

*AN ANALYSIS OF RESEARCH IN INFORMATION SYSTEMS (1981-1997)*

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AUTHORS:

ENRIQUE CLAVER. Full Professor of Business Management at the University of Alicante, Spain. Head of the Department of Business Management at the said University. His current research interests include Strategic Management, Human Resources Management and Information Systems Management.

REYES GONZÁLEZ. Senior Lecturer in Business Management at the University of Alicante, Spain. Her Ph.D. dissertation was an empirical study of the role of the Information Systems Managers in the area of Alicante (east of Spain). Her current research is Information Systems Management.

JUAN LLOPIS. Senior Lecturer in Business Management at the University of Alicante, Spain. Secretary of the Faculty of Economics and Business Studies at the said University. His Ph.D. dissertation was an analysis of Corporate Culture. His current research include Corporate Culture, Human Resources and Technology Management.

ABSTRACT: The study of Information Systems is a relatively new research area, thus an analysis of the latest literature could be useful by showing what researchers are doing and even what can be done to improve our approach. With that purpose in mind, this article analyzes the articles published in the *Management Information Systems Quarterly* and *Information & Management* journals between 1981 and 1997, paying attention to the usual topics as well as strategies, both in research and by the authors.

KEYWORDS: IS publications, categories of IS studies, methods of IS studies, authors'

profiles.

Correspondence author: REYES GONZÁLEZ. Alicante University. Facultad de Ciencias Económicas y Empresariales. Departamento de Organización de Empresas. Carretera San Vicente-Alicante. 03080. Alicante. Spain. Fax and Phone number: 34-96-5903606. E-mail. [mr.gonzalez@ua.es](mailto:mr.gonzalez@ua.es)

*AN ANALYSIS OF RESEARCH IN INFORMATION SYSTEMS (1981-1997)***1. Introduction**

In the last two decades, the study of Information Systems (IS) has been enriched by the contributions of various other research disciplines, mainly Management Science, Computer Science, and Organizational Science, until becoming an independent study area in its own right [8]. Numerous efforts have helped to consolidate the discipline of IS or MIS, but among them should be highlighted those made at the University of Minnesota, which in 1968 started its first IS academic programme and became the first research centre in this field [35]. Nevertheless, the study of IS is undertaken, even today, in various ways and scholars working in this area should consider other disciplines as possible areas that can add to the richness and complexity of IS studies [4].

As research and practice in a field develop, it becomes its own study object [2]. The arena of studies involving research in the IS field is beginning to be considerable and subject to study themselves. The study both shows what happened in the past and can also point out what should be done in future [43].

With these object in mind, the paper has, as its aim, the study of literature on the IS field, attempting to highlight the most researched topics or subjects as well as the research method used. We also determine which authors publishing the most, since we believe their contributions can improve our knowledge of this booming field.

**2. Data collection**

Our analysis of IS literature was based on the study of journals, instead of other publishing or research media (lectures, books...). The main reason for this decision was our belief that practitioners as well as academics use journals more often, both to acquire and

spread new knowledge [36]; whereas articles currently represent the highest level of research, other media, like books, are primarily for spreading knowledge that is already established [19].

The most widespread and prestigious journals specialized in the study of IS include the following: *Communications of the ACM*, *DataBase*, *Datamation*, *Decision Support Systems*, *Information & Management*, *Interfaces*, *Journal of Management Information Systems*, *Journal of Computer Information Systems*, *Journal of Systems Management* or *MIS Quarterly*. There are also some journals which, though not specializing in IS, regularly publish articles to this area: *Academy of Management Journal*, *Academy of Management Review*, *Administrative Science Quarterly*, *Decision Sciences*, *Harvard Business Review*, *Management Science*, *Omega*, and *Sloan Management Review*.

In order to determine important research in the IS field, we decided not to study the second group of journals (non-IS), although some of the landmark papers were published there. The main reason was that there may be complete issues (or even volumes) of these journals containing no IS articles that would distort a chronologically exhaustive study of research on IS, such as this.

Among IS-specialised journals, we have decided to focus on only two: *Information & Management (I&M)* and *MIS Quarterly (MQ)*. Different motives justify this decision: on the one hand, both journals have been cited in many other papers where IS literature was studied, such as those by Hamilton and Ives, Grover and Sabherwal [18], Grover, Lee and Durand [17], Suomi [41], Cheon, Grover and Sabherwal [7], Nord and Nord as well as Lai and Mahapatra [26]; likewise, they are both included in the ranking of the most prestigious journals in the IS field, as can be seen in the studies of Doke and Luke [11], Koong and Weistroffer [25], Gillenson and Stutz [15], Holsapple et al. [21 and 22]; also both journals

are ranked as two of the most often cited in Social Sciences, as seen in the *Social Sciences Citation Index*.

We used the information provided by the ABI/INFORM database. This, an acknowledged base that has been used in other studies with similar objectives [13, 45], is one of the most prestigious, academically, in the field of Economics and Business Administration, since it indexes over 350 journals in these areas. Furthermore, other studies of IS literature have been based on similar information; for example, the paper by Ives, Hamilton and Davis [23] goes into doctoral theses on IS exclusively paying attention to the analysis of their abstracts obtained in *The Comprehensive Dissertation Index* database (Vols. 33 to 39). Likewise, the study by Grover and Sabherwal makes a classification of IS articles according to topics, based only on their titles and abstracts.

The ABI/INFORM base supplies the following information about each article: *title, authors, title of the journal*, when and where the article appeared, including *volume, issue, pages* and *date*, the *keywords*, and *abstract*. We consider this information suffice for our study, at least as regards the classification of articles belonging to one subject or topic and concerning the identification of the authors. However, in order to determine the methodology used, we had to complement this information with a review of the text of 222 articles, the abstract of which was not sufficient.

#### TABLE 1

The I&M and MQ articles obtained are listed in Table 1. As can be seen, this provides us with information from 1981 onwards; unfortunately, there was no information about MQ until 1985, but since we thought it interesting to understand articles published prior to that date, we still used the articles published in I&M during those years. 1,121 articles in all have been analyzed, 768 of them (68.5%) from I&M and 353 (31.5%) from MQ. The disproportion in the number of articles from the journals reflects the fact that I&M publishes

more articles per year than MQ.

