Review of Sociology Vol. 13 (2007) 1, 31–48

EXPECTATIONS OF STAYING IN HOUSE: THE EFFECT OF SOCIAL NETWORKS

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Abstract: Previous research describes social structure in which employees are embedded as one of the important determinants of intra-organizational career expectations. There are two contradictory arguments in the literature, however. First, social closure of informal relations is supposed to strengthen the intentions of staying. Second, the efficiency and effectivity of the individual social network is assumed to enhance in-house career expectations. This empirical study analyzed data from 44 R&D teams in the Netherlands. Multilevel analysis was used to separate individual and team influences. Results show that the prospects to stay in the R&D team are determined positively by social closure, whereas the expectation to stay in the organization is determined positively by the efficiency and effectivity of individual social networks. The conclusions highlight that different forms of social capital might be important for different types of career perspectives.

Keywords: R&D management, social networks, social capital, career expectations, human resource management

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Introduction: R&D Teams and Keeping Specialists in House

In knowledge intensive industries the acquisition and capitalization of knowledge is crucial for economic success of firms (e.g., Grossman and Helpman 1991; Singh 2005). As knowledge acquisition and capitalization is not easy, most organizations have an essential interest to hold valuable knowledge embodied in highly educated and specialized employees in house. This is nowhere a bigger problem than in the Research and Development (R&D) teams that are the engines of innovation and of success within organizations in knowledge intensive sectors.

* Károly Takács is orresponding author, who acknowledges support of the Netherlands Organization for Scientific Research (NWO, VIDI scheme) and of the Hungarian Scientific Research Fund (OTKA, T049432).

R&D endeavours are mostly done using a team-based approach (e.g., Griffin 1997). There are several reasons for this. The main reason is that engineering new products involves the concerted input of specialists with various areas and levels of expertise. Engineering new products may involve the need for knowledge about issues of procurement, production, marketing, service, legal issues, and organization strategy. Engineering new products may also require in-depth knowledge of specific technical issues; for example dozens of engineers with many different specializations may be involved in the development of a new engine or a household item such as a refrigerator or an electric shaver. R&D teams are put together for a good reason: they are required since nobody possesses all of the demanded knowledge. Accordingly, holding the required specialists with the required knowledge in-house is often a precondition for engineering new products.

But what makes highly educated R&D staff staying at their R&D team or in the organization? This issue is addressed in this study by investigating factors that facilitate the perception of employees to stay in house. First, recent studies suggest that the structure of individual networks and individual social capital have a strong impact on the perception of individual chances and prospects to stay at the R&D team or in the organization (e.g., Gabbay and Zuckermann 1998; McGuire, 2000). Second, there is evidence that in interplay with contextual factors, age and gender of employees affect the perceived prospects to stay (e.g., van der Hulst 2004). We decided to include these main variables into our theoretical considerations and empirical analysis. The central aim of the study, therefore, is to unravel how social structure, gender and age affect the perceived intra-team and intra-organizational prospects of R&D team members.

As a practical relevance of this study, by generating knowledge under which circumstances perceived prospects develop, managers are enabled to organize R&D teams in a way that employees are more likely stay at their R&D organization and/or team, and in turn help to save costs for searching and/or training highly specialized R&D staff. Besides, as a theoretical contribution, this study helps to resolve the tension between two contradicting paradigms in research on social capital: whether social capital in a form of social closure (Coleman 1990) or in a form of structural holes (Burt 1992) is important for career perspectives.

In the next two sections, theoretical arguments are worked out leading to a number of hypotheses. Thereafter, the study design and the use of methods are explained. In the final sections, the results are presented and scientific as well as managerial conclusions are drawn.

Social Networks, Sociological Background and Perceived Prospects of R&D Employees

In explaining the opinion of employees whether to stay in the same team or organization for a long period or not, we primarily focus on the impact of individual networks and social capital as they largely contribute to attitudes of staying in house or not (cf. McGuire 2000). It is also well-known that these attitudes highly correlate with

actual decisions later and perceived intra-organizational career opportunities make employees staying (e.g. Brüderl et al. 1993; Morris and Villemez 1992).

