Modeling External Information Needs of Food Business Networks

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Abstract Awareness of threats and opportunities in the business and competitive environment is crucial for sustainable economic success of every company. It becomes even more important in the food sector where companies are parts of interdependent business networks. Scanning and monitoring the business environment for competitive intelligence has received a substantial push by the emergence of the Internet and the information provided there. Efficiency considerations favor joint, industry-wide market and competition monitoring systems for companies in food networks. Therefore, a crucial prerequisite is modeling the network's external information needs. Modeling external information needs of agrifood networks is difficult because not all areas of the business environment are equally relevant to all companies, and every company has its own and distinct perspective on it. This chapter presents a guideline for modeling the differentiated external information needs in food networks and their transfer to a monitoring system infrastructure. The guideline consists of two phases: organizing the tasks and activities to perform and results to obtain. The first phase regards the analysis and differentiation of the external information needs in the business network; the second phase deals with the transfer of the differentiated information need to the processes and structure of a supporting software system and includes the design of a categorization scheme and appropriate personalization filters.

1 Introduction

In times of globalization and increasing competitiveness, awareness of threats and opportunities in the business and competitive environment is crucial for sustainable economic success of every company. It becomes even more important in the food sector where companies are parts of interdependent business networks. Networks

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of companies are situations where companies are highly interdependent on one other [14, 21] and where awareness of developments of markets, products, business partners, and competitors becomes a crucial prerequisite for economic success for companies in networks in general (see [5]).

A prominent source for information about competition and markets is the vast number of distributed information sources provided through the Internet [1, 3, 4, 7, 15, 16]. However, a satisfactory and efficient use of these information sources for competition monitoring in food networks requires a focused, systematic, and automated scanning of their content and the linkage of scanning procedures and results with specific information needs of network companies. It is apparent that enterprises in food networks have, to some extent, comparable and analogous market-related information interests, equally relevant to all network companies. In this situation, feasibility and efficiency concerns ask for a monitoring system design where the scanning of the competitive environment builds on these analog information needs of the enterprises in the network. However, the needs of individual enterprises and their own and distinct perspectives on the respective external environment require a personalized, flexible, and specific information supply, which builds upon the individual perspective on the competition environment and easily adapts to changing situations.

Both the requirements for efficiency and individualization can be combined in dynamic and encompassing market and competition monitoring system applications for company networks where individualization and flexibility are provided through appropriate features for personalization and information filtering.

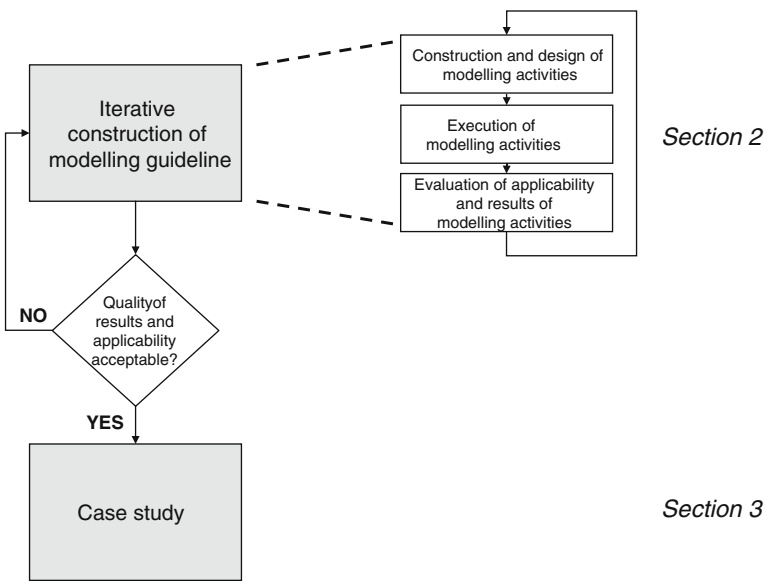

Fig. 1 Structure of the chapter

To facilitate personalization of the information for network firms, information requirements in the network need to be carefully analyzed to differentiate information needs common to the entire network from those specific to individual network firms. To successfully and systematically fulfill this task, a structured guideline for modeling the network's external information needs is required as a basis for the development of a monitoring system application.

