Learning During New Banking Service Development

A Communication Network Approach to Marketing Departments

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It has often been advocated that successful new service (product) development groups should bind into a cohesive unit, sharing a common direction and vision. This suggests close connections and communication between members of the department. The authors conducted two communication network studies to examine the impact of interpersonal communication (i.e., within team, cross team, and cross company) on market and technological learning during new financial service development within the marketing department of banks. They conclude that close cooperation, signified by a strong integration and a central position within the communication network, could be detrimental for learning activities. For service innovation management, the biggest challenge seems to be the preservation of heterogeneity and diversity among individuals and groups both within and across the marketing department to ensure learning. Both boundary-spanning communication and the presence of individuals within loosely coupled marketing networks seem effective communication conditions to obtain a rich learning environment.

The financial services industry has witnessed rapid changes during the past two decades. Traditional barriers between financial services like banking, insurance, and savings institutions have been eroded gradually as a result of deregulation and European Community (EC) provisions (which redraw the boundaries for European financial services), radical technological advances, new competitors, and more demanding customers (Bertrand 1991; Clarkson, Stone, and Steele 1990; de Brentani 1993; Drew 1994; Easingwood and Storey 1991). Innovation, therefore, has become a key asset in this increasingly competitive marketplace (Morone and Berg 1993).

To improve the effectiveness and efficiency of its retail and business services, the banking industry has developed many new services and information-technology-based systems (Donnelly 1976; Morone and Berg 1993). In addition to the creation of new market segments, information technology (IT) is seen as a major instrument in enhancing the productivity of financial services (Quinn and Baily 1994). Although early technological innovations within the banking industry were mainly centered on so-called back-office automation, new IT forms have much broader implications aiming to achieve specific strategic and marketing goals such as the creation of new products. ITs are an integral part of the so-called services technologies: "services technologies may appear on the level of systems interfaces to the outside world, at the integrated-operations or general management level, in incremental operations-productivity improvements, or as specialized

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equipment or software for specific service functions" (Quinn and Paquette 1990, p. 64). Thus, banks engage in "application engineering" or automation efforts of information processing tasks oriented toward cost reduction and new product development (Drew 1994; Morone and Berg 1993).

Indeed, financial services have absorbed a substantial percentage of the total revenue of the information industry during the past two decades (Pennings and Harianto 1992). Moreover, the increasing interorganizational links between the financial services sector and other sectors (e.g., telecommunication, transportation, computer industry) have enhanced their "absorptive capacity" (Cohen and Levinthal 1990) or ability to extract knowledge from other sectors.

In line with the information processing views of organizations, organizations may be considered as information systems (Daft and Weick 1984; Moorman 1995; Shivastrava 1983) and develop organizational knowledge (R. Duncan and Weiss 1979). Organizations need to learn continuously to keep up with the aforementioned technological, competitive, and customer trends. The transformation of this technological and market information into market-demanded outcomes is vital to the survival of these organizations (Barker and Martin 1998; Sinkula 1994). As a result, organizational learning is most critical during an organization's new product or service development process. Therefore, the innovation task can be considered as an organizational activity directed at the creation of a knowledge base so that the company can act on events and trends in present and prospective markets. Notwithstanding the importance of innovation for service-based companies, very little attention has been awarded to organizational learning during new service development. Therefore, in this article, we will focus on the following question: How do financial service organizations learn when trying to develop new services?

A crucial issue is how these developments should be regarded conceptually as well as managerially. Barker and Martin (1998) state, "learning organizations are characterized by knowledgeable, interdependent, human communication networks necessary to achieve the organization's fundamental mission, goals, and objectives" (p. 3). In line with this statement, we consider communication to be a major antecedent of organizational learning. We will examine the antecedent role of communication during banking innovation on two levels: (a) Where does a marketing department member get his or her information (i.e., the communication source: from within, across, or outside the marketing department)? and (b) How does the position of a marketing department member within the communication network affects his or her level of learning? Understanding the interconnected relations within the marketing department and among the marketing department and other departments is a key to the ability of management to design and implement effective communication programs. Indeed, effective communication will enhance learning within the marketing department:

> The marketing function has a key role to play in the creation of a learning organization. Because of its external focus, marketing is well positioned to appreciate the benefits of market-driven learning and be the lead advocate of the market oriented, entrepreneurial values that constitute the culture of the learning organization. (Slater and Narver 1995, p. 71)

Learning organizations lay at the heart of "market-orientation" (Slater and Narver 1995), or as Day (1994) stated, "market-driven organizations." Within this view, learning may very well be conceived as a distinctive capability in which the communication network constitutes one of the core competences facilitating the creation of knowledge. Therefore, organizations should develop and steer effective communication configurations (i.e., networks) that facilitate the development of knowledge that may become a basis for competitive advantage (Day 1994).

This article is structured as follows. First, a brief synthesis of the theoretical concepts related to learning and communication in the new service development process is offered. Subsequently, we report on the results of empirical studies conducted at two banks. We conclude with a number of theoretical and managerial implications. In doing so, we have used qualitative (i.e., two case studies) and quantitative (i.e., within-case network analyses) research designs in a complementary fashion. As a result, both deduction through literature analyses and induction through case study analyses have led to the development of our hypotheses. Moreover, combining both designs provided us with the opportunity to capture a more holistic interpretation of our studies.

THEORETICAL FRAMEWORK

Learning During Financial Service Development

In this article, we adopt the perspective of organizational learning as the development of a knowledge base (Shivastrava 1983). We perceive "knowledge" as the outcome of the organizational learning process (R. Duncan and Weiss 1979). The knowledge that is created is the result of a process involving the acquisition, the distribution, and the interpretation of information (Huber 1991; Davenport and Prusak 1998; Lant and Mezias 1992; Moorman 1995; Nevis, DiBella, and Gould 1995; Slater and Narver

1995). Organizational learning involves joint contributions of individuals toward organizational problems. An organization's ability to learn depends on the experience, ability, and actions of individuals (Agryris and Schön 1978; Helfat 1994; Kim 1993). Therefore, the acquisition, distribution, and interpretation of knowledge may be conceived as an iterative process occurring on the level of the individual within an organization. Thus, our focal unit of analysis is the individual. However, from a system's perspective, we need insight into the organizational knowledge-creating processes to explain the information-processing behavior at the individual level. Moreover, if we take the view that learning is a cumulative process, individual and organizational learning strongly overlap. Indeed, accumulated prior knowledge will enhance learning (Cohen and Levinthal 1990), and both individuals and the organization will "tap" knowledge from each other.

The created knowledge base will link action-outcome relationships and reduce the uncertainty linked to the innovation task. During this innovation process, project team members share information regarding (a) competitors and customers thereby enhancing their level of market learning and (b) technologies contributing to their level of technological learning. Indeed, these types of learning are the result of reducing uncertainties about user needs, technologies, and competition linked to the external environment (Souder and Moenaert 1992).

Communication as an Antecedent to Learning

As T. Duncan and Moriarty (1998) state, "Communication is the human activity that links people together and creates relationships. It is at the heart of meaning-making activities. . . . It serves as a way to develop, organize, and disseminate knowledge" (p. 2). Their definition clearly posits the relationship between communication and learning. Although we acknowledge that factors other than communication have an impact on learning, we examine communication as a major antecedent of organizational learning.