While MQ annually publishes a volume with four issues and the number of articles per year remains more or less stable (ranging from 20 in 1997 to 36 in 1988), I&M shows a more irregular behaviour. Thus, between 1981 and 1984, it published a yearly volume with 6 issues each, between 1985 and 1991 it published two volumes per year, with five issues in each of them, between 1992 and 1995 also two volumes were published, each volume containing 6 issues and from 1996 onwards, it has published volumes with five issues. As for the number of articles published per year, it is more uneven in this journal than in MQ, ranging from 24 in 1982 to 62 in 1995.

### **3. Data analysis**

The analysis of the information was divided into three sections. Firstly, we studied the topics most often considered in the journals, after which we analyzed the research methodology and, finally, we searched the names of the authors who have published most in these journals.

#### **a) Topics**

TABLE 2

The analysis of the most frequent topics addressed in the 1981-1997 period is presented in Table 2. This shows the number of articles dedicated to each topic and the percentage of the total of articles they represent, for each three-year period and overall. To deal with the classification of topics, we followed the sets used by Grover, Lee and Durand, which uses 20 IS groups. However, since it is important to emphasize other topics that these authors did not include (such as *IS Evaluation*, *Security*, or *Telecommuting*), we added to this list by taking Barki, Rivard and Talbot's scheme [5] as our main reference. In all, we therefore identified 30 different topics (plus an *Others* section) classified into 5

major groupings: *IS Management*, *IS Development/IS Life Cycle*, *Information Technologies*, *IS Usages*, and *Others*.

Reading the article's abstract, title, and keywords was the basic way to categorize an article as belonging to a particular topic. When we found it impossible to classify an article in this way, we included it in the *Others* group.

As can be seen, the most popular topics throughout these years have been *IS Development* (13.2% of the articles), followed by the study of *DSS* (8.9%), *IS Evaluation* (7.8%), *Implementation* (5.3%) and the study of *Expert Systems/Artificial Intelligence* (5.2%). In all, they represent 40.4% of the articles analyzed. Nevertheless, the behaviour of these subjects in time turns out to be more interesting than the overall result (Figure 1), since it becomes obvious that topics focusing specially on the IS Life Cycle (*Development* and *Implementation*, etc.), despite their global importance, have shown to decrease with the passage of time, especially in the final two-year period. In the case of *Development* we have passed from a percentage of 16.5% of the articles to 5.4% and as for *Implementation*, the decrease is from 12.4% to 3.1%.

#### FIGURE 1

However, other matters are increasing; e.g., *Evaluation* (which includes aspects such as IS User Satisfaction, the degree of IS Utilization, its Effectiveness -even from the expenses point of view- as well as the System's User-Friendliness) has become quite important; more precisely, studies on *Evaluation*, which represented 4.1% of the articles in the first three-year period, have risen to 10.4% in the last.

Within the *IS Management* section, it is interesting to see the evolution of topics such as *Using IS for Competitive Advantage/Strategic IS*. As can be seen in Table 2, we find that this is a topic that was seldom considered in the early 80's (no articles were registered

in the 81-83 triennium). During this early stage, systems were normally implemented to automate functions previously performed by hand and thus not considered strategic. Nevertheless, they were later examined to determine how they impacted on business strategy, that is to say, the firm's competitive advantage (hence the growing number in the early 90's: 7.0% of the articles in the 90-92 triennium). In more recent years, this subject has reduced to being of less interest (only 1.5% in the 96-97 biennium). Perhaps it is now accepted that IS can provide competitive advantage and it is unnecessary to emphasize the idea, or maybe authors now think that IS, rather than an advantage, have become a necessity.

*Outsourcing* is another topic with a directive character. There were no articles on this subject until the 93-95 triennium. This is so because the "fashion" of outsourcing, as an alternative to IS development and internal management, became a major issue in the early 90's, following successes reported by management of Eastman Kodak.

*IS Development* and *IS Life Cycle* have been the topic of a considerable number of articles (24.2%) throughout the 17 years, but these subjects appear to be reducing in interest.

In the *Information Technology* section, we see the significance of articles dedicated to *DSS*, *Expert Systems/Artificial Intelligence* and *GDSS* or *groupware*. It can also be seen that currently highly debated topics, such as *EIS* or *EDI* systems, are quite new (no articles appear until the late 80's or early 90's), and that treatment of *the Internet and the Information Highways* receives increasing attention.

*IS Usage*, particularly *End-User Computing* (4.5% of the articles on this topic were published in the 1984-86 period and 4.7% during the 1996/97 period), was not apparently



as important in the early 80's, because this phenomenon was not widespread and enterprise management was dominated by large centralised equipment (mainframes), with PCs and users having little or no role. *IS and Small Business* was the topic of many articles (18), since the specific problems of small firms make it difficult for them to keep up with large enterprises in their use of innovative technologies (the Schumpeter hypothesis). We must also highlight the importance of those articles dealing with *IS in developing countries and Intercultural aspects of IS*. The number of studies can no doubt be attributed to the international orientation of the journals; nevertheless, this interest makes it clear that IS are not a merely technical solutions, but need an in-depth study of the environment in which they perform.

Finally, in the *Others* section we have included articles that are difficult to group as well as articles that deal with *IS Research*; studies which, like the present paper, deal into meta-research topics (we included 32 articles in this category, 2.9% of the total).

#### FIGURE 2

A summarized version of the tendencies is shown in Figure 2. The area that received the most attention during these years has been *IS Management* (31.7%) followed by *IT* (25.7%) and *IS Development/IS Life Cycle* (24.2%). There is decreasing interest in subjects focusing on systems development in favour of managerial topics, which have received most attention since 1996.

#### **b) Research Strategies**

The articles we studied can be classified as both empirical and theoretical or non-empirical ones. Following Alavi and Carlson, we divided theoretical studies into *conceptual*, *illustrative* and *applied concepts*. The empirical ones, according to the classical scheme elaborated by Van Horn [44], and used by others [20], are classified as *case studies*, *field studies*, *field experiments* and *laboratory experiments*. APPENDIX 1 gives examples of

articles to show how this analysis was carried out.

**Theoretical studies.** These are mainly based on ideas, structures, and speculations, rather than on systematic observation of reality. Although some observations or empirical data may be found in non-empirical articles, the role of the former is merely secondary -a support one. In other words, emphasis is laid on the ideas rather than on data and observation. Non-empirical studies can be *conceptual*, *illustrative*, and *applied concepts*. In conceptual ones, frameworks, models, or theories are defined and reasons or explanations are given. Illustrative ones are designed to guide practice; they offer recommendations for action, or stages to be completed under specific circumstances. Their focus is on what and how, rather than on why. Finally, applied concepts articles are a sort of mixture of the two previous types, since they equally stress conceptual and illustrative elements.