However, existing literature does not provide a systematic guideline for this. It is the purpose of this chapter to present a guideline for modeling the external information needs of a business network to serve as a structured analysis and design guideline for the differentiation of external information needs in company networks and their transfer to an information system infrastructure. The chapter (Fig. 1) presents the modeling guideline resulting from an iterative construction process and its structure, activities, and methods to support the analysis and design (Section 2) and shows the results of its evaluation in a case study (Section 3).

2 Guideline for Modeling External Information Needs in Networks

An Internet-based market and competition monitoring system for food networks should automatically collect relevant information from Web sites offering high-quality information about trends and changes in the competitive and market environment. It should provide the information to network companies in a personalized way. In principle, Internet-based market and competition monitoring involves the process phases and process sequence shown in Fig. 2. This process is the operationalization of a conceptual framework integrating relevant knowledge bases and expertise from different scientific fields [8].

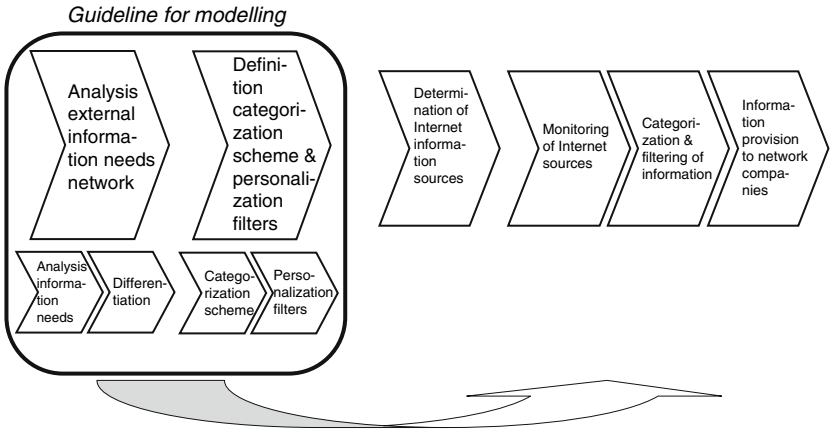

Fig. 2 Process phases for market and competition monitoring

The first two process phases regard the analysis of information needs in the network and the definition and design of a categorization scheme with personalization filters and represent the guideline presented in this paper. The outcome of the analysis and design activities of these process phases is a crucial input for the following phases; it decides on the quality of the information provision to network companies.

The guideline for modeling the external information need systematically structures analysis and design tasks in sequential process phases, links these tasks with suitable methods and tools, and defines results to acquire within each task [10, 18]. The construction of the guideline builds on the combination of available generic scientific expertise with complementary own developments for the particular situation in company networks. This development method is according to the principles of stepwise, cyclic system development [13]. In the following, the developed guideline for modeling the external information need and the underlying activities are presented with results of their application.

2.1 Analysis and Differentiation of the External Information Needs in Supply Networks

The first process phase of the guideline deals with the analysis and differentiation of external information needs in networks. The objective of this first phase is to analyze and map the external information needs of the network. The intended result is the representation of the differentiated information needs. An essential requirement in this phase is enabling the systematic differentiation of external information needs common to all network companies from external information needs specific to individual network firms. The first process phase consists of two subphases: organizing the tasks for analysis and differentiation of the external information needs in a network (Table 1).

2.1.1 Analysis Information Needs

The subphase for the analysis of external information needs considers the agglomerated information requirements of all network companies and takes

Table 1 First process phase with subphases for analysis and differentiation

Process Phase	Analysis External Information Needs Network	
Subphases	1. Analysis information needs	2. Differentiation information needs
Tasks and activities	Analysis of agglomerated external information needs in network.	Differentiation of map with agglomerated information needs according to network requirements.
Intended results	Hierarchical map of external information need with key topics, indicators, and required information.	Differentiation of external information needs in company network.

the perspective of the companies on their external environment. It can build on a well-established yet generic scientific basis. The critical success factors method defines an information need from companies' factors for success assessed in expert interviews and derives indicators for monitoring the current state of the success factors [22]; the five forces method assesses suppliers, buyers, rivalry among competitors, substitutes, and barriers to entry to analyze an industry [20]. This guideline for modeling the external information need integrates both approaches to facilitate an encompassing analysis of the external information need of networks, which complements specific information needs derived from the companies themselves with "ideal" forces for industry analysis. The intermittent analysis of companies' critical success factors allows for taking into account dynamically changing information needs of network companies.