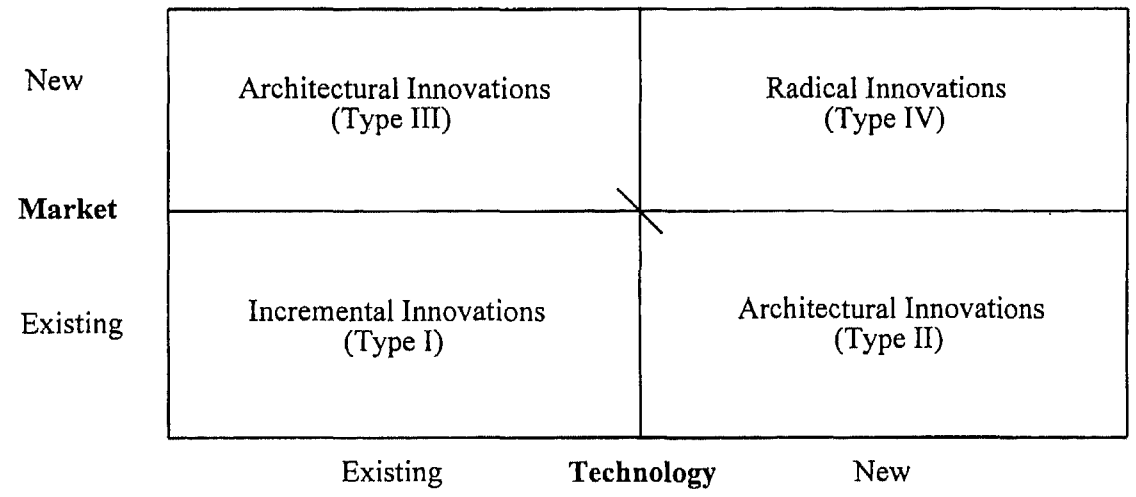
We will adopt the definition of communication provided by Rogers and Agarwala-Rogers (1976): " Communication is the process by which an idea is transferred from a source to a receiver with the intention of changing his or her behavior" (p. 9). Such behavioral effects may consist of changes in knowledge, changes in attitude, as well as changes in overt behavior (Rogers and Agarwala-Rogers 1976). We define effective communication as those changes in information receiver behavior that were intended by the information source (Rogers and Agarwala-Rogers 1976; Rogers and Shoemaker 1971). We conceptualize the marketing department within financial organizations as information-processing systems that have to attend to work-related uncertainty (i.e., the innovation task). Therefore, the intended change in receiver behavior in our study involves a cognitive change, that is, a change in knowledge. The latter refers to the development of a knowledge base on markets and technologies, that is, market learning and technological learning. Indeed, innovation team members, being part of the marketing department, may be viewed as pockets of knowledge (Souder and Moenaert 1992). Information exchange within such a team helps team members to tap these pockets of knowledge (i.e., within-team communication). However, innovative performance also will depend on information originating from outside the innovating unit. As a result, innovation team members also tap information originating from other departments (i.e., cross-team communication) as well as originating from outside the organization (i.e., cross-company communication). Effective communication (i.e., market and technological learning) will therefore be contingent on the type of communication flows: within team, cross team, or cross company.

Learning Environment and Communication Patterns: Development of Propositions

In developing our theoretical framework, we used Lynn's (1997) framework. The latter shows four different learning-type environments that require specific communication patterns for new product development to be successful. Each learning-type environment reflects the amount of market and technological uncertainty linked to the specific innovation task. Each learning environment provides a specific innovation platform and can be linked to the innovation typology provided by Henderson and Clark (1990). Figure 1 provides an overview of these learning environments with corresponding type of innovation.

Following the framework of Henderson and Clark (1990), we may state that the introduction of IT resulting in electronic-banking offerings represents a major radical innovation. Radical innovations have been defined as innovations based on a different set of engineering and scientific principles. Frequently, this means opening up whole new markets and potential applications (Henderson and Clark 1990, pp. 9-10). This type of innovation is what Lynn (1997, p. 11) classifies as new technologies for new markets (Type IV in Figure 1). These information technologies consequently have created a new dynamic and hence a new competitive reality for service innovations. The designs of new services are transformations of existing services and rely on combining traditional professional know how with IT-related knowledge.

FIGURE 1
Learning Environment and Type of Innovations Within a Banking Context



SOURCE: Adapted from Lynn (1997, p. 11). Adapted with permission.

Two types of innovations have emerged from these so-called radical IT innovations. On one hand, new banking products may represent style changes or minor product modifications not based on any underlying novel technology. These innovations partly involve so-called incremental innovations representing minor changes to the existing service. For example, many new financial services merely concern the application of new software thereby using the IT infrastructure already available within the firm (Drew 1994; Quinn and Baily 1994). Thus, these incremental innovations may involve new forms, administrative procedures, retrained service personnel, or a software enhancement. In line with this description, Lynn (1997) conceives these incremental innovations within the category of "existing markets/existing technologies" (Type I in Figure 1).

On the other hand, many service innovations largely fit within the typology of architectural innovations (Henderson and Clark 1990) and have been described as "the bundling or unbundling of existing service products" (Gadrey, Gallouj, and Weinstein 1995, p. 8). Architectural innovations represent a change in the way the components of the service are linked together without changing the core design concepts (Henderson and Clark 1990, p. 10). For financial service innovations, the components consist of steps in the production and delivery process of services supported by people and/or technology. The way in which these components are integrated into the organization may determine the architecture of the service (e.g., consider the recent introductions of home banking or office banking based on a different architecture of the traditional electronic banking for the customer). If this is the case, this type of innovation largely matches Lynn's (1997, p. 11) classification of new technologies for existing markets (Type II in Figure 1). Changing the components in service delivery and thereby creating new channels of distribution to reach new customers also may be considered as an architectural innovation and fit within Lynn's classification of existing technologies for new markets (Type III in Figure 1).

Case selection: assignment of marketing departments. Marketing directors were confronted with a description of Lynn's (1997) framework. During an in-depth discussion based on Figure 1, the location of the marketing department within one of the four cells was determined. In doing so, we were able to provide the marketing directors of two marketing departments that participated in our study innovations.

After presentation and discussion of this framework, marketing directors assigned their department in Type I (Bank A) and in Type II (Bank B). Bank A is a large, traditional bank offering a wide range of financial products. It can be considered the market leader in saving account products. Building further on that core competence, the bank had mainly been involved in the conception of incremental innovations (e.g., new saving formulas, packaging

of saving products with other financial products, etc.). The marketing director stated that innovation was not predominantly technological in nature. Moreover, it was brought to our attention that low market learning (competitors and customers) was expected due to the fact that the bank had had little experience in the business-to-business market. In line with this description, these incremental innovations fit within the category of "existing markets/existing technologies."