In **Empirical Studies**, the essence of research is to be found in the observation of reality. In this context, **Case Studies** are found; these are increasingly widespread in the IS field. Table 3 offers detailed information on the characteristics of this research method, which, according to Benbasat, Goldstein and Mead [6] is suitable for the study of IS for three reasons:

- a) The researcher can study IS in its natural environment, learn about the state of the art, and generate theories derived from practice.
- b) The case method enables the researcher to answer "how" and "why" and thus to understand the nature and complexity of the process taking place.
- c) It is appropriate to do research in an area where there are few previous studies; therefore, it fits the context of IS, since new topics keep arising. It is thus very often the first step in empirical research.

TABLE 3

The case study has often been criticized for its lack of scientific rigour, but this is not due to the method as such, but to the fact that the term has often been applied to a mere set of anecdotes [28].

The **Field Study** is another empirical research method; generally, several organisations are analyzed with respect to one or several variables, using experimental design but without experimental control. This means that the researcher collects the information from somewhat uncontrolled situations. The organization is observed but not altered by the study. But the researcher attempts to relate measurements to certain hypotheses. Compared to traditional experiments carried out in the Natural Sciences, field studies are inefficient or subject to error. They require a great amount of data in order to isolate the effects of the specific variables chosen by the researcher among the great number of uncontrolled or even unknown variables that often come together in the study object. The phenomena are analyzed without modifying them and in their normal function setting, but it is only some specific aspects or variables that are the topic of interest. On the other hand, the analysis of the information obtained from the case study is merely qualitative, in contrast to the quantitative methods that are normally used in a field study.

The **Field Experiment** involves examining one or more organizations with respect to one or more variables using a specific design and exerting experimental control. The researcher somehow manipulates or interferes with the study object, changing some aspect of the system being studied. However, the study object is analyzed in its natural setting. We must take into account that, both in the case study and in the field study, the researcher plays a passive role as an observer. Through the field experiment, with good experimental design, the researcher tries to determine the effect of each variable on the measurement of the results. Thus, the field experiment is *analogous* to traditional scientific experiments. It is difficult to carry out field experiments, due to the numerous problems

derived from interfering with a functioning reality and because, in real work settings, experiments are difficult to control.

The last form of empirical research is the **Laboratory Experiment**. It consists in the examination of a computing-organizational problem carried out in a setting that does not coincide with the habitual one of an organisation. When the real situation becomes too confusing, complex, slow, uncontrolled, or expensive, the researcher builds a model to replace it. Sometimes, the model is a set of equations and a symbolic representation of a problem, but, frequently, it is a physical representation of the problem. Thus, in Physical Sciences, a great deal of the research takes place in laboratories, which have at least two properties: 1) Mechanisms exist to measure both the dependent and independent variables, 2) the main objective is to add to the body of knowledge. Therefore, the only difference between a laboratory experiment and a field experiment refers to the objective. In the field test, the organization's aims prevail, whereas in the laboratory experiment knowledge matters. Hence most, if not all, laboratory experiments take place in another scenario, and thus avoid interfering with the organization's operation.

Table 4 gives the classification of the articles according to the research methodology used. The main difficulty in making this classification was that the abstract, the title, and the key words, were the sole reference points, and sometimes it was impossible to determine the research method. Therefore we had to resort to the complete text of 222 of the articles.

#### TABLE 4

The analysis of this table shows that most of the studies are empirical (68.7%) against only 31.3% theoretical studies, however, this is due to the qualitative growth of empirical studies since most of studies were theoretical in the first period analyzed (1981-83). This result is consistent with Alavi and Carlson's conclusions: in the mid-80's, research

efforts go through a change from theoretical to empirical ones.

Among the best-known theoretical studies are the illustrative ones, followed by conceptual and, finally, applied concepts. However, the tendency from 1981 to 1997 appears to be that the number of illustrative articles has been decreasing relative to the exclusively conceptual ones.

As regards empirical studies, the most popular is the field study (39.0%) followed by case studies (21.2%) and, a great distance behind, laboratory (7.5%) and field experiments (1.0%). We have included inside the group of case studies the ones Benbasat, Goldstein and Mead consider to be Application and Action Research, in addition to the ones those authors specifically identify as case studies. In Application Research studies, a detailed description is given of the author's experience in implementing a particular application. As for studies labelled as Action Research, the author is seen as a researcher participating in the implementation of a system, and simultaneously wanting to assess a specific intervention technique or a change within the organization.

As noted by others, there is a growth in the number of field studies as opposed to an almost constant number of case studies. Thus, Lai and Mahapatra's study showed that case studies are useful during the exploration stage of research, whereas the field study requires a deeper understanding, on the part of the researcher, of the phenomenon to be studied and is therefore more suitable for more advanced research. Likewise, in Teng and Galleta's paper, a very low number of experiments were found compared to field or case studies. They feel that this is probably due to the relative difficulty in conceiving and designing significant experiments for IS research.

The fact that field experiments are still less numerous than laboratory ones can be

due to the complexity of carrying out an experiment in a natural setting, like an enterprise, where interference is bound to occur.

### **c) Authors**

We made an analysis of the authors who were most prolific in publishing during the years studied in both journals. We are aware that such an analysis will exclude some important researchers, either because they have published in other journals or books, or because their publications were not properly located in the time-period under analysis. Such authors include, in our view: Ackoff [1], Anthony [3], Davis [9], Dearden [10], Ein Dor and Segev [12], Gibson and Nolan [14], Gorry and Scott Morton [16], Keen and Scott Morton [24], Leavitt and Whisler [27], Lucas [29], McFarlan [30], McKenney and Keen [31], Nolan [33], Porter and Millar [37], Raghunathan and Raghunathan [38], Rockart [39], Sprague [40], and Swanson [42]. This is why, though Table 5 shows the 25 authors having published most in both journals we were not attempting to rank them.

TABLE 5

We included authors' university of origin. 20 out of these 25 authors work in US universities, 4 in Canada, and 1 in Israel. It is surprising that no European Universities are represented in the top 25.

The previous data lead us to analyze which authors publish the most in I&M, on the one hand, and in MQ, on the other (Tables 7 and 8 of APPENDIX 2 show the authors publishing 4 or more articles in each of these journals). Again authors from US universities clearly prevail in both journals. This trend is more marked in MQ, 89% of the authors publishing the most belong to universities from that country and the remaining 11% belong to universities in Canada.