Critical success factors analysis and the five forces indicate key topics in the company environment to be monitored such as, for example, competitors, distributors, suppliers, or product quality (see first column in Table 2). These key topics are the starting point for the construction of a hierarchical map of external

Table 2 Map of external information need for market monitoring in company networks

Key Topic	Indicators	Information Required
Access to distribution channels	Relation of used distribution channels to entire number	Market share of different distribution channels
	Contribution of own products to success of distribution partner	Turnover of own products
		Contribution of own products to earnings of distribution partner
		Image of own products
	Contribution of competitors' products to success of distribution partner	Turnover of competitors' products
		Contribution of competitors' products to earnings of distribution partner
		Image of competitors' products
	Personal relationships to distributors	Who in which position
Access to supply channels	Price developments input	Input prices
	Personal relationships to suppliers	Who in which position
	Economic situation of suppliers	Profit or losses of suppliers
		Expansion at suppliers
		Disinvestments of suppliers
Success of marketing measures	Change in consumers' product/image perception as opposed to competitor	Survey results product group
		Consumer opinions to product group
	Relation demands to product characteristics	Survey results product group
		Consumer opinions to product group

Table 2 (continued)

Key Topic	Indicators	Information Required
Strategies of competitors	Market segments where competitors are active	Product launches of competitors Product changes of competitors Crises of competitors' products
	Marketing campaigns of competitors	New marketing campaigns of competitors Number of advertisements of competitors Marketing funds of competitors
	Economic situation of competitors	Turnover of competitors' products Profit or losses of competitors Expansion at competitors Disinvestments at competitors
	Personnel changes at competitors	Changes of executives at competitors
	Changes in company organization at competitors	Form of company organization at competitors
	Changes in competitors' production methods	Kind of production method at competitors
General and sector economic development	General economic development	Figures on economic situation
	Buying power	Available net household income Inflation rate
	Economic development in sector	Turnover products Selling prices products
	Development sector and consumer politics	News sector politics News consumer politics
Quality of own products	Quality of supplies	Reports regarding suppliers' products
	Customer quality perception	Results from market research Customer opinion on product quality
	Conformity products – regulation	Changes in laws and regulations
Success of substitutes	Market segments where substitutes are active	Product launches of substitutes Product changes of substitutes Crises of substitutes
	Marketing campaigns substitutes	New marketing campaigns for substitutes Number of advertisements for substitutes Marketing funds substitutes
	Changes in production method substitutes	Kind of production method
"Breaking news" in sector	News related to sector in the daily news	Content of the news

information needs of the supply network in a stepwise and systematic analysis and derivation process. To build the hierarchical map, appropriate information indicators have to be derived for the key topics; information required to monitor the indicators has to be delineated. Table 2 shows the stepwise delineation and mapping of the external information need of network companies from key topics and indicators.

2.1.2 Information Needs Differentiation

The second subphase deals with the differentiation of the agglomerated external information needs in the company network. It leaves the perspective of companies on their external environment and takes the view on the network "from the top" to systematically distinguish where information required for monitoring the indicators is shared by all network companies and where specific, different information is required to monitor indicators. It is essential to differentiate, for example, that the very same information is needed to inform all network companies about the general market development, but that, for example, different information content is needed to inform network companies about their respective competitors even if all companies need to be informed about their competitors; whether a company in the network is a competitor for another company or, for example, a supplier or buyer depends on the respective position of the company in the supply network.

This differentiation of the information need is the decisive key prerequisite for the realization of a market monitoring system for supply networks. It defines the configuration of the subsequent monitoring activities and adapts the monitoring system to the situation and external information needs in the company network. It therefore ensures the supply of network firms with personalized information about their specific competitive environment.

The development of activities for the differentiation of the information need of network companies could not build on an established knowledge base. In a combination of a heuristic approach and logical reasoning, activities were developed for the differentiation between

- parts of the hierarchical information needs map where the very same information content fits for the entire network and
- parts of the information needs map where specific, different information content is required for vertical and horizontal groups of companies in the network (Fig. 3) [12, 17].

The tool developed for differentiation is a matrix system with checklists serving as analysis instruments and supporting the extraction and acquisition of expertise regarding the situation in a specific network. Both matrix system and checklists represent the decisive key to the modeling of the differentiated information need and therefore the development of a market monitoring system for company networks.

