11 Research Design

11.1 Goals and research model

The main goals of the empirical study were two-fold:

- the investigation of the state of practice of the use of KMS in large German organizations,
- the investigation of concepts, scenarios and strategies for the management of KMS in organizations.

Figure C-2 shows how the empirical study is embedded into the research program on knowledge management (systems) directed by the author and, more specifically, into the research design of the research project "Knowledge management systems: concepts for the use in organizations" as described in detail in part A.

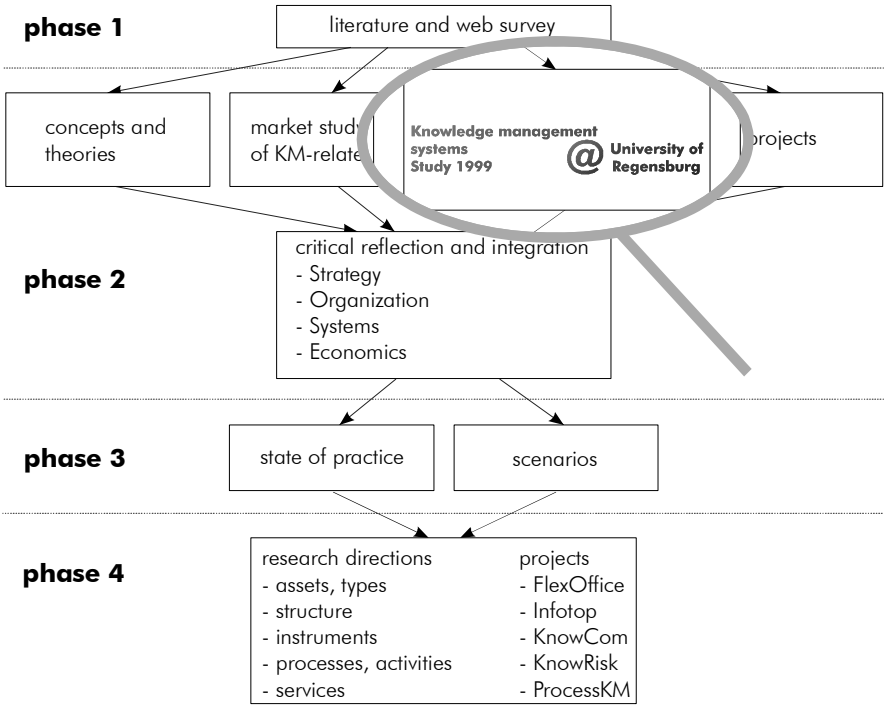

FIGURE C-2. Embedding of the empirical study in the general research design[7]

7. The figure shows the research design of the project "Knowledge management systems: concepts for the use in organizations"; see also Figure A-1 on page 11.

The research program consists of the four phases which are depicted in Figure C-2 and which have been described in detail in part A. The central activity of the second phase was the *empirical study* "Knowledge management systems 1999" which is reported here. The study was complemented by a number of knowledge management *projects*. Additionally, a *market study* on KMS and generally on ICT supporting KM was performed. These empirical and practical activities as well as numerous discussions in an interdisciplinary work group at the University of Regensburg and a knowledge community (AG Wissensmanagement)[8] influenced the qualitative interpretations that will be given in addition to the quantitative results obtained in the empirical study. The results will also be compared to results of other empirical studies[9]. Together, all these efforts provide the basis for an intense analysis of the state of practice of the use of KMS in organizations[10].

In the following, the focus will be on the empirical study[11]. Figure C-3 shows the research model which also guides the presentation of the findings in the following chapters.

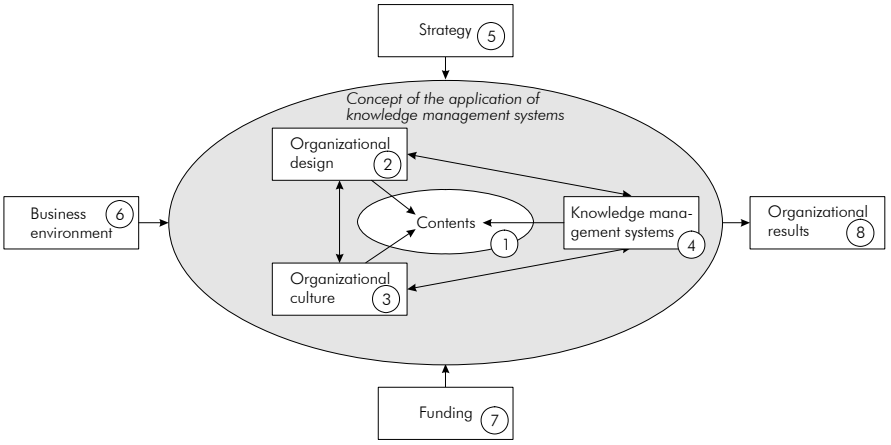

FIGURE C-3. Research model of the empirical study

The research model analyzes KMS supported knowledge management initiatives. The shaded ellipse visualizes the *concept of the application of KMS*. The concept comprises instruments applied to improve the handling of knowledge, the *contents (1)*. The contents consist of the knowledge of the members of the organi-