I&M is somewhat more varied, since, although 67.5% of the authors that publish the

most come from US universities, other countries are represented as well, namely, Israel (12.5%), Singapore, Finland and Canada (with 5% in all three cases) as well as Hong Kong and Chile (with 2.5% in each case).

Although this analysis of nationalities is not exhaustive, it does constitute a sign to believe in the handicap that European researchers have to face when it comes to publishing in prestigious IS journals. A similar conclusion is reached by Suomi in his study; after analyzing the nationalities of authors publishing in IS specialized journals, he states that the existence of an *international research community* is a myth, at least in this area, taking into account the prevalence of US researchers.

#### TABLE 6

Finally, we analysed the number of articles published individually by an author or by several authors (Table 6). The overall result follows the same orientation as that of Nath and Jackson's paper [32], which, while studying productivity in the IS area, also concluded that most of the articles analyzed were the fruit of a coauthorship. The global tendency is towards a decreasing number of articles signed by a single author, whereas during the first half of the decade of the eighties there was not a great disproportion between articles signed by one or by several authors, during the last two-year period, there is a clear predominance of articles by several authors, a fact that is even more marked in MQ.

#### **4. Summary and Conclusion**

The analysis of I&M and MQ during the last 17 years shows a change of interest in IS topics studied by researchers, who increasingly tend to focus their attention on IS management problems, while lesser emphasis is laid on classical matters such as systems development. Nevertheless, the greater weight of directive topics may be the result of the bias of the journals. On the other hand, this paper confirms that the IS area is always new and changing, as new IT are introduced within organizations. Thus, the study of some tools

(such as the EIS, the EDI, or even more, the Internet) has just become possible in recent years; likewise, phenomena such as outsourcing have only been studied for a few years, though very intensely.

There has been an increase in the number of empirical articles over theoretical ones. This could indicate that theoretical studies were more suitable in the past, while the popularity of empirical studies now reveals an interest in proving theories that already exist in practice, or even in building theories based on empirical facts.

The most frequent of the empirical studies is the field study, followed by the case study; the scarcity of laboratory experiments, and, above all, field experiments is a symptom of the difficulty experienced in carrying such experiments. Among theoretical articles, illustrative ones are the most common; however, since 1990, the number of conceptual studies has been growing, to the detriment of the former. This could suggest a greater interest in the consolidation of theories, going beyond the trend to do mere descriptions of IS related phenomena.

The analysis of the nationality of the authors that publish the most in both journals shows a clear orientation towards those working in US universities, as the ones establishing guidelines in the IS area, the participation of researchers from European universities is somewhat scarce. There is also a clear tendency to do team-research, which might show the area's move to a higher level of maturity.

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## **APPENDIX 1: EXAMPLES OF ARTICLES BY RESEARCH STRATEGIES**

### **Theoretical studies**

As an example, Bakos' article (1991) could be classified as being theoretical and conceptual, since it carries out a strategic analysis of electronic marketplaces and points out how prices, providers' profits and purchasers' welfare may vary following the decrease in information search costs. It also explains the new existing possibilities for the strategic use of these systems.

BAKOS, J.Y. (1991). "A Strategic Analysis of Electronic Marketplaces". *MIS Quarterly*. Vol. 15. N. 3. 295-310.

Koen and Im's article (1997) is also theoretical and could be classified as illustrative, as it explains the problems of computer piracy, trying to help alleviating them. With this aim it deals with: 1) the types of software piracy, 2) anti-piracy campaigns having been organized, 3) the forms of software intellectual protection and 4) several lawsuits and agreements in this context.

KOEN, C.M. and IM, J.H. (1997). "Software Piracy and its Legal Implications". *Information & Management*. Vol. 31. N. 5. 265-272.

On the other hand, the article by Hansen (1995) can be classified as a theoretical applied concepts one, since, on the one hand, it proposes a conceptual structure for mass IS (those addressed to a large audience such as videotex or the Internet) and, on the other, it elaborates a guide for the implementation of such systems.

HANSEN, H.R. (1995). "Conceptual Framework and Guidelines for the Implementation of Mass Information Systems". *Information & Management*. Vol. 28. N. 2. 125-142.

### **Empirical Studies:**

#### **Case Studies**

As an example of this method, the study carried out by Nidumolu et al. (1996) has as its purpose the development and application of a structure to explain IT implementation strategies in a public institution. With this aim, it uses the case of the implementation of these technologies in Egypt's local administrations. Research data are derived from the use of various methods and from different sources (in order to reflect the whole case in all its complexity), mainly non-structured interviews (interviews with 75 people were carried out, which covered a total time of some 1,500 hours) and information obtained from documents such as implementation project plans, organizational graphs, reports, etc.

On the other hand, Pliskin and Romm's study (1997) presents the story of a university academics' strike that took place in Israel in 1994; thus, an attempt is made to understand how electronic mail, which was the main communication medium between strikers and their leaders, is a valid medium of communication for a virtual community. The sources of information in this paper were the mail messages themselves, as they were sent while the strike lasted; through them it was possible to follow the evolution of the strike in its different stages.

NIDUMOLU, S.R., et al. (1996). "Information Technology for Local Administration Support: The Governatores Project in Egypt". *MIS Quarterly*. Vol. 20. N. 2. 279-305.

PLISKIN, N. and ROMM, C.T. (1997). "The Impact of E-mail on the Evolution of a Virtual Community during a Strike". *Information & Management*. Vol. 32. N. 5. 245-254.

### **Field Studies**

An example of Zigurs and Kozar's study (1994) carried out in the IBM Team Focus Center, which is a setting for team-decision-making, located in the IBM corporation in Boulder (Colorado). This center is habitually visited by work teams from different enterprises in order to make decisions on planning, strategy and other types of group-decisions. An analysis of the behaviour shown by 10 work groups having used this center in

order to solve their business problems was carried out. Through the use of questionnaires, which were filled before and after team working-sessions, an attempt was made to determine the influence that group support systems could have on the roles of those participating in a working team.

Another field study was the one Gowan and Downs (1994) carried out at General Electric, in its Wilmington office. For 10 months, information was collected on the use of the videoconferencing system this enterprise had (426 meetings were held during this period through videolecture). By means of questionnaires, it was possible to determine the interaction existing between the following variables: user's profile, tasks carried out and technologies used.