The matrix system (Fig. 4) serves as instrument for the analysis and mapping of the structure of the regarded company network. The analysis and mapping of

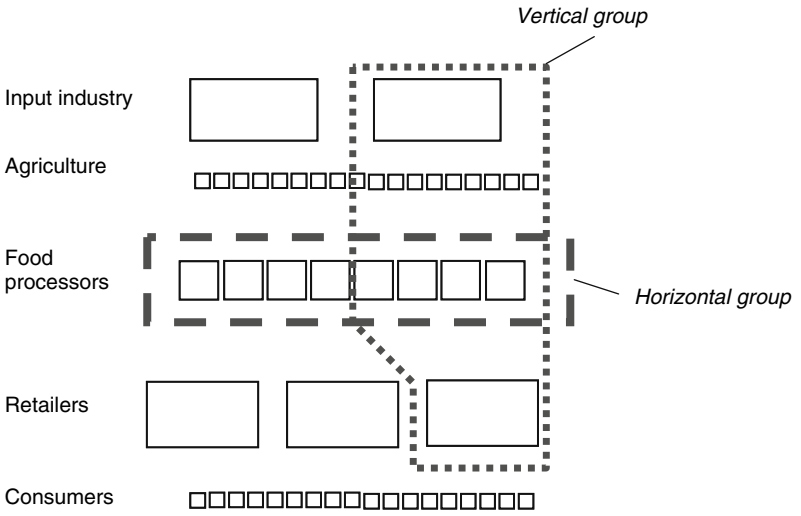

Fig. 3 Food production network with vertical and horizontal groups of companies

A	Company network
Chain levels	A

B	Company network
Chain level 1	B1
Chain level 2	B2
Chain level 3	B3

C	Sub-network 1	Sub-network 2	Sub-network 3
Chain levels	C1	C2	C3

D	Sub-network 1	Sub-network 2	Sub-network 3
Chain level 1	D1	D4	D7
Chain level 2	D2	D5	D8
Chain level 3	D3	D6	D9

E	Product group 1	Product group 2	Product group 3
Chain levels	E1	E2	E3

F	Product group 1	Product group 2	Product group 3
Chain level 1	F1	F4	F7
Chain level 2	F2	F5	F8
Chain level 3	F3	F6	F9

Fig. 4 Matrix system as tool for mapping the structure of a company network

the structure is necessary as a preparation for the modeling of the differentiated information need. To map the structure of the company network, the matrix system distinguishes

- The number and kind of horizontal chain levels;
- The number and kind of vertical subnetworks; and
- The number and kind of product groups as parts of the subnetworks.

Figure 4 shows the matrix system for a company network with three vertical and three horizontal segments and three product groups, respectively, with matrixes A, B, C, D, E, and F. Matrix A represents the entire network. The structure of this company network emerges from the subdivision of the network in different horizontal chain levels (B) and vertical subnetworks (C), and so forth. Matrix D shows the intersection of chain levels and subnetworks.

Once the structure of the network has been mapped in the matrix system, the hierarchical information needs map must be distributed across the appropriate matrixes in order to differentiate the external information need in the company network. This process is supported by checklists with guiding questions and selection criteria (Table 3). They are to be considered as "soft guidelines" supporting the extraction of expertise about the situation in a concrete supply network and show the way to modeling the differentiated external information need.

Table 3 Checklists for the differentiation of the external information need in company networks

Matrix	Objective of selection: all information need elements where the information *content*...	Guiding questions and selection criteria
A	...is equal and relevant for all companies in the network.	Information about economic situation, buying power, developments in politics relevant to the sector, "emergencies" in the sector
B	...is equal and relevant for all companies of a joint chain level.	Situation on the chain level: Different companies producing different product categories? Higher differentiation of the information needs regarding product-specific information required. Companies producing many product categories? Less differentiation of the information need required. Situation in the vertical chain: Different power allocation in the vertical chain and dependency on other chain level? Information about other chain level highly important! No dependencies? Information about this chain level less relevant. Otherwise: Information about competitors, customers/consumers.

Table 3 (continued)

C	. . .is equal and relevant for companies in a vertical subsector.	Information about developments specific to the subsector regarding the economic situation in the subsector, product quality in the subsector, legislation.
D	. . .is equal and relevant for companies in a joint intersection of subsector and chain level.	Information about development of input prices, suppliers.
E	. . .is equal and relevant for companies in a joint product group.	Information about product qualities.
F	. . .is equal and relevant for companies in a joint intersection of subsector and product group.	Situation on the chain level: Different companies producing different product categories? Higher differentiation of the information needs regarding product-specific information required. Companies producing many product categories? Less differentiation of the information need required. Situation in the vertical chain: Different power allocation in the vertical chain and dependency on other chain level? Information about other chain level highly important! No dependencies? Information about this chain level less relevant. Otherwise: Information about competitors, customers/consumers.