8. See also chapter 3 - "Procedure, Methods and Overview" on page 11.
9. For a characterization of these studies see chapter 10 - "Related Empirical Studies" on page 439.
10. The state of practice is summarized in chapter 16 - "Summary and Critical Reflection" on page 581.
11. The operational work of the empirical study was a joint effort with Oliver Klosa who used a portion of the data of the study in his work that concentrated exclusively on the two parts *knowledge management systems* and *contents*, Klosa 2001).

zation and of documented knowledge which can be paper-based and/or in electronic form. The contents can be structured according to an organization-wide knowledge structure.

The concept of the application of KMS influences how the organization deals with its content. The concept consists of the *organizational design* of KMS use *(2)*, e.g., the structuring of knowledge-related tasks and roles, the scope of the application of KMS, *the organizational culture (3)*, especially values, rules and norms concerning knowledge sharing and *knowledge management systems (4)*. The concept is the main unit of analysis in this study.

The KM initiative that implements this concept is managed by a KM unit which sets the KM *strategy (5)* and thus the goals for the concept of the application of KMS. The KM unit can be a separate organizational unit, a project or a committee that is responsible for the KM initiative. The concept is dependent on the organizational and *business environment (6)*, especially on structural and process organization, e.g., the degree of centralization, the size of the organization and the industry sector which the organization belongs to. The concept is also dependent on its *funding (7)* and will produce *organizational results (8)*, benefits of the concept, e.g., the achievement of business goals, an improved degree of organizational effectiveness or the achievement of KM goals, i.e., improvements in the management and handling of knowledge.

The eight parts of this model were studied in part B. Each part was described briefly followed by a list of variables assessing certain aspects of each part. The empirical results for the eight parts will be discussed in the following chapters. Table C-12 is meant to provide a quick finder for the theoretical and empirical sections that deal with the eight constructs of the research model.

TABLE C-12. Navigation aids for constructs in the research model

construct	theoretical sections	empirical sections
1. contents	7.2, p. 281ff	14.2, p. 532ff
2. organizational design	6.1, p. 158ff; 6.3, p. 207ff	13.1, p. 482ff
3. organizational culture	6.4, p. 221ff	13.2, p. 511ff
4. KMS	7, p. 273ff	14.1, p. 524ff; 14.3, p. 548ff
5. goals	5.2, p. 114ff	12.2, p. 471ff
6. business environment	-[a]	12.1, p. 468ff
7. funding	8.1, p. 397ff	15.1, p. 564ff
8. organizational results	8.2, p. 399ff; 8.3, p. 402ff; 8.4, p. 410ff	15.2, p. 568ff

a. The variables describing the business environment are a set of control variables (e.g., size, number of hierarchical levels, industry sector) that are not specific to knowledge management and can be found in many empirical studies. Therefore, they do not require a detailed discussion in the theoretical section.

11.2 Methods, procedure and sample

In the empirical study, the methods exploratory unstructured interview, questionnaire, telephone interview and structured personal interview were used. Figure C-4 shows how the empirical study proceeded and how it was embedded in the rest of the theoretical, empirical and practical activities of the research project. Concepts and theories, related empirical studies, the market study as well as the KM projects influenced the design of the empirical study. This is especially true for the questions selected, the structure of the interviews and questionnaires as well as the selection of the interviewees. The results of the study will be presented in the form of a description of the state of practice of knowledge management as well as scenarios of the application of KMS (see part D).

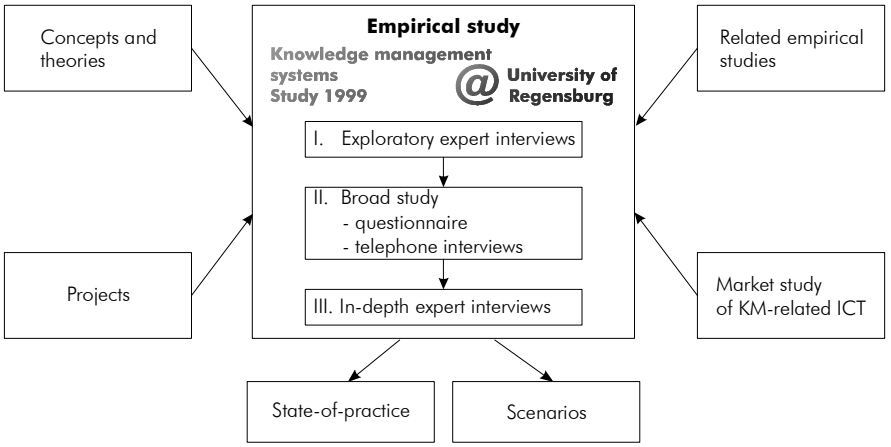

FIGURE C-4. Methods and procedure of the empirical study

The study consisted of the following three steps:

- *I: Exploratory unstructured expert interviews* were conducted with knowledge managers who claim that they already successfully apply knowledge management systems.
- *II: A broad study* was performed on the basis of a questionnaire and telephone interviews. The target group consisted of the 500 largest companies and the top 50 banking and insurance companies in German speaking countries which apply KMS and/or have a definite organizational design reflecting the application of the concept of organizational memory (e.g., a department, project or work group for knowledge management),
- *III: In-depth structured expert interviews* were performed with selected companies participating in step II to get detailed data on the use of KMS in these organizations (e.g., to identify success factors, pioneer solutions, particular organizational concepts).

The language used in the questionnaire is German. The questionnaire comprised 26 questions and was divided into three parts: (1) the organization, (2) organizational design of knowledge management, (3) Intranet, Groupware and knowledge management systems[12]. In the following, the management of the questionnaire is described in detail.

Selection of target organizations. First, the target organizations were selected with the help of the 1998/1999 edition of a yearly published list of the TOP 500 German companies and the TOP 50 banks and insurance companies (Schmacke 1998). The actuality of the data was confirmed prior to the study on the WWW. Some organizations had been acquired or merged with other organizations (e.g., Daimler and Chrysler). In other cases, the telephone calls revealed that there was only one mother company engaged in knowledge management for several daughter companies that were also listed in the TOP 500. Finally, there were 445 industrial and service companies and 59 banks and insurance companies in the sample. The telephone numbers of the (German) headquarters were checked on the WWW.

Identification of contact person within organization. Most questionnaires were sent directly to a contact person in a personalized way so that the questionnaire was not lost or misdirected within these large organizations. In order to identify the contact person, all organizations selected in step (1) were called by telephone to find out whether there was a chief knowledge officer, a knowledge manager, an organizational unit called "knowledge management" or a knowledge management project. If this was not the case, the organizations were asked for the person responsible for the organizational perspective of the organization's Intranet or Groupware system (not the system or network administrator!). If there was no such position or unit, most organizations directed the questionnaire to the CIO.

Pretest. The design of the questionnaire was tested with the help of four knowledge managers representing two organizations from the industry sector, one from the service sector and one professional services company which were all part of the sample. The design was substantially improved according to the terminology used and the format to reduce ambiguities.

Sending out the questionnaire. The questionnaire was sent out by normal mail as a DIN A4-sized letter including the questionnaire and a two-page description of the goals and the design of the research project. Three incentives were offered for the target group to participate in the study: one free copy of a research report of the Department for Management Information Systems III at the University of Regensburg of their choice, an exclusive report of the results of the empirical study and a surprise chocolate typical for Regensburg for all the respondents.

12. The questionnaire can be accessed at http://www-wi.uni-regensburg.de/~mar23522/.

Follow-up calls. There were four rounds of follow-up telephone calls in order to make sure that questionnaires had reached the right person and in order to motivate respondents to fill out the questionnaire. During these telephone calls, the goals of the study and the importance of their contribution were explained to contact persons in detail and assistance in filling out the questionnaire was given where necessary. An interesting side result of the follow-up rounds was that in a matter of a couple of months, about one in four persons had either left the respective organization or taken on a different position, or the organization was redesigned, acquired or merged so that the questionnaire had to be re-sent or faxed to somebody else in that organization in over 130 cases. In the final round of 243 telephone calls, a couple of general questions were asked about whether the contact persons were engaged in a knowledge management effort and whether they had an Intranet in place.

Statistical analysis. The following statistical methods were used: descriptive statistics, bivariate correlation analysis, regression testing and factor analysis. Reliability of statistical relations for support or rejection of hypothesis was tested using $\alpha \leq 0.05$ as the main threshold. Additionally, the exact level of significance will be given for each test reported in the study. In the case of correlation analyses, a Bonferroni type correction to the significance level was used in those cases where all entries in a correlation matrix were examined (for an application within the domain of MIS see Watson 1990; for a statistical discussion see Fahrmeir/Hamerle 1996, 92). For any significance level α, the significance level $\alpha_{corrected}$ for any entry in a n:m correlation matrix becomes:

$$\alpha_{corrected} = \frac{\alpha}{n \times m}$$

As the Bonferroni correction is a rather conservative correction (see Fahrmeir/Hamerle 1996, 92) and the area analyzed can be viewed as exploratory research, the significance level before correction is set to $\alpha \leq 0.10$ for these statistical tests. The Bonferroni correction was applied particularly in the correlation tests that involved the sets of business goals and knowledge goals[13]. The data was processed with the help of the analytical software system SPSS for Windows (version 10.0.7) which supports the statistical methods used in this study (see the list presented above, see also Backhaus et al. 1996, XXIIIff).