Bank B also may be considered as a large financial institution, offering the full range of financial products. In fact, the bank had built a reputation for banking innovations and is considered to be a technological pioneer in the Benelux Banking industry. A major emphasis has been put on the architectural innovations (e.g., consider the recent introductions of home banking or office banking based on a different architecture of the traditional electronic banking for the customer). During the past 10 years, since the introduction of self-banking, the strategic objective of this bank had been to introduce cheap and efficient distribution channels (for example, telephone/home and office banking). The marketing director of Bank B pointed to a relatively high level of technological learning (before measurement took place) due to the fact that service innovations strongly focused on information technologies. This increased the capacity to deliver services and enhanced cost efficiency. Moreover, excellent cooperation and involvement with affiliated companies had supported these technological innovations. Contrary to the marketing department of Bank A, the marketing director of Bank B also stated that the bank had been familiar with greater complexity and heterogeneity of the segments (i.e., business-to-business as well as retail). As a result, the marketing director assigned the department in the cell of new technologies for existing markets (Type II in Figure 1).

In the following two sections, we develop propositions in relation to various types of communication and communication network structures concerning organizational learning based on (a) literature review and (b) in-depth interviews with the marketing directors of both banks.

Within-team, cross-team, and cross-company communication. R&D communication studies have emphasized the importance of using particular information channels and information sources in the innovation process (e.g., Gerstberger and Allen 1968; Gerstenfeld and Berger 1980; Nilakanta and Scamell 1990). These studies have shown that R&D project performance strongly relates to internal sources and information sources outside the organization. Moreover, their relative effectiveness is contingent on the nature of the project task. In constructing our hypotheses, we will link the nature of the project (i.e., innovation) task to the effectiveness of within-team, cross-team, and cross-company communication.

The marketing director of Bank A pointed to the relatively recent existence of the marketing department. It was only in 1987 that the bank decided to integrate communication and product management. Prior to this date, the communication function was labeled "the propaganda service" of the bank. The limited marketing activities at that time were product oriented rather than customer oriented. The full integration of marketing activities, thereby adding price and distribution issues to the list, dates from early 1993. The marketing director indicated that due to the relatively recent nature of the marketing department, members strongly relied on each other for acquiring the necessary information. A relatively new department may mean more uncertainty. Thus, in a new department, members have frequent and extensive interactions to reduce this uncertainty (Daft and Lengel 1986; Weick 1969). As a result, marketing department members acquire information that is the direct result of the experience of other marketing department members and that of other individuals within the organization. In fact, learning by marketing department members is based on an existing knowledge base within the organization (Kogut and Zander 1992; Slater and Narver 1995). As a consequence, we expect marketing department members of Bank A, trying to develop new financial services using existing technologies for existing markets, to tap information that has been created within the marketing team. This concept has been called "combinative capability" (Kogut and Zander 1992) and refers to the importance of learning by building on knowledge that was developed in the past. Therefore, considering the type of learning environment, we assume that the marketing team of Bank A (Type I) will learn about the market (i.e., competitors and customers) and technologies mainly through within-team communication.

In the case of Bank B, team members are confronted with a more uncertain learning environment, as they will have to develop new technologies for existing markets. The marketing director of Bank B stressed the high level of perceived uncertainty by marketing department members. The technological environment is perceived as highly complex and heterogeneous. Thus, we expect the marketing department to be the organizational unit transferring useful marketing information concerning customers and competitors. However, novel information on technological applications is more likely to be transferred from outside the marketing team. Therefore, marketing department members of Bank B will have to focus on cross-company communication as well as cross-team communication with individuals outside the innovating unit to enhance technological learning (Lynn 1997). Literature on technological renewal has stated that the role of an effective communication interface between the different departments involved is essential (e.g., Moenaert and Souder 1996;

Souder 1987). de Brentani (1989) also identified inadequate internal communication as a major problem hindering the bank's new financial service development effort. In fact, she compared this situation with the communication gap that has been experienced by manufacturing firms between marketing and R&D: "Service firms also have difficulties getting their technical and systems people (e.g., computer experts, process specialists) and their marketing personnel (e.g., frontline or services concept specialists) to effectively combine their respective points of view and proficiencies" (p. 250). Taking into account the type of learning environment, we assume team members within Bank B (Type II) to learn mainly about technologies through cross-team and cross-company communication. Market learning is still mainly based on within-team communication as the learning environment involves an existing customer base. Hence, we may postulate the following proposition:

Proposition 1: (a) Market learning about customers and competitors and technological learning will be positively related to within-team communication of Bank A. (b) Technological learning will be positively related to cross-team and cross-company communication, whereas market learning will be positively related to within-team communication within Bank B.

Communication network structure. We assume that individuals who learn have systematically different communication patterns than those who do not. In addition, for both banks, we examine how the characteristics of an individual's personal communication network influence learning. We provide insight into the question, "How do the communication interrelationships of individuals affect an individual's ability to learn?" As we conceive every marketing department (or team) to be a separate communication network, this analysis is limited to the level of within-team communication. Therefore, we follow our first proposition, contingent on the type of learning environment, and only consider the type of learning linked to within-team communication.

The level of individual integration. First, we assess the level of individual integration. This communication network variable has substantial meaning when examining the level of market and technological learning as it reflects the heterogeneity in information exchange. Individual integration has been defined as "the degree to which members of an individual's personal communication network are linked to each other" (Rogers and Kincaid 1981, p. 179). The more individuals who interact with one another differ on certain attributes, the greater the informational strength of communication and, therefore, the more likely learning will occur. This is the typical situation for weakly integrated personal networks (Granovetter 1973). As a result, the degree of individual integration is inversely related to the potential of information exchange, hence the level of market and technological learning. Stated differently, lower levels of integration imply wider and richer information flows as the individuals who interact with one another have more heterogeneous backgrounds. Johnson Brown and Reingen (1987) also have adopted this reasoning in developing hypotheses relating to word-of-mouth (WOM) referral behavior as they expected weak ties for the WOM referral flow of information to be more heterogeneous than strong ties. Also, in studying the strength of social ties in creating shared beliefs, Sirsi, Ward, and Reingen (1996) state that people who are densely tied in their network not only possess similar information resulting from their interactions but also are more likely to interpret the information in the same way. However, in the case of new service development, the diversity in information is essential for the creation of a knowledge base, for idea generation, and problem solving throughout the project life cycle (Nonaka 1988). Cohen and Levinthal (1990) argue that "interactions across individuals who each possess diverse and different knowledge structures will augment the organization's capacity for making novel linkages and associations—innovating—beyond what any individual can achieve" (p. 133). Too much integration or coherence within product development teams enhances conformity, thereby hindering the flow of a wide range of information and ideas (Janis 1973; Leonard-Barton 1995; Macdonald 1998). We can deduce the following proposition:

Proposition 2: (a) The level of market learning and technological learning will be negatively related to the level of individual integration of marketing team members within Bank A. (b) The level of market learning will be negatively related to the level of individual integration of marketing team members within Bank B.