Figure 5 shows the application of matrix system and checklists for the differentiation of the external information need of companies in the food network across the matrixes mapping the structure of the network. The figure includes the indicators of the hierarchical information needs map (see Table 2). Their position in any one of the matrixes implies whether an indicator can be filled with the very same information contents for certain parts of the network or must be filled with different, specific information contents for other parts of the company network. For example, the results in matrix D show that the indicator "Price developments inputs" requires different information content for the subnetworks 1, 2, and 3 as inputs vary depending on the vertical production chain in the food network (milk, meat, or grain). The external information need of a particular company in the network is represented by the respective combination of matrixes and cells of matrixes according to the position of the company in the network.

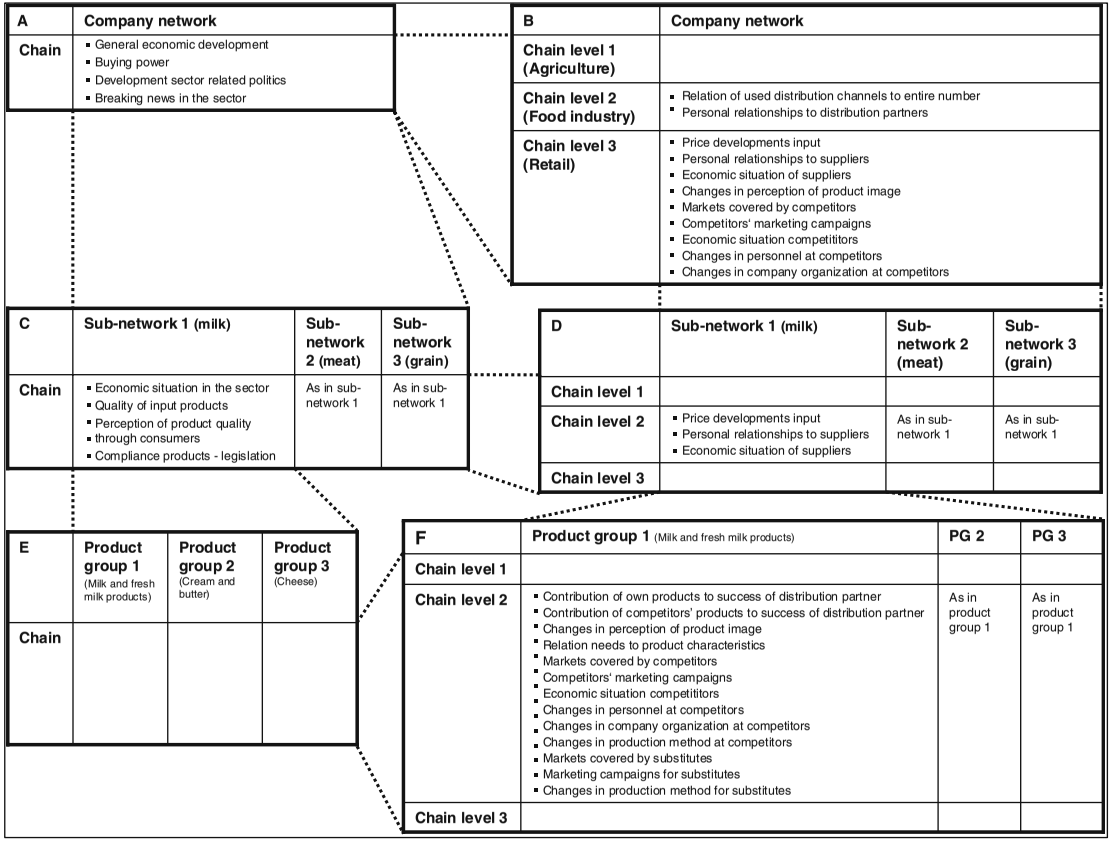

Fig. 5 Differentiated external information needs model for food networks

2.2 Categorization Scheme and Personalization Filters

The objective of this second phase of the guideline for modeling the external information need of a company network is to transfer the differentiated external information needs model of the company network to the structure and processes of software systems supporting the competition monitoring process. For the transfer, a categorization scheme for the organization of the information as well as information filters for the personalized access to the information must be derived and defined. This involves a shift from the analysis emphasis to a design emphasis.