ZIGURS, I. and KOZAR, K.A. (1994). "An Exploratory Study of Roles in Computer-Supported Groups". *MIS Quarterly*. Vol. 18. N. 3. 277-297.

GOWAN, J.A. and DOWNS, J.M. (1994). "Video Conferencing Human-machine Interface: a Field Study". *Information & Management*. Vol. 27. N. 6. 341-356.

### **Field Experiments**

As an example, we can cite Olfman and Mandviwalla's study (1994), in which 82 administration employees in a university went through training sessions on the use of a certain software (Microsoft Windows 3.0) for four weeks. Seven months later, a questionnaire was sent in order to check if they kept using this software. There were two different teaching methods (one based on concepts and the other focusing on procedures) and an attempt was made to determine whether the use of different software teaching methods has implications for its subsequent knowledge and use.

Another field experiment is the one by Hunton and Beeler (1997), which was carried out during a time-period of 19 months in a US state agency. The experiment involved 516

people, belonging to different public institutions, in which a new expense application was going to be implemented. The institutions were distributed in three groups: one with the participation in the application's development process, another which was kept up to date on the new system and its benefits though not taking part in the development process, and a third group which only knew that a new system was going to be implemented, but being ignorant of any details about that system. In this way, the study tried to explain the effectiveness of the user's involvement in the development of a new application. Both the previous article and this one are longitudinal studies, that is, they study a phenomenon over time.

OLFMAN, L. and MANDVIWALLA, M. (1994). "Conceptual Versus Procedural Software Training for Graphical User Interfaces: A Longitudinal Field Experiment". *MIS Quarterly*. Vol. 18. N. 4. 405-426.

HUNTON, J.E. and BEELER, J.D. (1997). "Effects of User Participation in Systems Development: a Longitudinal Field Experiment". *MIS Quarterly*. Vol. 21. N. 4. 359-388.

### **Laboratory Experiments**

An example is Massetti's experiment (1996) carried out with 44 MBA students. They were subject to the use of an ICSS (Individual Level Creativity Support System) with the purpose of determining whether the individuals' creativity could be improved using this tool. It is advisable to make clear that the experiment was carried out at the university, but outside the habitual setting of the classes students used to receive.

In Sia, Tan and Wei's experiment (1996), 44 groups of five people (again IS students from a large university) used a GDSS to analyze whether the kind of screens used for this type of systems and the tasks that were fulfilled by applying those systems could influence the consensus of the decisions made and the fairness in terms of participation in decision-making procedures, on the part of those forming the group.



MASSETTI, B. (1996). "An Empirical Examination of the Value of Creativity Support Systems on Idea Generation". *MIS Quarterly*. Vol. 20. N. 1. 83-97.

SIA, C-L., TAN, B.C.Y. and WEI, K-K. (1996). "Exploring the Effects of Some Display and Task Factors on GSS User Groups". *Information & Management*. Vol. 30. N. 1. 35-41.

## **APPENDIX 2: AUTHORS WITH THE MOST ARTICLES PUBLISHED IN MQ AND I&M**

TABLE 7

TABLE 8

TABLE 1: ARTICLES CLASSIFIED ACCORDING TO JOURNAL AND YEAR

Years	Information & Management		MIS Quarterly		Total Articles
	From/to (Vol. and N.)	N. Articles	From/to (Vol. and N.)	N. Articles	
1981	V.4 Nº1 / V.4 Nº6	25	-	-	25
1982	V.5 Nº1 / V.5 Nº6	24	-	-	24
1983	V.6 Nº1 / V.6 Nº6	24	-	-	24
1984	V.7 Nº1 / V.7 Nº6	24	-	-	24
1985	V.8 Nº1 / V.9 Nº5	40	V.9 Nº1 / V.9 Nº4	24	64
1986	V.10 Nº1 / V.11 Nº5	40	V.10 Nº1 / V.10 Nº4	28	68
1987	V.12 Nº1 / V.13 Nº5	47	V.11 Nº1 / V.11 Nº4	35	82
1988	V.14 Nº1 / V.15 Nº5	53	V.12 Nº1 / V.12 Nº4	36	89
1989	V.16 Nº1 / V.17 Nº5	50	V.13 Nº1 / V.13 Nº4	30	80
1990	V.18 Nº1 / V.19 Nº5	55	V.14 Nº1 / V.14 Nº4	27	82
1991	V.20 Nº1 / V.21 Nº5	55	V.15 Nº1 / V.15 Nº4	30	85
1992	V.22 Nº1 / V.23 Nº6	60	V.16 Nº1 / V.16 Nº4	28	88
1993	V.24 Nº1 / V.25 Nº6	60	V.17 Nº1 / V.17 Nº4	26	86
1994	V.26 Nº1 / V.27 Nº6	60	V.18 Nº1 / V.18 Nº4	24	84
1995	V.28 Nº1 / V.29 Nº6	62	V.19 Nº1 / V.19 Nº4	24	86
1996	V.30 Nº1 / V.31 Nº4	47	V.20 Nº1 / V.20 Nº4	21	68
1997	V.31 Nº5 / V.33 Nº2	42	V.21 Nº1 / V.21 Nº4	20	62
Total		768		353	1121