The level of individual connectedness. Second, we assess individual connectedness or the degree to which an individual is linked to other individuals within his or her network (Rogers and Kincaid 1981, p. 178). The better an individual is connected to the other actors within the department, the more his or her personal communication network will increase in terms of the number of personal interactions. This concept is related to the concept of centrality in network theory (Scott 1991) reflecting the number of interactions within an individual's network, thereby assuring the accessibility of information within the network. Results from prior research may guide our insight in developing the appropriate proposition. The current study focuses on individual communication networks,

whereas most R&D communication network studies have examined patterns of the level of the project group (e.g., R. Katz and Allen 1982; Taylor and Utterback 1975; Tushman 1979c). Thus, differences in the unit of analysis make direct comparisons difficult. Notwithstanding these differences, these studies may add to our insight and understanding. Decentralized communication networks have been found in research groups dealing with more complex and uncertain tasks, whereas an opposite pattern emerged if research groups faced less work-related uncertainty (Tushman 1979a; Tushman and Katz 1980). For instance, Connolly (1975, p. 50) also examined the relationship between the degree of centralization of communication nets and uncertainty in R&D planning and the nature of the work. His findings indicated a lower level of perceived uncertainty and more centralized communication nets as the nature of the planned work became more applied. Therefore, technological learning may represent more uncertainty. A decentralized communication network would be more suitable for technological learning to happen, whereas market learning would require more centralized communication networks. As a result, this would imply that marketing department members need lower levels of individual connectedness for technological learning to occur, compared to market learning concerning customers and competitors. We can formulate the following proposition:

Proposition 3: (a) Market learning about customers and competition is positively related to the degree of individual connectedness of marketers within Bank A, whereas technological learning will be negatively related to the connectedness of marketing team members. (b) Technological learning will be negatively related to the degree of individual connectedness of marketing team members within Bank B.

In Figure 2, we provide an overview of our theoretical framework including the innovation context, the communication patterns, and types of learning. In the next section, we report on the network studies designed to test the aforementioned hypotheses.

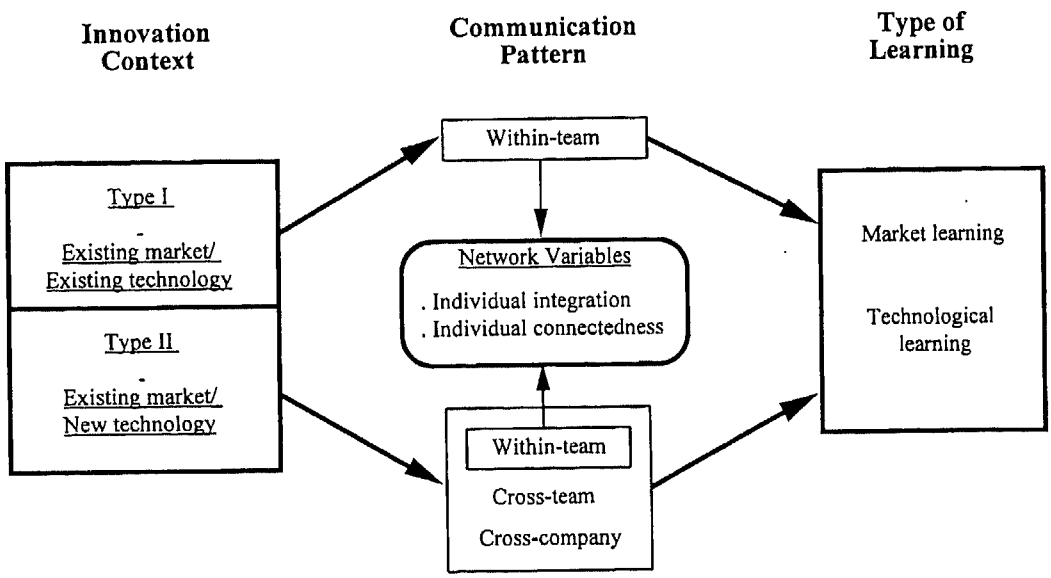
RESEARCH DESIGN

Communication Network Studies

We have adopted a communication network design to analyze the effect of interpersonal communication on learning by individuals within two financial service marketing departments. "Network analysis is a method of research for identifying the communication structure in a system, in which sociometric data about communication flows or patterns are analyzed by utilizing interpersonal relationships as the units of analysis" (Rogers and Agarwala-Rogers 1976, pp. 110, 123). Network analysis as a method to study social structure has its roots in sociology, anthropology, and role theory (Araujo and Easton 1996; Galaskiewicz and Wasserman 1993; Iacobucci 1996; Rogers and Kincaid 1981; Tichy and Fombrun 1979; Tichy, Tushman, and Fombrun 1979). Arabie and Wind (1994) rightly stated that before the 1990s, the academic, business, and marketing literature paid little attention to social network analysis. Since the leading article of Iacobucci and Hopkins (1992), "Modeling Dyadic Interactions and Networks in Marketing," contributions gradually emerge from different marketing areas. From a consumer behavior perspective, interpersonal communication and the social context of individuals has favored the use of network analysis in understanding WOM processes (Frenzen and Nakamoto 1993; Johnson Brown and Reingen 1987) and their role in a service marketing referral network (Reingen and Kernan 1986). Moreover, network analysis has been used to understand the relationship between the types of social relations (Reingen et al. 1984), cognitive structure (i.e., a network of associations among concepts in a consumer's mind), and brand choice behavior (Marcati 1996; Ward and Reingen 1990, 1996). Finally, social structure has been used as a paradigm to study the concept of market embeddedness and its impact on purchasing behavior (Frenzen and Davis 1990). The latter strongly suggests network analysis, and tie strength in particular, to be a useful tool for market segmentation purposes (Arabie and Wind 1994). From a relationship marketing perspective, researchers have used the network paradigm within a business-to-business environment to study (a) dyadic business relationships (Anderson, Hakansson, and Johanson 1994; Thorelli 1986) and (b) the creation of value-added networks (Anderson and Narus 1999; Campbell and Wilson 1996). Iacobucci and Ostrom (1996) have investigated to what extent applied knowledge about interpersonal relationships may provide insight into the structure and nature of commercial dyads in business marketing, services, and consumer marketing (see also Iacobucci and Zerrillo 1996 and Iacobucci 1998).

By adopting a communication network approach, we offer a dynamic perspective when addressing our research problem as we pay attention to the social dynamics that exist within organizational units (Barley 1990). Communication within organizations as well as learning by individuals in a financial service marketing department can be conceived as a process. Therefore, network analysis is well suited to study this phenomenon.

FIGURE 2
Theoretical Framework



Sampling and Surveying

We decided to determine the boundaries of the marketing network to avoid distortion of the network members in a system. Defining a network too broadly for the current research problem may trigger nonresponse. Missing data represent a serious problem in network analysis, because holes in the who-to-whom matrix may substantially distort the derived communication structure of the system (Ibarra 1993; Rogers and Kincaid 1981; Stork and Richards 1992). We defined the boundaries as follows: We selected the actors within the marketing department on the basis of (a) nominations by the marketing director and (b) formal job descriptions. Actors were sampled based on their professionalism and substantial contribution during the innovation process of new financial services. Personnel conducting purely administrative tasks and providing merely administrative support during the innovation process were not included (e.g., a secretary may substantially contribute but is not considered a professional).