This second phase combines the "user perspective" of the company network on the competitive environment with the "system perspective" regarding the information need to be satisfied from the system process logic and system demands. The second process phase consists of two subphases grouping the tasks for the design of the categorization scheme and the personalization filters (Table 4).

2.2.1 Categorization Scheme

It is the objective of this subphase to design a categorization scheme for the organization of the incoming information about developments in the network's market environment according to the information needs structure in the market monitoring information system. In principle, the design of a categorization scheme can build on the scientific basis of information retrieval [1]. Information retrieval develops and describes methods for the archiving and retrieval of documents. However, to meet the requirements of Internet-based competition monitoring for company networks, the guideline had to adapt the methods of information retrieval.

The guideline defines the following steps for the construction of a categorization scheme for market monitoring for company networks:

1. Design of the structure of the categorization scheme to be implemented in the software system;
2. Development of synonym lists defining the concepts of the branches of the categorization scheme to prepare automatic categorization of incoming information.

Table 4 Second process phase with subphases

Process Phase	Definition of Categorization Scheme and Personalization Filters	
Subphases	1. Design categorization scheme	2. Design personalization filters
Tasks and activities	Design of structure of categorization scheme and development of synonym lists	Extraction of individual user profiles and definition of search queries
Intended results	Categorization scheme for differentiated information needs in network and synonym modules	Personalization filters for individualized information provision

To define the structure of the categorization scheme, the guideline integrates the generic map of the information needs of the company network (see Table 2) with the results of the differentiation analysis for the particular network (see Fig. 5). Result of this integration is an enriched hierarchical structure of the differentiated external information needs in the network. As the differentiation requirements vary for different food networks, the hierarchic map depends on the situation in a concrete network and may not be defined universally.

Table 5 shows an example of the integration of the external information need model with the differentiation results. The third column is the key to the particular structure of the categorization scheme for a specific supply network as it combines the generic information needs model with the differentiation results and therefore defines the structure of the categorization scheme. The letters and numbers in the third column link the information needs model to the matrix system mapping the differentiated information needs.

For the development of synonym lists for the branches of the categorization scheme, the guideline for modeling the external information need of the network combines available thesauri with expertise on the situation of a specific company network. A thesaurus is a vocabulary collection covering and organizing the terminology of a field. The guideline foresees a three-step route with generic economic thesauri, sector-specific thesauri, and scenario-specific expertise leading to three separate modules of generic synonyms to be used in market monitoring in general, synonyms specific to the sector, in which a network operates, and synonyms particular to a specific network scenario.

An example for a thesaurus containing general economic terms is "OECD Macro-thesaurus"; examples for a thesaurus containing words for, for example, the food sector are "Agrovoc" or the "CAB Thesaurus." In addition to the terms to extract from thesauri, scenario-specific expertise is required to include, for example, brand or company names and persons' names relevant to the network in the respective branches of the categorization scheme. Table 6 shows the three synonym modules for the example of the food network.

Table 5 Example for categorization scheme

Key Information Topics	Indicators	Information Content to Differentiate For
Access to distribution channels	Relation of used distribution channels to entire number	B2
	Contribution of own products to success of distribution partner	F2 F5 F8
	Contribution of competitors' products to success of distribution partner	F2 F5 F8
	Personal relationships to distribution partners	B2

Table 6 Example of synonym modules

Key Information Topic	Indicator and Information Need For B2	Concepts	Modules		
			Generic Synonyms	Sector-Specific Synonyms	Scenario-Specific Synonyms(for Germany)
Access to distribution channels	Relation of used distribution channels to entire number; market share of food distribution channels	Distribution channel	Distribution partner, distribution system, marketing channel, chain of distribution, sales channel, retail, discounter, discount shop, wholesale trade	Food retailer, supermarket, grocery shop, grocery store	Markant, Metro, Edeka, Rewe, Aldi, Tengelmann, Spar, Lidl, Norma, Dohle Handelsgruppe, Lekkerland-Tobaccoland, Schwarz-Gruppe, Penny
		Market share	Market volume, market leader, market power	—	—

2.2.2 Personalization Filters

It is the objective of this subphase to superimpose the user perspective on the categorization scheme to realize the personalized information provision to network companies. This means that on the categorization scheme, which is the differentiated information need of the network "seen from above" and implemented in a software system structure, personalization filters realizing the "company perspective" for the different network companies on their competitive environment need to be imposed. The intended purpose of the personalization filters is to guide the incoming stream of information according to the information need of the individual network companies.