A large body of evidence links the ability to span crucial social boundaries with higher rates of upward future and career advancement (e.g., Gabbay and Zuckermann 1998; Seibert et al. 2001). Well-known examples of this are the 'strength of weak ties' argument of Granovetter (1973) or the 'structural hole' argument of Burt (1992). As Burt (1992: 1) argues: "Given an increasing number of people available with comparable levels of human capital, social capital is increasingly the factor differentiating candidates, and so determining achievement". Metaphorically, social capital refers to resources embedded in social relations that help individuals accomplishing their goals (e.g. Coleman 1990). In research on social capital, however, there are two contradicting lines. The 'structural hole' argument of Burt (1992) claims that the lack of connections among associates determines social capital by creating higher career chances, whereas Coleman (1990) among others argues that actors benefit from social closure that creates a pleasant work environment and contributes to higher prospects to stay within the organization.

The 'structural hole' argument describes a configuration of individual networks, in which information and control benefits are realized by being connected to a selected number of colleagues who do not have connections among each other (Finlay and Coverdill 2000). Such individual network structures guarantee an effective and efficient access to valuable resources as information and control. On the opposite, the 'social closure' argument suggests that members of highly interconnected structures trust others to provide reliable information. Dense relations among a set of actors create a situation in which interpersonal credits and debits flow at a high speed, binding actors to one another in mutually beneficial ways (Coleman 1988). These two arguments undoubtedly contradict each other, especially if one takes into account that dense collegial networks are typically characterized by strong ties (e.g. Reagans and McEvily 2003). The advantages described by Coleman would seem to be unavailable to those whose contacts are divided by structural holes. The density of networks correlates negatively with a structural hole-measure of individual networks. In fact, network density as an aggregate measure represents what Leenders and Gabbay (1999) label as corporate social capital, since it describes social capital at the level of the collective. Because of the clear differences, when we investigate the perceived prospects of R&D team members to stay in the R&D team and/or organization, both approaches should be taken into account.

Besides investigating network effects, we have to take into account individual variables that are known to be predictors of individual career prospects. Gender is one of these important variables. Women are less likely promoted to managerial positions of R&D teams and of business organizations (Evetts 1993; Igbaria et al. 1999; Carli and Eagley 2001). Careers of women are characterized by glass ceilings especially at high skill levels and the expectation of restricted possibilities has also been built in their career prospects (Kanter 1977; Filippin and Ichino 2005). As a consequence, not only discrimination and the opportunity structure, but also gendered beliefs are responsible for a lower percentage of women in key organizational positions (Correll 2001). Gender differences in career perspectives can largely be explained by

differentiated signals, by gender-differentiated perceptions, and by biased self-assessments (Correll 2001). There are indications in the literature that gender effects of staying in house are probably more diverse than this. Valcour and Tolbert (2003) found that women expect higher inter-organizational mobility while men expect higher intra-organizational mobility. It has also been suggested that the greater intra-organizational future expected by men is due to the fact that they make more extensive use of informal networks (e.g. Brass 1995; Hopcroft 1996; Tharenou 1997) and have greater access to informal networks (e.g., Ohlott et al. 1994; van der Hulst 2004).

Among the variables that might have a main effect on staying in house, not only gender could distort the bivariate relationship between structural variables and individual prospects of staying in house. Age is a variable that naturally modifies career perspectives. According to developmental stage theories, career prospects through the life span change in a way that permits maximum self-expression (Super 1957; Feldman 1989; Sullivan 1999). Career stages that an individual goes through the life span are exploration, establishment, maintenance, and disengagement, the latter being the period of phasing into retirement (Super et al. 1988). Most empirical research has used age as a proxy for psychological career stages (Ornstein and Isabella 1990, 1993).

In a study of Kratzer (2001) it has been shown that age is negatively associated with the closure of the personal networks. In other words, it was found that older R&D team members have less contact to other team members than younger members. In addition, older R&D team members stay more central in the team's communications network despite of having a lower number of contacts. So, seemingly the personal networks of older R&D team members are more efficient and effective in the sense of Burt (1992).