This resulted in samples of respectively 42 (out of 100 full-time employees for Bank A) and 37 (out of 56 full-time employees for Bank B) individuals. Thus, in the case of a bounded system, a high response rate is a conditio sine qua non. The response rate was 100% for Department B, and 97.6% of the network population responded in Department A (i.e., 1 department member did not respond). As the data were reciprocal and undirected, we have reconstructed the personal communication network of the nonrespondent, based on the other actors' communication scores with the nonrespondent (Stork and Richards 1992). We applied several strategies to elicit a maximum response rate and reduce potential measurement error:

1. Respondent fatigue was minimized by providing a grid with names on which respondents had to report their communication frequency. On average, respondents needed 10 minutes to complete the questionnaire.
2. All measures involved simple rating and Likert-type scales.
3. Anonymity and confidentiality were ensured.
4. An agreement was established with each bank separately to provide feedback on study results.
5. The accompanying letter underlined the benefits marketing department members would experience when participating in the study.

Following this network definition, we conducted a sociometric survey providing the sample of individuals a structured questionnaire in which they were asked to report on the frequency of within-team, cross-team, and cross-company communication. Communication frequency was assessed on a 5-point scale (5 = "I talk with that person more than once a day," 4 = "I talk with that person more than once a week," 3 = "I talk with that person more than once a month," 2 = "I talk to that person at least once every 3 months," 1 = "I never talk with that person/that person is

TABLE 1
Construct Validity of the Learning Constructs

Learning Constructs	*Cronbach α Department A*	*Cronbach α Department B*	*Cronbach α Departments A and B*
Learning about competitors	.51	.84	.85
Learning about customers	.86	.91	.92
Learning about technologies	.76	.88	.87

NOTE: The reliability analysis comprises 41 ratings ($N = 41$) in Department A and 37 ratings in Department B. The overall reliability coefficient was calculated on all ratings of both marketing departments (total $N = 78$).

unknown to me"). In Appendix A, we provide an overview of these questions/scales.

Following the sociometric survey (i.e., our quantitative research design), we organized feedback sessions (i.e., part of the qualitative research design) with the marketing directors of both banks to obtain a more holistic interpretation of our findings.

Development of Measures and Measurement Instrument

Self-report measures were included on market learning (i.e., about customers and competitors) and technological learning. Appendix B provides an overview of the sample items of the questions and scales. We developed multiple-item scales and assessed the internal consistency through the calculation of Cronbach α (Churchill 1979; Peter and Churchill 1986). Cronbach α has been assessed on an aggregate level as well as for each marketing department separately. All measures show acceptable to high reliability estimates (Nunnally and Bernstein 1994). An overview of the reliability estimates is given in Table 1.

All learning measures show good to high reliability estimates (Nunnally and Bernstein 1994), except for the level of competitive learning in Bank A. One possible explanation emanated from the debriefing sessions with the marketing director of Bank A. This bank used to be a state-owned bank, in which product orientation has long dominated banking operations. Thus, the actual marketing department and the sampled network are relatively young. As a result, information retrieval from and dissemination among network members is still an ongoing process that involves important cultural changes imposed by recent changes of the financial institution as a whole. This might explain perceived differences in the members' ability to learn about competitors.

The sociometric measures were defined following Scott's (1991) operationalization. This operationalization of individual integration boils down to the concept of density defined as "the number of lines in a graph, expressed as a proportion of the maximum possible number of lines" (Scott 1991, p. 74). Thus, individual integration can be defined as the proportion of an actor's extant ties. Individual connectedness was operationalized as the number of members to which a member is adjacent. The degree of connection (point degree) is calculated by the number of nonzero entries for that individual in its row or column entry in the adjacency matrix (Scott 1991).

DATA ANALYSES

Preparing for Data Analyses

In terms of network structure, three levels of analysis are proposed within the literature (Rogers and Agarwala-Rogers 1976; Rogers and Kincaid 1981; Tichy and Fombrun 1979): (a) the individual level, (b) group level, and (c) system level. We will concentrate our unit of analysis on the egocentric level, that is, the individual level (Knoke and Kuklinski 1982). Thus, if our sample size for Bank A consisted of 41 persons, we have 41 units of analysis at the egocentric level.

The data gathered by the sociometric questionnaires involve valued, undirected relational data (Scott 1991). To calculate individual integration and individual connectedness, these valued data were converted into binary data after we symmetrized the relations within the communication networks using the average value algorithm (i.e., the average value of the column value and row value for an individual: $D(i,j) = (D(i,j) + D(j,i))/2$). Matrix correlation of the original communication matrix and its transpose produced the coefficient of identity for each department (.85 for Department A, .87 for Department B). This measure indicates a high degree of identity between the original matrix and its transpose (Zegers and ten Berge 1985) and provides a rationale for symmetrizing the communication matrices.

In view of the network boundaries and the average communication within each department, we assumed that weekly communication would be a significant cutoff value. A cutoff value of 4 was chosen (weekly communication) for departments A and B. Each communication matrix was subsequently dichotomized replacing values less than 4 (weekly communication) by 0 and values of 4 and higher by 1. For every network actor, his or her personal

communication matrix was extracted from the dichotomized communication matrix. Using the centralization-command within UCINET, the density of the created submatrix was calculated, indicating the level of individual integration of the individual's personal communication network. Thus, starting from the personal communication network of an individual, we calculate the number of links among the members and divide it by the total number of possible links. Because our data are binary, the degree is the column or row sum for a focal individual. Moreover, because our data have been symmetrized, no differences occur between row and columns entries. Point degree can be regarded as a measure of local centrality and is provided for all network members within UCINET through the centralization option on the dichotomized communication matrix. Diagonal values were not included in the analyses. Off-diagonal average communication was inversely related to network size. On a 5-point scale, the network values calculated by UCINET-statistics (sociometric analysis package) are 2.87 for Department A and 3.32 for Department B. After derivation of the network variables within UCINET IV, they have been imported into an SPSS-file for further analyses with the learning constructs.

Data Screening

Prior to the data analysis, all variables were carefully screened to check the assumptions of normality, linearity, independence, and homogeneity of variance (Tabachnick and Fidell 1989). Through the inspection of the standardized scores (measures with a z score in excess of ± 3.16) and normal probability plots, univariate outliers were identified among the continuous variables. Considering the relatively small sample size, we decided not to delete these cases but to reduce their influence by assigning them a value that was one unit larger (or one unit smaller) than the next extreme score in the distribution that was not an outlier (Tabachnick and Fidell 1989, p. 70). The hypotheses that were formulated on the role of interpersonal communication on the level of innovative learning by marketers are directional hypotheses. The α level is consequently one-tailed and was set at .10 considering the moderate size of our samples under study (Department A: 41 individuals, Department B: 37 individuals). Testing of the propostitional framework is based on bivariate correlational analyses.

INTERPRETING THE RESULTS

In this section, we discuss and interpret our results based on (a) feedback sessions with the participating banks and (b) the existing literature base.

Types of Communication

Table 2 shows the Pearson zero-order correlation coefficients between the learning constructs (i.e., market learning and technological learning) and the communication variables: within-team, cross-team, and cross-company communication. Proposition 1(a) is partly supported. The level of within-team communication in Bank A relates positively to the level of market learning about competitors ($r = .29, p < .05$) and customers ($r = .30, p < .05$). However, no support was found for the relationship between technological learning and within-team communication within Bank A. The correlation coefficient ($r = -.18$), although not significant, has a negative sign. This indicates that within-team communication may not be effective in fostering technological learning. Considering the recent existence of the department and the relatively lower uncertainty perceived within the market and technological environment, we assumed marketing department members to mostly restrict their communication patterns within the department both for acquiring market knowledge and technological knowledge. Following our results, the latter does not seem to be the case when project team members are dealing with technological issues related to the innovation project. Our data do not show a significant relationship with either cross-team or cross-company communication. Notwithstanding the fact that within-team communication does not significantly correlate with technological learning, the position of individuals within their communication network may reveal more insight (see Propositions 2 and 3).

