar & Kietke (1996) study the influence of voice interface on system evaluation and finally Mundorf, Westin & Dholakia (1993) study the use of colour, graphics and music.

The students only found one empirical article specifically researching the internet as an information service (that is, WWW or Gopher) in a professional setting. Kelly & Nicholas (1996) study the use of internet by information professionals in the banking and finance sector in which they focus on the advantages and disadvantages of internet as an information source (especially quality and accessibility) and the advantages and disadvantages on how manageable internet is. They argue that internet has many retrieval difficulties in which browsing/surfing fastly becomes ploughing, that there is free information for organizational intelligence but there are very few authoritative sources (which makes the information potentially unreliable). In terms of management, internet does seem to ask too much time and poses a security threat, but it is cheap and it raises the profile of the library/information center; internet has put electronic information services on the agenda.

In the ongoing debate concerning quality and accessibility, new perspectives have been added: perceived usefulness - the extent to which a user thinks an information service will benefit him or her and perceived ease of use - is introduced as an alternative to “quality” (Klobas, 1995; Chau, 1996). Klobas compares different models with slightly different interpretations of both quality and accessibility, in which she interprets perceived usefulness as comparable to quality but put in context. In other words, the concept of quality of an information source has been often operationalized as a more or less objective characteristic of the source. Perceived usefulness concerns the perceived quality of a source but relates it directly to the degree the sources benefit work performance. Klobas empirically shows that when quality is operationalized as perceived usefulness it turns out to be a stronger predictor than perceived ease of use or accessibility. She, however, also shows an even stronger model exists; the theory of planned behavior. This model states that the intention to use depends on the attitudes to outcomes (what will be the result of use according to the potential user?), social pressure (the influence of other people) and perceived behavioral control (the extent to which a person believes he or she has control over performance of the behavior). In her LISREL analysis this last model explained the most variance in use. The students also found two studies which did not only look at perceived usefulness but also at perceived fun or enjoyment (Igabaria, Ivari & Maragahh, 1995; Igbaria, Schiffman & Wieckowski, 1994).

In the debate concerning direct access by end-users or intermediate access by librarians, new insights are given by Edwards & Browne (1995) in which they compare the expectations of users and librarians about the quality of information services in an academic setting. It turns out that
academics (as end users) and librarians have similar expectations but there are differences in the emphasis each group places on aspects of services. Librarians seem to underestimate the importance to academics of the responsiveness of a service and the use of electronic services in general and seem to overestimate the characteristics of the staff who provide services. In other words, librarians seem to underestimate the wishes and expectations academics have in using electronic information services themselves and seem to overestimate their role in doing so. Academics are probably in many respects a-typical users and it is the question whether these results can be generalized to other professionals, but the article does add arguments to the statement that librarians tend to overestimate the advantages of intermediate access.

4.9. Conclusion

Budding investigators think that the purpose of a literature review is to determine the answers about what is known on a topic; in contrast, experienced investigators review previous research to develop sharper and more insightful questions about the topic. (Yin, 1989, p. 20)

To follow the wise words of an experienced investigator, the purpose of the meta-analyses described in this chapter, was not only to see what is known, but also to discover some of the blind spots in present research open to investigate, and to check which questions should be asked to suppliers and users of electronic information services (or, which variables should be included in the research design). Not all the variables mentioned in the preceding 20 pages will be included in the remaining part of this dissertation. The models displayed are mere representations of what is already known on the use of electronic information services. It is now our task to develop meaningful questions by finding missing links or contradictions in the existing literature.

The empirical research has given most attention to media characteristics and environmental characteristics. Within media characteristics, the focus has been on the relative importance of either accessibility or quality and on the role information intermediaries can play. The relationships with organizational characteristics are ambivalent. In the theoretical and professional readings, accessibility is again a major topic. But, the organizational context is put on the agenda. The update epilogue tends to the conclusion that this has not changed with the emergence of the internet in the business arena.

Concerning the blind spots in existing research, we conclude there are ambivalent results on the importance of environmental uncertainty: there is a clear relationship between environmental uncertainty and environmental scanning, but a much less clear relationship between uncertainty and the use of electronic information services. It seems these services are not suited for uncertain situations, because they are not accessible enough for managers and small- and medium sized corporations (who experience higher degrees of uncertainty) and they only allow for very
systematic searching (knowing what you want to know), which is very difficult in situations of high uncertainty and early phases of decision making (like the intelligence phase).

Another very controversial topic has been the advantages and disadvantages of intermediate usage; some believe it is a necessity because of the inaccessibility of the services — you need to be a skilled user to be able to efficiently and effectively search these databases — others believe you end up with an unnecessary gatekeeper who doesn't know enough about the business and who is limited in his or her scanning forms (limited to systematic searching (knowing what you want)).

A remarkable blind spot has been the organizational context: hardly any attention is given to organizational effects and ambivalent results exist about the relationship between organizational characteristics (such as size) and the use of electronic information services. Whenever authors discuss the use of electronic information services, they seem to be focused more on the way individuals interact with these machines and the difficulties they encounter. Media characteristics and individual characteristics are dominant. Most of the time, the research subjects were often experienced users and intermediaries such as librarians and their perceptions of the specific services are dominant in the literature. Also, most of the articles that discuss electronic information services are written from the perspective of supply and thus focus on those aspects that can be influenced by the supplier such as ease of use or accessibility, quality and costs. This doesn't seem to have changed over the last few years, judging from the results of our update analysis.

On the other hand, the studies on environmental scanning and external information need, focus on the value of environmental scanning and less on the effort it takes. These studies seem to concentrate on environmental characteristics and some organizational characteristics that influence perceptions of environments and there is general consensus that "to study environmental scanning, the perspective of the organizational environment as a source of uncertainty seems the most appropriate" (Choo & Auster, 1993). But these studies hardly connect the scanning process to the use of electronic information services. Some investigate all possible sources and then conclude that personal ones are favorable, others simply stop at the assessment of information needs.

In chapter six we will use the results of the meta-analysis and the general conclusions from chapter 3 (on electronic information services) to investigate how suppliers think they can bridge the gap between suppliers and users. In chapter seven we will focus entirely on the users of electronic information services, from an organizational perspective. It is in these areas, an unexplored field is still wide open for us. But first we will discuss how we will research this open area.