11.3 Hypotheses

In the following, the hypotheses tested are briefly summarized[14].

Hypothesis 1: The share of organizations with a KM initiative has increased compared to earlier studies

13. See section 15.2.4 - “Correlations with goals” on page 575.
14. The numbers of the hypotheses link them to the corresponding hypotheses in part B.

KM concepts, activities and instruments get more and more well known with organizations so that awareness of KM increases. Also, the need for a systematic management of the way an organization handles knowledge increases as the share of employees in the role of "knowledge workers" rises. At the same time, "good" or "best practices" of organizations successfully applying KM get published which might also motivate organizations to implement KM.

Hypothesis 2: Service organizations have a higher share of employees with access to KM-related systems than industry organizations

This hypothesis is based on the fact that the share of knowledge workers in service organizations is generally higher than in industry organizations. Also, on the whole, there are more non-routine business processes in service organizations than in industry organizations. This implies that if a service organization uses KM-related systems, the roll-out should be more comprehensive than in an industry organization.

Hypothesis 3: Knowledge management activities span business processes rather than focusing on exclusively one business process

Supposedly it is the information and knowledge flows between (knowledge-intensive) business processes that matter most for knowledge management. Thus, it is expected that the organizations support several if not all business processes rather than focusing on one single business process.

Hypothesis 4: Organizations with systematic knowledge management that has been established for at least one year are more likely to have installed KMS than organizations without systematic knowledge management

In the more recent approaches to knowledge management, most authors suggest to follow a holistic approach overcoming the distinction between human-oriented and technology-oriented knowledge management. Organizations with a formal KM initiative supposedly apply a more in-depth approach to knowledge management and thus should be more aware of the positive results that are expected from a joint application of organizational and ICT measures for KM. However, this might not be true for the first year of implementation as it takes some time until complex ICT is selected to support the initiative.

Hypothesis 5: Organizations converge in their use of ICT and increasingly use communication-oriented functions of knowledge management systems

This hypothesis is based on the suggested trend that organizations are transformed into communication-intensive organizations that are supported by corresponding ICT systems (Blackler 1995, 1030). In this case, this would mean a trend towards the use of more interactive KMS functions than in surveys preceding this empirical study.

Hypothesis 6: Compared to earlier studies significantly more organizations use ICT in general and knowledge management systems in particular to support their KM activities

The increasing amount of literature, Web portals, software and conferences on KM in general and KMS in particular suggests that KMS to support KM initiatives are on the rise. More and more vendors integrate KM functionality into their products or offer specialized KMS. Consequently, it is likely that the support of KM initiatives by information and communication technologies in organizations is on the rise as well.

Hypothesis 7: The majority of organizations strongly aim at more than half of the KM goals (>7 goals) at the same time

The relationships between KM goals and strategies (e.g., which ones are complementary and which ones contradict each other) were certainly not understood well, neither in theory, nor in practice, at the time of the empirical study. Thus, it is likely that organizations implement many KM activities at the same time hoping that some of them might trigger a substantial improvement of the way the organization handles knowledge.

Hypothesis 8: The more formal the organizational design of a knowledge management initiative, the higher are the expenses for knowledge management

It is expected that those organizations that institutionalize a separate organizational unit, staff it with more employees and also invest more in KM[15] than those organizations that set up a KM project or have an entirely decentralized, informal approach with no functional organization at all. The reasoning behind this hypothesis is that organizations that already have had a functional unit responsible for certain KM-related tasks such as information brokering preceding the KM unit, have already assigned employees to a unit and a defined budget and, thus do not have to assign new ones. Moreover, the installation of a separate organizational unit for KM shows compared to a project that this organization regards KM as a permanent task rather than a temporary one.

Hypothesis 9: Employees are more willing to share knowledge within than outside their work environment (group or team)

The "Not invented here" syndrome was frequently reported in the literature, meaning that individuals regularly show a negative attitude towards experiences made by individuals not known to them. This might also be reflected by a higher willingness to share knowledge within a work group or team than between groups and teams. Different teams or work groups might also often compete with each other. Communities might help to reduce these barriers between teams and work groups as common interests and thus an "experienced similarity" between members of the community might also lead to a higher willingness to exchange knowl-

15. Investment is measured in terms of non-salary expenses; see also section 8.1 - "Expenses and funding" on page 397.

edge. Additionally, it is also plausible that members of the organization have more opportunities to share knowledge within their traditional work environment than outside, say, privately or at company events and the like.