Proposition 1(b) is partly supported as well. Technological learning does relate to the level of cross-team communication ($r = .24, p < .1$) within Bank B. The marketing director attributed the absence of any significant relationship between within-team communication and market learning to the fact that the marketing department itself was relatively small compared to market operations. Extensive communication interdependencies exist between the marketing department and the other departments. For instance, product managers are spread across several departments urging them to seek cooperation and communication with other departments. The fact that the marketing department is not the organizational unit in which members obtain technological knowledge is stressed through the negative and significant correlation between within-team communication and technological learning.

Communication Network Variables

Table 3 shows the Pearson zero-order correlation coefficients between the learning constructs and the communication network variables. Partial support was found for

TABLE 2
Correlations of Market and Technological Learning With Types of Communication

	Department A			*Department B*		
Variables	*Within Team*	*Cross Team*	*Cross Company*	*Within Team*	*Cross Team*	*Cross Company*
Market learning about competitors	.29**	.22*	.44***	.19	.03	–.11
Market learning about customers	.30**	.24*	.09	.11	–.15	–.02
Technological learning	–.18	.03	.11	–.23*	.24*	.07

NOTE: Table entries represent Pearson product-moment correlations for Departments A and B. Using pairwise deletion, the sample sizes vary between 40 and 41 for Department A and between 35 and 37 for Department B.
*$p < .10$. **$p < .05$. ***$p < .01$ (one-tailed).

Proposition 2(a). Within Bank A, we find substantial support for the inverse relationship between the level of individual integration and learning. Lower levels of individual integration are associated with higher levels of market learning about competitors ($r = -.47, p < .01$) and learning about technologies ($r = -.35, p < .05$). The link with customer learning is not significant but carries the hypothesized sign.

Proposition 2(b), relating to Communication Network B, was not supported. No inverse relationship was found between the level of individual integration of marketing department members and market learning. Again, during the feedback session with the marketing director of Department B, the strong interdepartmental communication culture existing within the bank was put forward as a possible explanation. The marketing director stated that the strong level of interdepartmental communication by marketing department members breaks down the boundaries within the organization. Referring to the problem of communication barriers, researchers have stated that as systems—organizations—grow, they differentiate. Communication networks become more differentiated (e.g., Stork 1991; Tushman 1977). However, as differentiation—specialization—increases, differences in language, norms, values, and coding schemes will hinder the communication flows across the internal system's boundaries (e.g., Allen 1988; D. Katz and Kahn 1966; Thompson 1967). Therefore, as R&D communication studies have illustrated, an effective communication interface between the different departments involved is essential (e.g., Moenaert and Souder 1996; Souder 1987). In fact, the openness of Communication Network B could explain its bad fit with our theoretical model. Openness can be described as "the degree to which a unit exchanges information with its environment" (Rogers and Kincaid 1981, p. 181). The presence of boundary spanners is a proxy of openness as these individuals link the marketing department with other functional areas. They provide the heterogeneous knowledge base necessary during the innovation task. From a network perspective, these boundary spanners constitute the bridges between different channels of information.

Exploring Communication Roles

Indeed, we may conceive the presence of boundary spanners as an indication of the openness of a unit/department within an organization. We stated that the lower the individual integration of an actor within his or her personal network, the higher the heterogeneity of the information exchange and the more market and/or technological learning is enhanced. As a matter of fact, boundary spanners also increase the heterogeneity of the information exchange and could therefore contribute substantially to learning. To shed more light on some of the findings, we decided to perform an exploratory analysis of our data relating to the existence of boundary spanners next to a conclusive use of our data through the testing of our propositions.

Various R&D communication network studies have stressed the importance of boundary spanners (e.g., Tushman 1977; Tushman and Nadler 1980), communication stars or so-called sociometric stars (e.g., Allen 1985; Allen and Cohen 1969), and technological gatekeepers (e.g., Brown and Utterback 1985). We have distinguished between gatekeepers and organizational liaisons. Within every department and for every communication role, Mann-Whitney U tests (Siegel and Castellan 1989) were performed comparing (a) gatekeepers with nongatekeepers and (b) organizational liaisons with nonorganizational liaisons concerning the learning constructs and the communication network variables.

We start with the concept of internal communication stars as it was introduced by Allen and Cohen (1969) when examining information flows in R&D laboratories. Technical communication stars were defined as "those individuals who are most frequently consulted on technical matters within the subunit" (Tushman and Nadler 1980, p. 104). We have adopted this definition by stating that internal communication stars are those individuals within the communication network that are most frequently approached as a discussion partner. This description is in line with the meaning of individual connectedness: the number of direct communication links an individual has within his

TABLE 3
Correlations of Market and Technological Learning With Communication Network Variables

	Department A		*Department B*	
Variables	*Individual Integration*	*Individual Connectedness*	*Individual Integration*	*Individual Connectedness*
Market learning about competitors	−.47**	.05	.03	.2
Market learning about customers	−.16	−.01	.19	.01
Technological learning	−.35**	−.35**	.01	−.18

NOTE: Table entries represent Pearson product-moment correlations for Departments A and B. Using pairwise deletion, the sample sizes vary between 40 and 41 for Department A and between 35 and 37 for Department B.
*$p < .10$. **$p < .05$. ***$p < .01$ (one-tailed).

or her communication network. Internal communication stars with a substantial amount of cross-company communication have been termed gatekeepers (Tushman and Nadler 1980; Brown and Utterback 1985). Or, gatekeepers in our communication network studies are those individuals highly connected within the marketing department as well as substantially involved in the transfer of cross-company communication. When we apply the strict operationalization (one standard deviation above the mean value, see Pruthi and Nagpaul 1978) for the internal and external communication orientation of an individual, practically no gatekeepers were found. Therefore, we have decided to define gatekeepers as those individuals who are simultaneously above the median value for individual connectedness and cross-company communication. First, Bank B has the largest proportion of gatekeepers relative to the size of the communication network: 11 members or approximately 30% within the communication network perform the gatekeeper role. This is in contrast to Department A comprising 8 gatekeepers or 20% of the network members. Second, an interesting finding emanates regarding the relationship between gatekeepers and the level of individual integration. The bivariate correlational analyses did not indicate any significant relationships between individual integration and the learning domains for Department B. The Mann-Whitney U test comparing median values and mean ranks between gatekeepers and nongatekeepers indicates that the level of individual integration is significantly lower for gatekeepers, suggesting that these individuals have a more heterogeneous information network. These findings suggest that the heterogeneity of the information transfer that was hypothesized to be an important antecedent condition for the type of learning environment of Bank B is embedded within the gatekeeper role of network members within the marketing department.