TABLE 2: ARTICLES CLASSIFIED ACCORDING TO RESEARCH TOPICS

TOPICS	1981/83	1984/86	1987/89	1990/92	1993/95	1996/97	Total
<b>IS MANAGEMENT</b>	<b>22</b> <b>30.1%</b>	<b>46</b> <b>29.4%</b>	<b>69</b> <b>27.5%</b>	<b>87</b> <b>34.1%</b>	<b>80</b> <b>31.2%</b>	<b>52</b> <b>40.0%</b>	<b>356</b> <b>31.7%</b>
1. Strategic Planning for Information Systems	4 5.5%	2 1.3%	8 3.2%	5 2.0%	15 5.9%	1 0.8%	35 3.1%
2. IS alignment/Organizational Impact	10 13.6%	4 2.6%	11 4.4%	5 2.0%	10 3.9%	14 10.8%	54 4.8%
3. IS Human Resources	-	7 4.5%	7 2.7%	16 6.3%	16 6.2%	2 1.5%	48 4.2%
4. IS Evaluation	3 4.1%	15 9.5%	15 6.0%	19 7.5%	17 6.5%	18 14.0%	87 7.8%
5. Using IS for Competitive Advantage/Strategic IS	-	5 3.2%	15 6.0%	18 7.0%	5 2.0%	2 1.5%	45 4.0%
6. IS Managers	1 1.4%	5 3.2%	3 1.2%	6 2.3%	5 2.0%	3 2.3%	23 2.1%
7. IS Outsourcing	-	-	-	-	3 1.2%	2 1.5%	5 0.5%
8. IS Security	4 5.5%	3 1.9%	1 0.4%	8 3.1%	6 2.3%	5 3.8%	27 2.4%
9. Other Management Issues	-	5 3.2%	9 3.6%	10 3.9%	3 1.2%	5 3.8%	32 2.8%
<b>IS DEVELOPMENT/IS LIFE CYCLE</b>	<b>35</b> <b>48.0%</b>	<b>45</b> <b>29.0%</b>	<b>68</b> <b>27.1%</b>	<b>51</b> <b>20.0%</b>	<b>59</b> <b>23.0%</b>	<b>13</b> <b>10.0%</b>	<b>271</b> <b>24.2%</b>
10. IS Development	12 16.5%	23 14.9%	39 15.6%	30 11.8%	37 14.5%	7 5.4%	148 13.2%
11. IS Implementation	9 12.4%	10 6.4%	13 5.2%	10 3.9%	13 5.1%	4 3.1%	59 5.3%
12. Database	8 10.9%	5 3.2%	9 3.6%	8 3.1%	7 2.7%	2 1.5%	39 3.5%
13. Developing Infor.Architecture./Informa. Requeriment Analysis	6 8.2%	7 4.5%	7 2.7%	3 1.2%	2 0.7%	-	25 2.2%
<b>INFORMATION TECHNOLOGY</b>	<b>12</b> <b>16.4%</b>	<b>32</b> <b>20.5%</b>	<b>69</b> <b>27.5%</b>	<b>64</b> <b>25.1%</b>	<b>76</b> <b>29.8%</b>	<b>35</b> <b>26.9%</b>	<b>288</b> <b>25.7%</b>
14. DSS	6 8.2%	21 13.4%	33 13.2%	24 9.4%	11 4.3%	5 3.8%	100 8.9%
15. GDSS	-	2 1.3%	8 3.2%	13 5.1%	15 5.9%	6 4.7%	44 3.9%
16. Expert Systems/Artificial Intelligence	-	4 2.6%	10 4.0%	17 6.7%	22 8.6%	6 4.7%	59 5.2%
17. EIS	-	-	-	3 1.2%	5 2.0%	2 1.5%	10 0.9%
18. EDI	-	-	1 0.4%	1 0.4%	5 2.0%	3 2.3%	10 0.9%
19. Telecommunications	-	4 2.6%	10 4.0%	4 1.5%	8 3.1%	2 1.5%	28 2.5%
20. The Internet/Information Highways	-	-	-	-	3 1.2%	4 3.1%	7 0.6%
21. Other IT	6 8.2%	1 0.6%	7 2.7%	2 0.8%	7 2.7%	7 5.3%	30 2.8%
<b>IS USAGE</b>	<b>3</b> <b>4.1%</b>	<b>27</b> <b>17.3%</b>	<b>30</b> <b>11.9%</b>	<b>44</b> <b>17.3%</b>	<b>28</b> <b>10.9%</b>	<b>18</b> <b>13.8%</b>	<b>150</b> <b>13.4%</b>
22. Office Automation	-	7 4.5%	3 1.2%	2 0.8%	-	1 0.7%	13 1.1%
23. Factory Automation	1 1.4%	2 1.3%	2 0.8%	2 0.8%	3 1.2%	-	10 0.9%
24. Telecommuting	-	1 0.6%	1 0.4%	1 0.4%	-	-	3 0.3%
25. Inter-Organizational Systems	1 1.4%	1 0.6%	1 0.4%	1 0.4%	4 1.6%	1 0.7%	9 0.8%
26. End-User Computing	-	7 4.5%	14 5.6%	17 6.7%	8 3.1%	6 4.7%	52 4.6%
27. IS and Small Business	1 1.4%	2 1.3%	2 0.8%	6 2.3%	5 2.0%	2 1.5%	18 1.7%
28. IS in Developing Countries/Intercultural IS Comparisons	-	4 2.6%	7 2.7%	12 4.7%	7 2.7%	7 5.4%	37 3.3%
29. Other IS Usages	-	3 1.9%	-	3 1.2%	1 0.3%	1 0.7%	8 0.7%
<b>OTHERS</b>	<b>1</b> <b>1.4%</b>	<b>6</b> <b>3.8%</b>	<b>15</b> <b>6%</b>	<b>9</b> <b>3.5%</b>	<b>13</b> <b>5.1%</b>	<b>12</b> <b>9.2%</b>	<b>56</b> <b>5.0%</b>
30. IS Research	1 1.4%	3 1.9%	11 4.4%	2 0.8%	9 3.5%	6 4.6%	32 2.9%
31. Others	-	3 1.9%	4 1.6%	7 2.7%	4 1.6%	6 4.6%	24 2.1%
<b>TOTAL</b>	<b>73</b> <b>100.0%</b>	<b>156</b> <b>100.0%</b>	<b>251</b> <b>100.0%</b>	<b>255</b> <b>100.0%</b>	<b>256</b> <b>100.0%</b>	<b>130</b> <b>100.0%</b>	<b>1121</b> <b>100.0%</b>

TABLE 3: KEY CHARACTERISTICS OF CASE STUDIES

Source: Benbasat, Golstein and Mead (6)

- a. Phenomenon is examined in a natural setting.
- b. Data are collected by multiple means.
- c. One of few entities (person, group or organization) are examined.
- d. The complexity of the unit is studied intensively.
- e. Case studies are more suitable for the exploration, classification and hypothesis development stages of the knowledge building process; the investigator should have a receptive attitude towards exploration.
- f. No experimental control or manipulation are involved.
- g. The investigator may not specify the set of independent and dependent variables in advance.
- h. The results derived depend heavily on the integrative powers of the investigator.
- i. Changes in site selection and data collection methods could take place as the investigator develops new hypotheses.
- j. Case research is useful in the study of "why" and "how" questions because these deal with operational links to be traced over time rather than with frequency or incidence.
- k. The focus is on contemporary events.

TABLE 4: ARTICLES CLASSIFIED ACCORDING TO RESEARCH METHODOLOGY.