Hypothesis 10: The higher the share of newly recruited employees is, the more knowledge exchange is taking place outside traditional work environments

Newly recruited employees need to build social networks within the organization whereas employees who have been with the organization for longer already have had time to build enough social relationships. Newly recruited employees might be willing to devote more leisure time to their job engagements and eager to build social networks privately with colleagues. This is especially probable if newly recruited employees had to move prior to their new job engagement and thus had to leave parts of their social relationships. Additionally, a "generation factor" might also cause the effect that more exchange takes place outside traditional work environments. A large part of newly recruited employees might be within their first couple of years of work, young and childless which might once again positively affect motivation to meet with colleagues outside traditional work environments[16].

Hypothesis 11: A high share of employees leaving the organization negatively affects willingness to share knowledge between groups and teams

In organizations that lay off a large part of their employees, usually the atmosphere suffers. Those employees that have to leave might not be motivated to hand on their experiences. Those employees that remain in their jobs might fear to be replaceable if they share their knowledge. They might think that "knowledge is power" and sharing of that knowledge means to give up power. It is expected, however, that this behavior is most obvious between groups and teams where social relationships are traditionally lower than within these collectives. Within groups, employees might still be willing to share knowledge because the work group or team may offer a "social home" in times of unpleasant changes.

Hypothesis 12: In organizations with systematic knowledge management, willingness to share knowledge is improved

One of the first activities in most KM initiatives is to raise awareness throughout the organization about the potentials and benefits of sharing knowledge, to build trust between employees and to stress the importance of every employee's knowledge. Thus, these activities might already trigger a change of employees' attitudes towards knowledge sharing because they feel taken seriously (Hawthorne effect, see e.g., Schreyögg 1999, 45f) and because they want to share in the benefits of KM.

16. Recently, this effect has been repeatedly described in articles about start-up companies in the popular press (e.g. DER SPIEGEL). Start-up companies in many cases have been viewed by their employees (who are in their 20s and 30s) as a kind of "family" and boundaries between work and leisure time in many cases have become increasingly blurred.

Hypothesis 13: Organizations with systematic knowledge management target different contents than organizations without such an initiative

This hypothesis is tested to show that organizations with a systematic KM differ from organizations without KM with respect to contents handled in their KMS. In this case, a concentration on instruments, such as best practices, lessons learned or employee yellow pages is expected.

Hypothesis 14: If an organization allows private contents as part of their knowledge management systems, willingness to share knowledge is higher

Private contents were included in the list of items describing the contents of KMS because they supposedly are an indicator for alternative ways in which organizations handle knowledge. By allowing employees to publish private contents or to present themselves, organizations can show that they respect the individuals' off-the-job interests and networking needs. If organizations take these needs and interests seriously, it might in turn have a positive influence on the building of trust and as a consequence the willingness to share knowledge of their employees.

Hypothesis 15: Organizations with systematic KM handle a larger knowledge base than organizations without such an initiative

The volume of the knowledge base will be measured in terms of the number of knowledge elements and the amount of storage capacity used. Identification, providing access to and/or documentation of existing knowledge turned out to be among the first activities of KM projects in most organizations. The result of these activities should increase the amount of knowledge elements visible in organizations. These organizations should therefore use increased amounts of storage capacity for knowledge elements.

Hypothesis 16: Organizations with systematic KM handle a higher share of multimedia elements, contributions to newsgroups and data base elements in their KMS than organizations without such an initiative

Organizations with a systematic KM initiative might also include more differing types of media in their knowledge bases than organizations without one. These organizations should pay more attention to the activities identification of knowledge, providing access to knowledge and documentation of existing knowledge. The activities should lead to a greater variety of types of media used to represent knowledge elements.

Hypothesis 17: There are more organizations which apply a network structure to their knowledge areas than organizations with a hierarchical structure of knowledge areas

The hypertext is the single most important metaphor for organizing documents in an organizational Intranet or KMS. Navigation of hyperlinked documents has become a basic standard within an Intranet and KMS. The next step would then be to use the hypertext or network metaphor not only for navigation within docu-

ments, but also for the overall organization of knowledge areas. Thus, the network supposedly is the predominant principle applied to structure knowledge areas.

Hypothesis 18: Organizations with KMS have a larger number of KMS functions than organizations without KMS

It is supposed that organizations with a KMS solution (no matter whether bought on the market or developed internally) have implemented a larger number of KMS functions than organizations without a dedicated KMS solution.

Hypothesis 19: KMS functions in organizations with KMS bought on the market are more integrated than KMS functions in organizations without KMS

As KMS architectures strongly aim at an integration of existing data and knowledge sources, a positive correlation between the existence of KMS in organizations and the integration of KMS functions is expected.