The design of the personalization filters could build on the knowledge from the research areas of information filtering and user modeling [6, 19, 11, 2, 23], which could be applied to the specific application scenario for the design of the personalization filters. The core of the fields of information filtering and user modeling is a user model representing a user's information need in the structures of an information system.

The categorization scheme containing the differentiated information need of the company network stands for the aggregation of the single user models of the companies in the network and contains their individual perspectives on their external environment. For the development of personalization filters for competition monitoring in networks, two tasks are defined:

- The extraction of the individual information needs of the network companies from the aggregated perspective; and
- The definition of search queries for the branches of the categorization scheme to represent the information need in the software system.

For the implementation of personalization filters, the single-user models need to be extracted from the aggregated categorization scheme according to the position of a company in the network and the respective relevant areas of the categorization scheme resulting from Fig. 5 and Table 5. The mode of functioning of the personalization filters is that for different companies only those areas of the categorization scheme relevant to them are visible and accessible resulting in an effective filtering of the information.

For the transfer of the users' information needs models of the food network to the system infrastructure of a market monitoring system, suitable search queries are required for every branch of the scheme. The queries can build on the synonym lists, which have been developed for the categorization scheme. Their definition depends on the specific rules and functionalities of the supporting technology tool working with, for example, free text search or search with Boolean operators such as AND or OR.

3 Evaluation of the Modeling Guideline

The evaluation of the guideline for modeling the external information needs of a business network has the objective to test its usefulness and applicability in the support of the analysis and differentiation of the external information needs in a

company network and the design of an appropriate information infrastructure [9]. The guideline is a complex combination of activities and tasks and combines generic knowledge bases of different scientific fields with specific developments for the acquisition of specific expert knowledge regarding the scenario of market and competition monitoring for company networks. This complexity of the guideline for modeling inhibits the exact determination and analysis of embedded cause-and-effect relationships. Certain specificities of the guideline reduce the complexity of the evaluation needs: The different process steps build on distinct knowledge bases and generate separate, specific results. Therefore, the evaluation can focus separately on the single process phases and their results. As the guideline is linked to various scientific areas, the evaluation can bypass basic elements of the process rules where logical reasoning and scientific knowledge convince without further testing. For the guideline, this argument can be accepted for the approaches selected for the analysis of the external information need of companies.

The iterative development of the guideline (see Fig. 1) building on the cyclic inclusion of experiences already made represents a first testing of the applicability of the model. In a second step, a case study for the company network producing dairy products was performed with a convincing version of the guideline for modeling the external information need of a company network in the food sector to test the appropriateness of the rules and methods embedded for the activities and tasks for identifying and differentiating the information need of a company network.

In the case study, the modeling rules of the guideline were activated and the related activities and tasks performed to analyze and differentiate the external information needs of the network and to design and transfer and implement the categorization scheme and personalization filters to the technological system infrastructure of CleverPath Portal, a suitable market monitoring software from Computer Associates. The successful process activation for the case study represents in itself a testing of the applicability of the rules embedded in the modeling guideline. On the basis of the information provided by the market monitoring software system, the quality and purposefulness of the guideline in terms of personalization of the information for different network companies was evaluated together with experts regarding the information need of dairy network companies. The evaluation showed that the application of the guideline for modeling the external information needs had led to a market monitoring system that facilitated the personalization of the external market and competitive information according to the demands of the network companies [8].

4 Conclusions

In times of globalization and increasing competition, awareness of developments in the competitive environment has become a crucial element for economic success. Networks of companies are situations where companies are highly interdependent

on one other and where awareness of developments of markets, products, business partners, and competitors is a crucial prerequisite for economic success for companies in networks in general. For market and competition monitoring systems that exploit economies of scale and build on joint monitoring activities for company networks, individualized information access needs to be supported through appropriate features for personalization and information filtering.