RESEARCH METHODOLOGY	1981/83	1984/86	1987/89	1990/92	1993/95	1996/97	Total
<b>THEORETICAL STUDIES</b>	<b>41</b> 56.2%	<b>54</b> 34.6%	<b>97</b> 38.6%	<b>69</b> 27.0%	<b>64</b> 25.0%	<b>26</b> 20.0%	<b>351</b> 31.3%
Conceptual	7 9.6%	7 4.5%	40 15.9%	32 12.5%	32 12.5%	14 10.8%	132 11.8%
Illustrative	28 38.4%	41 26.3%	49 19.5%	27 10.6%	27 10.6%	8 6.1%	180 16.0%
Applied Concepts	6 8.2%	6 3.8%	8 3.2%	10 3.9%	5 1.9%	4 3.1%	39 3.5%
<b>EMPIRICAL STUDIES</b>	<b>32</b> 43.8%	<b>102</b> 65.4%	<b>154</b> 61.4%	<b>186</b> 73.0%	<b>192</b> 75.0%	<b>104</b> 80.0%	<b>770</b> 68.7%
Case Studies	13 17.8%	37 23.7%	56 22.3%	59 23.1%	50 19.5%	23 17.7%	238 21.2%
Field Study	13 17.8%	57 36.5%	78 31.1%	110 43.1%	111 43.4%	68 52.3%	437 39.0%
Field Experiment	-	2 1.3%	4 1.6%	1 0.4%	2 0.8%	2 1.5%	11 1.0%
Laboratory Experiment	6 8.2%	6 3.9%	16 6.4%	16 6.4%	29 11.3%	11 8.5%	84 7.5%
<b>TOTAL</b>	<b>73</b> 100.0%	<b>156</b> 100.0%	<b>251</b> 100.0%	<b>255</b> 100.0%	<b>256</b> 100.0%	<b>130</b> 100.0%	<b>1121</b> 100.0%

TABLE 5: AUTHORS WITH THE MOST ARTICLES PUBLISHED IN I&amp;M AND MQ

<b>AUTHORS</b>	<b>University</b>	<b>Articles N.</b>
Igbaria, Magid	The Claremont Graduate University. U.S.A.	20
Doll, William J.	University of Toledo. Ohio. U.S.A.	12
Wetherbe, James	University of Minnesota. U.S.A.	11
Grover, Varun	University South Carolina. Columbia. U.S.A.	10
Lederer, Albert L.	University of Kentucky. U.S.A.	10
Palvia, Prashant C.	The University of Memphis. U.S.A.	10
Torkzadeh, Gholamreza	The University of Texas. U.S.A.	10
Watson, Hugh	The University of Georgia. U.S.A.	10
Guimaraes, Tor	Tennessee Technological University. U.S.A.	9
Ives, Blake	Southern Methodist University. Texas. U.S.A.	9
Nunamaker, Jay F.	University of Arizona. U.S.A.	9
King, William R.	University of Pittsburgh. U.S.A.	9
Aiken, Milam W	University of Mississippi. U.S.A.	8
Bergeron, Francois	Université Laval. Canada.	8
Couger, J. Daniel	University of Colorado. U.S.A.	8
Jarvenpaa, Sirkka L.	University of Texas. U.S.A.	8
Vogel, Douglas	University of Arizona. U.S.A.	8
Benbasat, Izak	University of British Columbia. Canada.	7
Carr, Houston H	Auburn University. Alabama. U.S.A.	7
Goodhue, Dale L.	University of Georgia. U.S.A.	7
Huff, Sid L.	The University of Western Ontario. Canada.	7
Kozar, Kenneth A.	University of Colorado. U.S.A.	7
Pliskin, Nava	Ben Gurion University. Israel.	7
Straub, Detmar W.	Georgia State University. U.S.A.	7
Todd, Peter	Queen's University. Kingston. Canada.	7

TABLE 6: CLASSIFICATION OF ARTICLES BY NUMBER OF AUTHORS

JOURNAL	Number of AUTHORS	1981/83	1984/86	1987/89	1990/92	1993/95	1996/97	Total
I&M	One author	36 49.3%	43 41.3%	56 37.3%	52 30.6%	57 31.3%	22 24.7%	266 34.6%
	Several authors	37 50.7%	61 58.7%	94 62.7%	118 69.4%	125 68.7%	67 75.3%	502 65.4%
	<b>Total I&amp;M</b>	<b>73 100.0%</b>	<b>104 100.0%</b>	<b>150 100.0%</b>	<b>170 100.0%</b>	<b>182 100.0%</b>	<b>89 100.0%</b>	<b>768 100.0%</b>
MQ	One author	-	22 42.3%	26 25.7%	18 21.2%	12 16.2%	7 17.1%	85 24.1%
	Several authors	-	30 57.7%	75 74.3%	67 78.8%	62 83.8%	34 82.9%	268 75.9%
	<b>Total MQ</b>	<b>-</b>	<b>52 100.0%</b>	<b>101 100.0%</b>	<b>85 100.0%</b>	<b>74 100.0%</b>	<b>41 100.0%</b>	<b>353 100.0%</b>
BOTH	One author	36 49.3%	65 41.7%	82 32.7%	70 27.5%	69 26.9%	29 22.3%	351 31.3%
	Several authors	37 50.7%	91 58.3%	169 67.3%	185 72.5%	187 73.1%	101 77.7%	770 68.7%
	<b>TOTAL</b>	<b>73 100.0%</b>	<b>156 100.0%</b>	<b>251 100.0%</b>	<b>255 100.0%</b>	<b>256 100.0%</b>	<b>130 100.0%</b>	<b>1121 100.0%</b>