Perceived Prospects of Staying In House: Hypotheses

The arguments advanced in the previous section point to laudable effects of social structure on perceived prospects to stay in the R&D team or organization. Among structural effects, because of their obvious advantages and importance, the closure and the effectivity and efficiency of interaction have become the foremost explanatory variables when looking at perceived prospects (Gabbay and Zuckerman 1998; van der Hulst 2004). First, it will be outlined why researchers expect a closure of contacts to contribute to perceived prospects and the contrary line of argument is discussed afterwards. Finally, the effects of gender and age are hypothesized on perceived individual prospects.

One line of theorizing refers to communicational closure of personal relations. One form of informal conversation that is frequent in work teams is morale-building communication (Jehn and Shah 1996). Morale-building communication is defined as communication encouraging team members to perform better by exchanging positive comments about the team member's contributions (Jehn and Shah 1996). When the density of personal relations is high, all members express solidarity, mutual liking and positive feelings about attending meetings and carrying out the tasks. In this case more

information is shared (e.g., Roloff 1987). Moreover, close personal relations create trust among team members (Jehn and Shah 1996; Roloff 1987).

In addition, a closure of contacts facilitates orientations towards each other (Homans 1974). As a consequence, a dense team-network strengthens actors' orientation to their peers and enhances conformity of opinions and behavior in the team. Consistent with this hypothesis, studies have found a positive relationship between the closure of personal relations and compliance to group norms and trust among the group members (cf. Balkundi and Harrison 2006). As Coleman (1988) argues, strong group bonds are beneficial for all belonging to the group, because the information shared is trustworthy and control is exhibited by rewarding each other. Moreover, close communicational contacts increase the job satisfaction of employees (Yoon and They 2002). So, it can be expected that R&D team members who stay in dense R&D teams perceive better intra-team prospects than those who are members of sparse teams. This expectation might be similar when considering the product development organization as a whole, because the boundaries of the organization are still closer than the outside world and positive intra-team experiences might be also translated into more positive feelings toward staying in the organization.

Hypothesis 1: The denser the R&D team network, the better are the perceived prospects of R&D team members to stay in the R&D team and in the organization.

A rival line of argument addresses the structure of the individual's network. A well-known concept with respect to the provision with information is the concept of structural holes (Burt 1992). The 'structural hole'-argument describes a configuration of individual's networks, in which information and control benefits are realized. Information and control benefits can be realized by two kinds of configurations. First, the number of contacts increases the effectivity of the individual network and second the number of non-redundant or non-overlapping contacts increases the efficiency of the individual network. The interplay between effectivity and efficiency determines the perceived career prospects of employees (Burt 1992). As Burt (1992) argues, actors with contact networks optimised for structural holes – or in other words actors with networks providing high structural autonomy (highly effective and yet highly efficient networks) – enjoy higher rates of return on their investments because they know about, have a hand in, and exercise control over more rewarding opportunities. A study of Gabbay and Zuckerman (1998) confirmed that such ego-networks increase intra-team and intra-organizational career expectations, and in turn, contribute to better prospects to stay in the R&D team and in the organization.

Hypothesis 2: The higher the effectivity and efficiency of the R&D team-member networks, the better their perceived prospects are to stay in the R&D team and in the organization.

As we discussed, besides structural effects, we expect that gender is also playing an important role in determining career expectations. Previous research shows that intra-team and intra-organizational career expectations are different between men and

women: women attach on average less importance to career than men (Kanter 1977; Cassirer and Reskin 2000; Correll 2001). The majority of sociological explanations concentrate on differences in the socialization process, on gender-role mediated perceptions and on biased self-assessment. There is also a growing body of literature, however, that denies the existence of a net gender effect and asserts that gender differences in career perspectives are determined by differences in the formal organizational positions sexes occupy (Kanter 1977; Cassirer and Reskin 2000) or by differences in their informal social networks. Men make more use of their individual networks and have higher network effectivity by having more contacts (e.g. van der Hulst 2004). Moreover, they have access to many more first and second order contacts (e.g. van der Hulst 2004), so their network is not only more effective but also structured in a way of providing more structural holes. Hence, men might profit from being embedded in more contacts as well as having more information and control benefits due to the their larger networks, and in turn, have better perceived prospects to stay in house. This line of research would ascribe the bivariate relationship between gender and perspectives of staying in house to structural differences. Furthermore, as the study of Valcour and Tolbert (2003) shows, gender effects might be different for perspectives of staying in the team and for perspectives of staying at the company.