This chapter has presented a guideline for modeling the external information needs of a business network to serve as a structured analysis and design guideline for the analysis and differentiation of external information needs in company networks and their transfer to a monitoring system infrastructure. The guideline links suitable scientific research areas as generic knowledge bases with specific developments for the extraction of expertise on the situation in a company network. The modeling guideline was developed in an iterative process building on feedback loops and consists of two phases: organizing the tasks and activities to perform and results to obtain. The first phase regards the analysis and differentiation of the external information needs in the network; the second phase regards the transfer of the differentiated information need to the processes and structure of a supporting software system and includes the design of a categorization scheme and appropriate personalization filters. The guideline and the underlying activities were tested in a case study for the dairy network. The case study has shown that the modeling guideline supports the analysis and differentiation of the external information need in company networks in a purposeful way.

References

1. Baeza-Yates, R., Ribeiro-Neto, B. (1999). Modern Information Retrieval. ACM Press, New York.
2. Belkin, N, Croft, B. (1992). Information filtering and information retrieval: two sides of the same coin? Communications of the ACM 35 (12), 29–38.
3. Chen, H., Chau, M., Zeng, D. (2002). CI spider: A tool for competitive intelligence on the Web. Decision Support Systems 34: 1–17.
4. Choo, C.W., Detlor, B., Turnbull, D. (2000). Web Work. Information Seeking and Knowledge Work on the World Wide Web. Kluwer, Dordrecht.
5. Day, G.S., Schoemaker, P.J.H. (2005). Scanning the periphery. Harvard Business Review (November)11: 135–148.
6. Denning, P.J. (1982). Electronic junk. Communications of the ACM 25 (3): 163–165.
7. Desouza, K.C. (2001). Intelligent agents for competitive intelligence: survey of applications. Competitive Intelligence Review 12 (4): 57–63.
8. Fritz, M. (2005). Market and Competition Monitoring for Company Networks. New Potentials Through the Internet [in German]. DUV – Gabler, Wiesbaden.
9. Galliers, R.D. (1992). Choosing information system research approaches. Galliers, R.D. (ed.) Information System Research: Issues, Methods, and Practical Guidelines. Blackwell, Oxford: 144–162.
10. Glissmann, S., Smolnik, S., Schierholz, R., Kolbe, L., Brenner, W. (2005). Proposition of an m-business procedure model for the development of mobile user interfaces. Brookes,

W. Lawrence, E., Steele, R., Chang, E. (Eds.), Proceedings of the 4th International Conference on Mobile Business (mBusiness), Sydney, Australia, IEEE CS, pp. 308–314.
11. Hanani, U., Shapira, B., Shoval, P. (2001). Information filtering: overview of issues, research and systems. User Modeling and User-Adapted Interaction 11: 203–259.
12. Hausen, T., Fritz, M., Schiefer, G. (2006). Potential of electronic trading in complex supply chains: an experimental study. International Journal of Production Economics 104 (2): 580–597.
13. Heinrich, L.J. (2001). Wirtschaftsinformatik. Einführung und Grundlegung. 2nd edition. Oldenburg, München, Wein.
14. Lazzarini, S.G., Chaddad, F.R., Cook, M.L. (2001). Integrating supply chain and network analyses: the study of netchains. Journal on Chain and Network Science 1 (1): 7–22.
15. Liu, S. (1998). Business environment scanner for senior managers: Towards active executive support with intelligent agents. Expert Systems with Applications 15: 111–121.
16. McGoonagle, J.J., Vella, C.M. (1999). The Internet Age of Competitive Intelligence. Quorum, Westport.
17. Ménard, C., Klein, P.G. (2004). Organizational issues in the agrifood sector: toward a comparative approach. American Journal of Agricultural Economics 83 (3): 750–755.
18. Müller, G. (1981). Strategische Frühaufklärung. Ph.D. thesis, University of Munich, Munich.
19. Oard, D.W. (1997). The state of the art in text filtering. User Modeling and User-Adapted Interaction 7: 141–178.
20. Porter, M. (1980). Competitive strategy: Techniques for Analyzing Industries and Competitiors. The Free Press, New York.
21. Powell, W.W. (1990). Neither markets nor hierarchy. Network forms of organization. Research on Organisational Behaviour 12: 295–336.
22. Rockart, J.F. (1979). Chief executives define their own data needs. Harvard Business Review 58 (March-April): 81–93.
23. Stadnyk, I., Kass, R. (1992). Modeling users' interests in information filters. Communications of the ACM 35 (12): 49–50.