Hypothesis 20: The majority of organizations apply organization-specific KMS developments or a combination of organization-specific developments and KMS tools rather than just KMS available on the market

Supposedly, most organizations had already installed a large number of application systems and ICT platforms that had provided (basic) functionality for knowledge management before they installed a formal KM initiative. Especially Intranet platforms form a substantial investment and many organizations might hesitate to invest heavily in an ICT platform yet another time as long as it is not clear which KMS vendors will survive the consolidation phase. KMS might also be viewed as important organizational assets that provide core competencies for the organization. Especially highly knowledge-intensive organizations might view the systematic handling of knowledge in general and their ICT systems supporting KM in particular as their core competence and fear that they might loose a strategic advantage if they implement a standard software solution available on the market. Thus, it is expected that most organizations that actually have implemented KMS solutions have combined several tools and implemented additional functions on their own rather than just buying specialized KMS software on the market.

Hypothesis 21: Organizations with KMS have a higher rate of KM activity than organizations without KMS

One of the most propagated benefits of the use of KMS is that it is a lot easier to publish documents or to share in an electronic discussion than before. Due to the integration between documentation, contextualization and communication, participants should be more motivated to directly or indirectly interact with each other. Rate of KM activity is defined as the number of active participants divided by the total number of participants[17].

17. See section 8.5 - “Résumé” on page 428.

Hypothesis 22: The more employees have access to Groupware and/or KMS, the more they are willing to share knowledge

The implementation of Groupware tools or KMS requires that the organization focuses more on the support of communication and collaboration between groups and teams than those organizations that do not have such tools or which apply them to a lesser extent. The higher the share of employees who can access these systems, the easier it is for these employees to exchange ideas within and between groups and teams and the more groups and teams are emphasized as the units holding documents and receiving messages. This heightened awareness, the increased ability to share knowledge, the higher visibility of groups and teams as well as the easing of knowledge-related tasks with respect to groups might support willingness to share knowledge.

Hypothesis 23: The more rigorously knowledge management is established in an organization, the more business goals are achieved in that organization

Rigor of the systematic establishment of knowledge management will be measured according to the investment in KM per participant. There were two measures for this: firstly, the ratio KM expenses divided by the number of participants and secondly the number of employees assigned to KM divided by the number of participants[18]. If KM instruments generally support the achievement of business goals, then the more organizations invest into that approach, the more they should benefit.

11.4 Respondents and response rate

As mentioned above 73 organizations responded. Table C-13 shows the sample, respondents and the *response rate*.

TABLE C-13. Sample, response and response rate

sample description	sample size	response	response rate
TOP 500 organizations	445	53	11.91
TOP 50 banks and insurance companies	59	20	33.90
total	504	73	14.48

The group of banks and insurance companies had a substantially higher response rate than the group of industry and service companies. One explanation might be that—on average—the IT function in banks and insurance companies in terms of number of employees is bigger and more centralized and thus it is easier (a) to determine a person suited to fill out the questionnaire and (b) for this person

18. See section 8.5 - “Résumé” on page 428.

to get the data needed to fill out the questionnaire than in the case of a decentralized IT. In the sample, the number of IT employees is significantly higher in the case of banks and insurance companies than in the case of industry and service companies (Spearman's rho: 0.279, significance: 0.027, n=63).

Respondents were asked about the *job position* they held. Out of the 71 answers 65 different terms describing the position were used showing the wide variety and the low degree of standardization of KM-related positions in today's organizations. Thus, the terms were classified according to the two dimensions "generic position" in the sense of a level of hierarchy (employee – manager – senior manager – executive) and "functional area". Table C-14 shows the distribution of generic positions that the respondents held. 52 out of 63 respondents (= 82.5%) answering this question held a managing position. The rest either were functional specialists, indicated in the table as "employee" (7 cases), or internal consultants of the organization (4 cases). As some respondents were more specific in their answers, department heads and heads of main departments/areas were separated from the group of senior managers and project managers were separated from (line) managers. The number of project managers filling out the questionnaire was quite low compared to the high figure of senior line managers which were in most cases CIOs or heads of the IT/organization department.

TABLE C-14. Generic position (level of hierarchy) which the respondents held

respondent's generic position	frequency	percent
senior manager	30	47.62
department head	8	12.70
manager	8	12.70
employee	7	11.11
internal consultant	4	6.35
head of main department/area	3	4.76
project manager	3	4.76
total	63	100.00

Table C-15 shows the *functional areas* which the respondents worked for. More than half of the respondents belonged to the IT area. One in five respondents held a job position in an organizational unit called knowledge management, document management or the Intranet area/internal communications. Of the 8 respondents specifically indicating a job position in knowledge management, three were on the senior manager level, two were project managers, one internal consultant and two held the position of a functional specialist. Examples for positions were "knowledge manager", "knowledge networking officer", "consultant knowledge processes" or "project manager knowledge management".

In some cases, the CIOs or heads of the IT/organization departments also coordinated the KM efforts so that the actual number of respondents who specifically worked (at least partially) for KM was higher. In the functional areas, most respondents' positions had to do with business development, organization or general management. As for the other functional areas one respondent working in the public relations department coordinated several organizational members who contributed to the questionnaire and one respondent belonged to the department "protection of the environment and security" and was supposedly also coordinating the KM activities of that organization.