Finally, next to gatekeepers, we have looked for the presence of organizational liaisons. Within innovation studies (e.g., Tushman 1977), organizational liaisons were emphasized as critical boundary spanners between the laboratory and other departments such as marketing, manufacturing, and sales. We have defined organizational liaisons as boundary spanners between the innovating subsystem and the larger organization. Within our communication network studies, we adopt the same conceptualization while changing the innovating subsystem for the communication network. Therefore, organizational liaisons mediate information between the marketing department and the other departments of the organization. Again, if we strictly operationalized organizational liaisons as those individuals with one standard deviation above the mean level of interdepartmental communication, none was selected. Thus, individuals were labeled as organizational liaisons if they scored equal or above the median amount of cross-team communication.

Technological learning differed substantially between organizational liaisons and the other members of the network within Department B. The existence of organizational liaisons spanning intraorganizational boundaries has been emphasized as an important function in the innovation process (e.g., Keller 1994; Tushman 1977; Tushman and Nadler 1980). Moreover, we can specifically link the findings of Department B to the fact that the more complex the learning environment and hence information-processing requirements, such as the acquisition and dissemination of technological information, the more they will rely on boundary spanners to attend to cross-boundary communication (e.g., Brown and Utterback 1985; Tushman 1977; Tushman and Nadler 1980). Moreover, this finding validates the correlational analysis presented in Table 2. (b) supporting a positive correlation between the level of cross-team communication and technological learning by network members of Bank B. Again, we may repeat here that Bank B has an innovation strategy that has been highly technological in nature.

Finally, we notice a consistent pattern within Bank B concerning the relationship between individual integration and the communication roles. Again, the Mann-Whitney U test illustrates the significant distinction between organizational liaisons and other network members with respect to the level of individual integration. Organizational liaisons showed lower levels of individual integration indicating that their personal communication

networks are more heterogeneous. In fact, this condition was stated within the theory development as an important contributor to the level of learning. Thus, the present research findings clearly suggest that the level of individual integration does play an important role within the communication patterns of Bank B. In view of the strong interdependence between the marketing department and the other departments, the heterogeneity of the information transfer across departments has been stated as crucial within Bank B. The level of individual integration does not seem to reflect this heterogeneity in information transfer, mainly because boundary spanners may substitute for low levels of individual integration.

Proposition 3(a) is only partly supported, and proposition 3(b) is supported concerning the negative relationship between the level of technological learning and the degree of individual connectedness of marketing department members both for Bank A and Bank B. Within Bank A, no significant correlation was found between market learning about competitors and customers and the connectedness of individuals within the marketing department. The effectiveness of individual connectedness, being a measure of local point centrality (Scott 1991), seems to be contingent on the innovation context, hence the type of information and learning that may result. Low levels in the degree of individual connectedness do seem to enhance technological learning. Also for Bank B, although not significant, the correlation coefficient carries the hypothesized sign. This may also explain the negative correlations in Table 2 between technological learning and within-team communication for both banks. In a highly innovative bank, as underlined by the significant correlation coefficient ($r = -.23$, $p < .1$) for Bank B, too much communication within the team may even impede technological learning. However, our data do not support a positive relationship between high levels of individual connectedness and market learning in Bank A in which the innovation context can be labeled as incremental innovations with lower levels of perceived uncertainty.

CONCLUSIONS

We have adopted a social network perspective to study the impact of interpersonal communication on market and technological learning during new banking service development. Network analysis gives researchers the opportunity to (re)examine (familiar) problems in innovative ways. Research contributions within marketing applying the network paradigm have evolved only gradually and are still largely fragmented. The objective of this study was to shed light on the communication patterns that enhance market and technological learning within an initial innovation context. The latter has been expressed as the level of environmental uncertainty in both market and technology.

In general, our research indicates that the different innovation contexts do require different communication patterns both in terms of (a) the communication source (within-team, cross-team, and cross-company communication) and (b) the position within the communication network (integration and connectedness).

Cross-team communication seems favorable to technological learning when innovations are developed comprising new technologies for existing markets (Bank B), whereas within-team communication contributes to market learning concerning customers and competitors when Bank A innovates for existing markets with existing technologies. No support emerged, however, for the proposed impact of cross-company communication on the level of technological learning within Bank B. As research has suggested (e.g., Tushman 1977, 1979b; Tushman and Katz 1980), this may be due to the fact that boundary-spanning roles evolve acting as links between the subunit and external information areas. Or stated differently, contact mediated by gatekeepers may be alternative modes to bring external information into the department.

A major finding of our communication network studies for Bank A has been the relationship between the level of integration of an individual's personal communication network and the level of market learning. As a matter of fact, the inverse relationship between network integration and learning implies that low integration is an important network antecedent for learning to happen. Although we also hypothesized the latter for Bank B, no support emerged from our data. Additional analyses exploring communication roles again has suggested that we have to consider communication patterns that may substitute for individual integration effectiveness as a communication network variable. Organizational liaisons learned substantially more about technologies. Moreover, these organizational liaisons had a significantly lower level of individual integration.

Debriefing of the results with marketing directors suggests that the perceived complexity and uncertainty in the customer and competitors' environment enhance learning by marketing department members. In fact, Marketing Department B provided the most evidence of a department with a strong external orientation (previously referred to as openness of the network). Indeed, R&D communication studies have emphasized perceived environmental uncertainty as a useful concept. As uncertainty increases, the organization will rely more on interpersonal communication and interactive information systems and use outside sources of information (e.g., Brown and Utterback 1985; Tushman 1979b). Considering the innovation context of Bank B, showing higher levels of perceived uncertainty,

openness of the marketing department seems to be the best condition to obtain the required heterogeneous and diverse information sources. Indeed, the communication roles that were examined (gatekeepers and organizational liaisons) showed significantly lower levels of individual integration in Network B. The latter is a reflection of the heterogeneous nature of their information transfer. Thus, although individual integration does not show a direct effect on learning, our findings indicate that this effect may be mediated through boundary spanners within the marketing department.

Our findings strongly suggest that the impact of an individual's communication network variables is contingent on the innovation context and hence the type of innovative learning. The less an individual was integrated and central (i.e., directly connected to others) within his or her personal communication network, the more technological learning was enhanced.

MANAGERIAL IMPLICATIONS

Managing new service innovation is managing a network of individuals in which a project manager strives to create optimal communication conditions for learning to take place. These network conditions should guarantee diversity and heterogeneity.

Marketing department members should feel free to cooperate and communicate with other members of the organization. They should not be tied exclusively to the same people or working team. Managers need to assess the importance of understanding communication network *relations* within their marketing department. In fact, these individuals are embedded in networks of information that cut across marketing and organizational boundaries.

Therefore, management needs to recognize the crucial communication roles that marketing department members may fulfill during new service development. Boundary spanners may link different information sources with one another; they are therefore an excellent tool to preserve the flow of heterogeneous market and technological information into the marketing department. As a result, the communication flows mediated by these boundary spanners foster learning during the innovation process.

It has often been advocated that to develop successfully new products or services, members of development groups in organizations should bind into a cohesive unit, sharing a common direction and vision. Such a common direction suggests close connections and communication between members of the department. From our research, we conclude that such close cooperation could work out to be detrimental to the learning activities of individuals. For developing services in existing markets with existing technologies, we advise management to stimulate communication within the team. For developing new services for existing markets with new technologies, we recommend stimulating cross-team communication and communication via gatekeepers of the department.