Hypothesis 3: Men perceive better intra-team and intra-organizational prospects to stay in the R&D team and product development organization than women, but this effect disappears after controlling for structural variables.

Finally, age has a potential influence on the perceived prospects to stay in the R&D team and product development organization. At a relatively young age, opportunities outside the organization can subjectively be more attractive and might also provide opportunities for easier promotion. For middle-age employees, established paths of promotion are more accessible within the organization and for employees at a higher age there is a strong disutility from leaving the house before retirement. In relation to this, we expect a different effect of age on team prospects and on organizational prospects. While promotion at a higher age becomes more accessible within the organization, problems might arise with remaining in the R&D team due to skill obsolescence, which might be foreseen by the employees (Rosen and Jerdee 1988; Kim and Cha 2000).

Finding effects of age might be due to the influence of organizational tenure, which develops a preferential attachment to the organization (Rosen and Jerdee 1988; Kim and Cha 2000). For this reason, organizational tenure will be included as a control variable.

Hypothesis 4a: The higher the age of R&D team members, the better are their perceived prospects to stay in the organization.

Hypothesis 4b: The age of R&D team members has a curvilinear effect on perceived prospects to stay in the R&D team with a peak for middle-aged (30–39) employees.

METHOD

Sample and Procedure

Data was collected in 44 R&D teams in 11 Dutch companies, all engaged in development of digital products. First, all known Dutch companies conducting innovation activities in this sector with cross-functional team approaches were considered and 39 companies that fulfilled other practical criteria were selected. A letter was sent to directors of R&D settings of the selected companies. In this letter, companies were offered presentations of the project and 21 of them agreed to receive more information in this way. A presentation has taken place at these companies, and finally 11 agreed to participate in the research. In the other companies, the research could not be executed mainly because of disagreement in the management. After all, 28.8% of the contacted companies participated in the research. The companies that are included in our research develop, for instance, copy machines, printers, screens, computer products, medical instruments, digital household appliances or biotech products.

The main motivation behind having a sample with companies only from the sector of digital product development was to have a controlled research design. Furthermore, we aimed to select a highly knowledge-intensive sector of industry in which R&D teams play a crucial role. In the field of developing digital products, it is of pivotal importance from the point of view of management to organize R&D teams efficiently and to keep valuable expertise in house.

All members of the selected teams were requested to fill in a questionnaire regarding their prospects whether they intend to stay in their R&D team and organization and with which team-mate they interacted at least on a weekly basis about "work-related matters: communication involving the discussion, innovation, or evaluation of new ideas or approaches to technical problems; technical or scientific help or advice; mutual use as 'sounding board' for ideas; distribution of scientific or technical information stemming from outside of the team". In the questionnaire, a full roster of team members was used for each R&D team. The rosters of team members had been established in communication with team members and, where applicable, with team management in advance. As a result, all team rosters were reported to be 'complete' by all respondents. As a consequence, network data was obtained in a form of an asymmetric interaction matrix for each team with values 0 = no (or less than) weekly communication and 1 = (at least) weekly communication. This procedure is typical for the way in which communication network data are collected .

In addition, we asked team members about their age, gender, and several questions regarding their membership of the team and other background information. On average, team members had been in their field of specialization for 9.3 years, and had been with the organization for an average of 7.3 years. The main fields of specialization were chemical engineering (12 percent), mechanical engineering (24 percent), and computer science (22 percent). Most team members had polytechnic education (44 percent) or an academic education (30 percent). In addition, 14 percent had a doctorate. All R&D teams were relatively small and had between 4 and 10

members. A few larger outliers and teams with less than four respondents were excluded from the analysis.