Similarly, in the 2001 KPMG study 36% of the respondents stated that the IT area had *initiated KM* (KPMG 2001, 9, multiple responses possible). 19% said it was R&D, 18% marketing, 15% corporate organization and 13% sales and distribution and only 2% production. In the same 2001 KPMG study, IT (28%), the executive board (27%) and corporate organization (13%) were also found to be the primary units *coordinating the KM activities* (KPMG 2001, 12, multiple responses possible). HRM (10%) and marketing/communication (7%) were in charge in substantially less cases.

TABLE C-15. Functional area which the respondents worked for

respondent's functional area	frequency	percent	frequency total	percent total
knowledge management and related areas				
knowledge management	8	12.70		
document management	2	3.17		
Intranet/internal communications	2	3.17	**12**	**19.05**
general IT/organization				
chief information officer (CIO)	21	33.33		
head of an IT group/department/project	15	23.81	**36**	**57.14**
functional areas/departments				
business development	4	6.35		
organization/human resource management	3	4.76		
general management	3	4.76		
marketing/customer Service	2	3.17		
production	1	1.59		
other functional areas/departments	2	3.17	**15**	**23.81**
total			**63**	**100.00**

To sum up, knowledge management at this stage seems to be mostly dealt with in traditional IT/organization units or in management services units concerned with

business development or management of change. Most respondents held a position at the senior management level.

Table C-16 shows the distribution of responding organizations according to *industry sectors*. The three main sectors – industry, services and trade – are detailed for all those industry sectors which were represented by more than one organization. Industry on the one hand as well as services and trade on the other hand were each represented by approximately half of the responding organizations.

TABLE C-16. Group of respondents according to industry sector

sector	frequency	percent	frequency total	percent total
industry				
mechanical engineering	7	9.59		
electrical engineering/electronics	5	6.85		
chemical	4	5.48		
energy	4	5.48		
food	2	2.74		
health care	2	2.74		
automotive	2	2.74		
other industry	12	16.43	**38**	**52.05**
service				
financial services	12	16.44		
insurance	8	10.96		
IT/telecommunication	5	6.85		
other services	2	2.74	**27**	**36.99**
trade				
general trade	6	8.22		
trade association	2	2.74	**8**	**10.96**
total			**73**	**100.00**

In 22 out of 73 responding organizations (30.1%) *KM was well established* in the sense that they had already started (formal) knowledge management programs (Question: "Does your organization systematically apply knowledge management?"). A telephone survey was performed with 243 non-responding organizations in the sample in order to check this percentage. 17 out of 47 phoned persons (36.2%) willing to answer this question said they had a KM initiative in place, so that all in all 39 out of 120 respondents (= 32.5%) applied knowledge management.

The 1998 KPMG study reported 43% of organizations with a KM initiative in place (KPMG 1998, 6). However, only 26% of these were in the implementation

phase, whereas the others were investigating (19%), reviewing (23%), preparing (12%) or setting budget (7%) for this approach. 14% did not state in which phase they were (KPMG 1998, 12). Thus, the question asked in the 1998 KPMG study is less restrictive than the one in the study presented here. In order to compare the results, only those organizations have to be considered that were in the implementation phase. These were 11% of the organizations (0.43*0.26*100) which is significantly lower than the share of 30.1% found in the study presented here (t-test of mean differences: t-value: -3.539, significance: 0.001, n=73). In the 2001 KPMG study, 21% had an existing KM initiative and another 37% planned to introduce one (KPMG 2001, 8). As KPMG studied organizations of all sizes, the share of organizations with a KM initiative seems to be lower in smaller organizations.

Similarly, the share of 28% of organizations with KM activities as found in the 1997 survey of the Delphi group might be considerably lower when broken down into different phases (Delphi 1997, 16). Additionally, the Delphi study found an extremely high growth rate of this share with 50% of organizations either having established KM activities or planning to do so within the next year, 77% within the next two years and 93% within the next four years suggesting that (at least some form of) KM might soon be established in almost every organization (Delphi 1997, 16f). All in all, these results show a strong upward trend of KM from possibly around 7% of organizations in the implementation stage in the 1997 Delphi study via around 11% in the 1998 KPMG study to 30.1% in the study presented here. Thus, these results support Hypothesis 1: 'The share of organizations with a KM initiative has increased compared to earlier studies'.

11 respondents answered the question about when they had systematically established KM. 8 of these (= 72.7%) had started their programs within the last two years before the study was conducted (in 1998 or 1999). In many organizations there was a project group or a committee established which was responsible for a feasibility analysis of KM. The telephone survey supported these findings. In most organizations, knowledge management either was part of other initiatives (e.g., the introduction of Intranet solutions) which meant that there was not too much attention paid to knowledge management or there was a group of people who started knowledge management activities which could lead to formal projects in the future. Thus, it can be stated that knowledge management is a very young effort. Most organizations in German speaking countries were either still engaged in preparatory analysis or their efforts were in the first two years after introduction.