It requires a certain degree of openness in the system to seize the advantages of available knowledge outside the department and within the organization. Probably, it is not even necessary to initiate special teams for development purposes. A strong network including boundary spanners of the department with strong external networks or organizational liaisons would be sufficient. In the case of existing technologies, the focus of the network should be on the cooperation of members within the department. This means that it is wise to tailor learning strategies of marketing departments to the specific innovation environment.

Management must stop treating the marketing department as a unit in which cooperation should be maximized. The consequence of such a strategy would be a severe lack of learning, which could be detrimental especially in a situation in which new technologies have to be incorporated. Management should carefully develop and retain knowledge that could be achieved by employees geared with the right incentives to learn across traditional organizational borders.

In fact, management should stimulate openness within the marketing department, thereby stimulating marketing personnel to distribute market-oriented values inside the organization. In that sense, the initial networks of marketing personnel support learning within the organization, which is a condition for an organization to become and stay market driven. Especially for innovation project teams that face uncertain environments, tight coupling within a network may constrain the inflow of new knowledge and limit the search for knowledge outside the department.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

A sociometric survey was proposed as an improved research design to capture innovative learning as it focuses on interpersonal processes. One limitation, however, stems from the cross-sectional design of our study. A longitudinal approach could address the question of how market and technological learning precedes and affects communication network variables. Especially interesting would be the study of the evolution of tie strength. Weak ties within the marketing department (i.e., low levels of integration) or boundary spanners forming bridges between different departments have emerged from our data as the core mechanisms to enhance learning. However, over

time, these ties between marketing department members may become stronger, thereby limiting the search and transfer of useful knowledge from other departments. Future research could analyze the evolution of tie strength during new service development as well as the relationship with the presence of boundary spanners to detect combinations and contingencies that may explain effective communication and hence learning. This research could also shed light on the extent that boundary spanners may substitute for lower levels of individual integration.

Moreover, the present research design is based on sociometric surveys in two marketing departments, each having specific organizational characteristics. Indeed, the sampling design of network analysis provides less basis for using statistical inference to generalize specific research results to a larger population (e.g., Rogers and Kincaid 1981) but provides a greater ability to understand the nature of the communication structure. In network analysis, we accept a trade-off between generalization of the research results and acquiring an in-depth understanding of communication patterns within a bounded system. Therefore, we did not pool the sociometric data of the two banks. We believe that several organizational characteristics moderate the relationship between interpersonal communication and market and technological learning. Thus, further research may account for the organizational context. For instance, openness and perceived uncertainty were proposed during debriefing sessions as potential moderators for future research.

Another limitation of our study stems from the balance between within-team, cross-team, and cross-company communication. The extent to which within-team communication varies with cross-team and cross-company communication is unclear. Frequent within-team communication may make the marketing department overly inward focused, neglecting external and diverse knowledge from other departments. On the other hand, an overly external focus may upset the consensus within the marketing team that is needed to move new service development forward. Future research should address these tensions and check for an ideal balance between within-team, cross-team, and cross-company communication throughout the project life cycle.

Our research supported the fact that verbal/interpersonal communication is an important medium through which technological and market information is transferred. However, through the measurement of work-related verbal communication only, we have not been able to capture the effect of more formal means of communication. Effectiveness of communication modes in the marketing department of a bank, a highly formalized and bureaucratic setting, may be completely different from communication in an R&D environment. In addition, other communication channels next to verbal (face-to-face) communication should be examined. For example, "How effective are alternative communication channels (written communication, telephone calls, meetings, e-mail, etc.) during the innovation task, and how do they contribute to innovation performance?" The fact that informal information retrieval would be inherently more efficient than more formal information gathering has been reported in studies concerned with communication in an R&D setting (e.g., Ebadi and Utterback 1984; Rothwell and Robertson 1973). Therefore, future research needs to examine the link between different communication systems and learning within different innovation contexts for service organizations.

APPENDIX A

Communication within the marketing department (within-team communication)

On the next pages, we have listed the personnel working at your department. Please indicate how much you *talk* on average with each of the mentioned persons. By talking, we understand whatever form of oral communication, irrespective of the content. Hence, "talking" is not necessarily limited to information exchange concerning your work but could also include any other topic that might emerge (e.g., during the lunch break or other informal gatherings).

Please indicate below how often on average you talk with *each* of the persons mentioned below. Do this by circling the relevant number. You can choose between

5	On average, I talk with that person more than once a day
4	On average, I talk with that person more than once a week
3	On average, I talk with that person more than once a month
2	On average, I talk with that person at least once every 3 months
1	I basically never talk with that person; I don't know that person

Please circle *one* number only per name. Make a judgment call and circle the number that *according to you, best reflects the actual situation*. The persons have been grouped according to their task group within the marketing department.

Marketing Management and Communications and Marketing Management of Insurances	*More Than Once a Day*	*More Than Once a Week*	*More Than Once a Month*	*At Least Once Every 3 Months*	*Never, Unknown*
201. Person 1	5	4	3	2	1
202. Person 2	5	4	3	2	1
203. Person 3	5	4	3	2	1
204. Person 4	5	4	3	2	1

Communication outside the marketing department

Communication with the head office of your bank (cross-team communication)

On average, how often do you talk with *colleagues of other departments within the head office of your bank* (thus excluding branch personnel or independent agents)? Circle the appropriate number on the scale below.

More Than Once a Day	*More Than Once a Week*	*More Than Once a Month*	*At Least Once Every 3 Months*	*Never*
5	4	3	2	1

Communication external to bank (i.e., customers, other banks, suppliers . . .) (cross-company communication)

On average, how often do you talk with people *outside your organization*? Circle the appropriate number on the scale below.

More Than Once a Day	*More Than Once a Week*	*More Than Once a Month*	*At Least Once Every 3 Months*	*Never*
5	4	3	2	1

APPENDIX B

Market Learning and Technological Learning

Instruction

As a member of an innovation team, you constantly acquire, distribute, and interpret information. In fact, by sharing information during the innovation process, you may learn (i.e., increase your knowledge base). Shown below are a number of items on which you may increase your knowledge base. Along with each item, you will find a scale. Please indicate how strongly you agree that you have learned about the following items. Circle the scale value that best reflects your opinion.

Respondents were asked to rate the following items on a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*)

Sample list of the items

Competitors

I have increased my knowledge base . . .

1. . . . on the technological strategy of the competition.
2. . . . on the marketing strategy of the competition.
3. . . . about the activities of our competitors.
4. . . . about new product strategies of competitors.

Customers

I have increased my knowledge base . . .

5. . . . about changes in customer needs.
6. . . . on new user requirements.
7. . . . about changes in the potential market.
8. . . . on the buyer behavior of the potential customer.

Technologies (e.g., EDP and financial technologies)

9. . . . about the quality of the applied technologies (e.g., information technologies).
10. . . . on the user-friendliness of the technologies.
11. . . . on the cost-efficiency of the technologies.
12. . . . concerning the performance of the involved information technologies.

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