TABLE 7: AUTHORS WITH THE MOST ARTICLES PUBLISHED IN MQ

<b>AUTHORS</b>	<b>University</b>	<b>Articles N.</b>
Jarvenpaa, Sirkka L.	University of Texas. U.S.A.	8
Ives, Blake	Southern Methodist University. U.S.A.	7
Benbasat, Izak	University of British Columbia. Canada.	6
Kozar, Kenneth A.	University of Colorado. U.S.A.	6
Todd, Peter	Queen's University. Kingston. Canada.	6
Watson, Hugh J.	University of Georgia. U.S.A.	6
Wetherbe, James C.	University of Minnesota. U.S.A.	6
Doll, William J.	University of Toledo. Ohio. U.S.A.	5
El Sawy, Omar A.	University of Southern California. U.S.A.	5
Goodhue, Dale L.	University of Georgia. U.S.A.	5
Igbaria, Magid	The Claremont Graduate University. U.S.A.	5
Watson, Richard T.	University of Georgia. U.S.A.	5
Zmud, Robert W.	The Florida State University. U.S.A.	5
Barki, Henry	École des hautes Études Commerciales. Québec. Canada	4
Baroudi, Jack J.	New York University. U.S.A.	4
Boynton, Andrew C.	University of North Carolina. U.S.A.	4
Copeland, Duncan G.	Copeland & Company. U.S.A.	4
Couger, J. Daniel	University of Colorado. U.S.A.	4
Davis, Gordon B.	University of Minnesota. U.S.A.	4
DeSanctis, Gerardine	Duke University. U.S.A.	4
Kettinger, William J.	University of South Carolina. U.S.A.	4
Lederer, Albert L.	University of Kentucky. U.S.A.	4
Mason, Richard O.	Southern Methodist University. U.S.A.	4
McKenney, James L.	Harvard Business School. U.S.A.	4
Robey, Daniel	Georgia State University. U.S.A.	4
Straub, Detmar W.	Georgia State University. U.S.A.	4
Torkzadeh, Gholamreza	University of Texas. U.S.A.	4

TABLE 8: AUTHORS WITH THE MOST ARTICLES PUBLISHED IN I&amp;M

<b>AUTHORS</b>	<b>University</b>	<b>Articles N.</b>
Igbaria, Magid	The Claremont Graduate University. U.S.A.	15
King, William R.	University of Pittsburgh. U.S.A.	9
Aiken, Milam	University of Mississippi. U.S.A.	8
Grover, Varun	University of South Carolina. U.S.A.	8
Palvia, Prashant	University of Memphis. U.S.A.	8
Doll, William J.	University of Toledo. Ohio. U.S.A.	7
Guimaraes, Tor	Tennessee Technological University. U.S.A.	6
Lai, Vincent S.	The Chinese University of Hong Kong. Hong Kong.	6
Lederer, Albert L.	University of Kentucky. U.S.A.	6
Nunamaker, Jay F.	University of Arizona. U.S.A.	6
Pliskin, Nava	Ben Gurion University. Israel.	6
Torkzadeh, Gholamreza	The University of Texas. U.S.A.	6
Ang, James	National University of Singapore. Singapore.	5
Bergeron, Francois	Université Laval. Canada.	5
Huff, Sid L.	University of Western Ontario. Canada.	5
Jason, Marius	University of Missouri-St. Louis. U.S.A.	5
Sabherwal, Rajiv	Florida International University. U.S.A.	5
Vogel, Douglas	University of Arizona. U.S.A.	5
Wetherbe, James	University of Minnesota. U.S.A.	5
Zviran, Moshe	Tel Aviv University. Israel.	5
Adams, Dennis A.	University of Houston. Texas. U.S.A.	4
Ahituv, Niv	Tel Aviv University. Israel.	4
Banerjee, Snehamay	Clark-Atlanta University. U.S.A.	4
Borovits, Israel	Tel Aviv University. Israel.	4
Carr, Houston H.	Auburn University. U.S.A.	4
Couger, J. Daniel	University of Colorado. U.S.A.	4
Cheney, Paul H.	Texas Tech University. U.S.A.	4
Durand, Douglas E.	Southwest Missouri State University. U.S.A.	4
Franz, Charles R.	University of Missouri. U.S.A.	4
Jain, Hemant K.	University of Wisconsin. Milwaukee. U.S.A.	4
Jones, Mary C.	Mississippi State University. U.S.A.	4
Joshi, Kailash	University of Missouri. U.S.A.	4
Lyytinen, Kalle	University of Jyväskylä. Finland.	4
Mykytyn, Peter P.	University of Texas. U.S.A.	4
Perez, Victor L.	Universidad de Chile. Chile.	4
Saarinen, Timo	Helsinki School of Economics. Finland.	4
Shoval, Peretz	Ben Gurion University. Israel.	4
Snyder, Charles A.	Auburn University. U.S.A.	4
Watson, Hugh	The University of Georgia. U.S.A.	4
Yap, Chee Sing	National University of Singapore. Singapore.	4



FIGURE 1: THE MOST POPULAR RESEARCH TOPICS

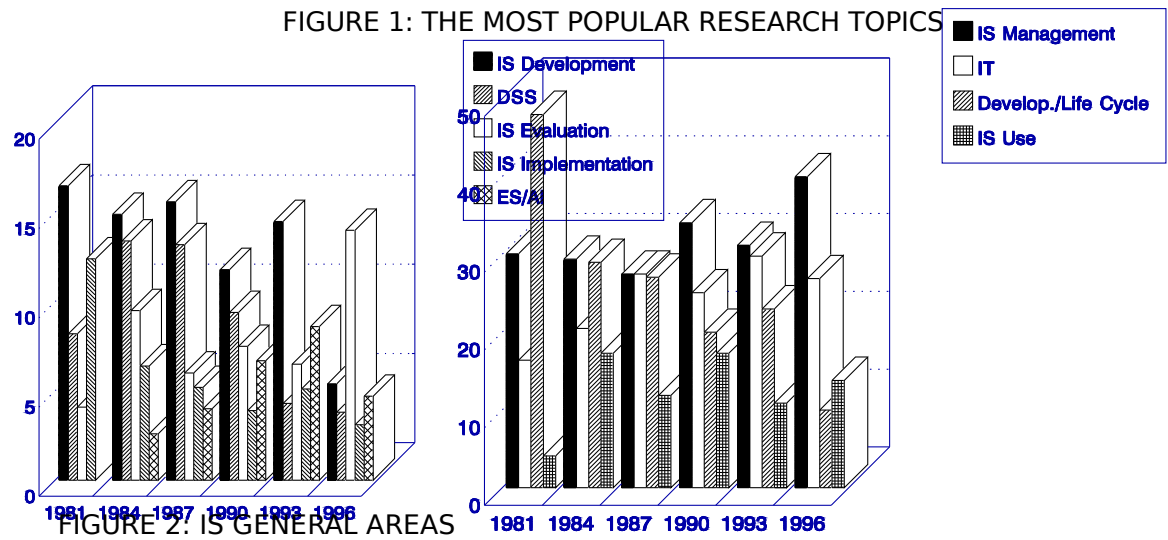


FIGURE 2: IS GENERAL AREAS