11.5 Résumé

In the following, the design and process of the empirical study is critically reflected. The following points were observed during the study:

"Questionnaire overload". It is fairly difficult to motivate experts to fill out questionnaires. In the telephone calls, interviewees frequently made comments such as "We get several questionnaires a week" or "There are three questionnaires about

knowledge management or a related topic on my desk". These days, there are empirical studies in abundance which can be divided into three groups:

Firstly, major professional services companies and (partly) state-funded research companies perform mostly pragmatic descriptive studies on topics that are "en vogue". These studies are usually highly visible to companies as they are advertised effectively and the results can be bought at high prices.

Secondly, master students from Universities and Universities of Applied Sciences (Fachhochschulen, a form of practice-oriented University in Germany) perform broad studies (in terms of target group) on narrow topics. The results of these studies usually do not gain high visibility. Their results can be bought in the form of a research report and they are hardly advertised.

The third category are serious attempts to test constructs by researchers from Universities and research institutes (researchers, Ph.D. students, professors). They usually deal with more complex phenomena resulting in more complex questions. Their results can be obtained for a comparably small fee in the form of journal articles or in the form of research reports which get medium visibility as compared to the two other types of studies.

For a potential respondent, it is not easy to judge whether the results will be useful for his or her work and even whether he or she will get any results as some authors do not hold their promises to provide their respondents with the results of their study. Thus, it is very hard these days to motivate experts to fill out a questionnaire. This is especially true for a "modern" topic where experts in organizations are addressed by a multitude of people from inside and outside their organizations. A lot of effort was put into finding the right person in the organizations of the target group and motivating them to fill out the questionnaire. An empirical study on the basis of a questionnaire is a very exhaustive and expensive effort these days. However, I still think that the results are worth the effort as questionnaires are about the only way to gain representative data.

"Emergent topic". Knowledge management in general and the use of KMS in particular were emergent fields at the time when this study was performed – and they still are. It was hard to find pioneering organizations and then to find those employees who had already gathered experience in this field. It was difficult to compare these pioneering activities with each other because the efforts were in most cases not separate KM projects, but activities that were parts of other projects. These projects were hard to identify.

Moreover, it was difficult to use the "right" terms in the sense that the experts in the target group would understand them as there was no broad agreement on these terms, neither in the language used in the academic literature nor in practitioners' language. This made the design of the study, the selection of the variables and the wording of the questions difficult. Certainly, this is a lot easier in more stable research fields where well-established theories and approaches exist, where terminology is more or less clear and where basic concepts are understood well in both, the academic and the business worlds. Examples are data base theory or data modeling. As the field develops very dynamically, results of such studies might just

prove "common understanding". Insights are most needed in those areas that are "under construction or development". So (immediate) usefulness of research results is traded in for stability of the theoretic foundations and understandability of the constructs. This trade-off has been addressed in the MIS community on-line on ISWORLD, at a multitude of conferences[19] and also in research journals[20] (e.g., in MISQ) in a much more generalized way under the headline "rigor versus relevance".

A good empirical study might be able to combine both, rigor and relevance. Secondly, it seems important to work in both, emergent and rather stable research fields. Emergent topics have to be addressed as the (IT) world develops very quickly and otherwise contact with what is happening in the organizations is lost, but existing and (seemingly) well-proven theories and approaches have to be questioned in order to gain further insights into the theoretical basis of the field. In my opinion, it is especially important to build on existing theories, to do cumulative empirical work. The attempt was made to build on existing constructs as much as possible. Thus, the empirical study is in many respects not exclusively addressing an emergent topic as it also deals with technologies and especially organizational issues that have been around for some time: Intranet technologies, Groupware systems, organizational questions how to handle the management of documents, cultural issues etc. The half-life of some of the insights gained might be short as the empirical basis of the study presented here – the organizations – is changing quickly. Other insights might prove more stable as the research field develops into a more mature stage. However, this is true for most of the topics in the field of MIS as even mature areas like data base design have changed dramatically during the last years[21].

The study addresses a dynamic topic which is currently in the middle of being shaped by a multitude of players. I hope that the insights gained in this study improve the understanding of this field and thus help to shape the next generation of knowledge management systems.

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19. Examples are on ICIS, the International Conference on Information Systems, on ECIS, the European Conference on Information Systems and on the German conference on MIS, WIRTSCHAFTSINFORMATIK.
20. Examples are the journal MISQ, Management Information Systems Quarterly, and the journal WIRTSCHAFTSINFORMATIK.
21. See section 4.1.2 - "From data to knowledge management" on page 39.