The questionnaires were administered on site during formal team meetings and achieved a response rate of 95% (N=243). The 5% missing is due to members not being present at the meetings. At these meetings, a researcher was present to answer questions. The questionnaire was personalized such that each team member could unequivocally report with whom he or she maintained interaction. This individual identification was removed once the data were entered, such that the structure of the communication network was maintained but information about the identity of the individuals was invalidated.

Dependent Measures: Intra-team and Intra-organizational Prospects

All R&D team members were asked to indicate whether they see their individual future in a period of ten years from now within the same R&D team (0 no / 1 yes) or within the same organization at which they are employed currently (0 no / 1 yes). The perceived intra-team prospects are labelled *team prospects* and intra-organizational prospects are labelled *organizational prospects* in the tables.

Independent Measures

Structural variables: 'closure of the R&D team' and 'efficiency / effectivity of the individual networks'

Whenever possible, existing and commonly used operationalizations were chosen for the empirical study. The operationalizations used for the closure of the R&D team and for the efficiency / effectivity of the individual networks are common in social network analysis .

The closure of the R&D team was determined by the density of the communication network. Density describes the overall level of interaction reported by the team members. It is analogous to the mean number of ties per team member and varies between 0 (no communication in the team) and 1 (everyone communicates with everyone, at least once a week). The variable is labelled *density* in the tables.

The efficiency / effectivity of the individual's networks' was determined by the individual constraint-measure developed by Burt (1992). The constraints of the individual's refer to the efficiency and effectivity of the individual communication network. Efficiency describes the ratio of non-redundant (not overlapping) and redundant (overlapping) network connections. Effectivity describes the size of the individual network. So, the individual constraints are higher the less connections someone has and as more the connections are redundant. As Burt puts it: "Your entrepreneurial opportunities are constrained to the extent that you have invested the bulk of your network time and energy in relationships that lead back to a single contact" (1992: 55). Individual constraints vary between 0 (the network is not constrained at all) to 1 (the network is fully constrained). The variable is labelled

constraints in the tables. The aggregated constraints in a network are known to be correlated with density (Burt 1992: 58–59).

Demographic Variables: Age and Gender

Age was measured using 5 categories (1: under 30; 2: 30–39; 3: 40– 49; 4: 50– 59); and 5: over 60). *Table 1* summarizes the descriptive statistics of individual level variables. Correlations are rather small and only statistically significant regarding organizational prospects and team prospects; age and organizational prospects; and constraints and organizational prospects (negative). *Table 2* illustrates the descriptive statistics of density of teams.

Table 1. Descriptive Statistics and Correlations of Main Individual Level Variables

Variable	N	Mean	s.d.	(1)	(2)	(3)	(4)
(1) Team Prospects	233	.3433	.476				
(2) Organizational Prospects	233	.5279	.500	.141*			
(3) Age (5 categories)	233	2.107	.831	-.115	.174**		
(4) Gender (Female = 2)	233	1.060	.238	-.107	-.086	-.098	
(5) Constraints	243	.695	.267	.083	-.155*	.028	.039

Note: ** Significant at the 1% level * Significant at the 5% level (two-tailed).

Table 2. Descriptive Statistics of a Team Level Variable

Variable	N	Mean	s.d.
Density	44	.5839	.25110

In the next step, we provide a closer look at gender and age. As *Table 3* displays, gender is strongly unevenly distributed. There are only 14 women in the sample, which confirms the postulation that R&D settings are men-dominated (cf. Cohen and Cohen 1991; Leenders et al. 2003). Moreover, it raises the question whether to continue including gender in the analysis. We decided to do so but being aware of the limitations. Based on 14 individual observations, our results will not be conclusive about any of the hypotheses that involve gender effects. Age is also unevenly distributed. R&D team members who are older than 49 do not perceive any prospects in their R&D teams; and only very few of them perceive prospects in the product development organization over a period of ten years from now. We decided to take this into account and to execute separate statistical analyses including all team members and including only team members that are younger than 50 years.

Table 3. Mean Team and Company Prospects by the Main Background Variables

Independent Variable	Category	N	Team Prospects	Organizational Prospects
			Percentages of Saying 'Yes'	Percentages of Saying 'Yes'
Gender	Male	219	.36	.54
	Female	14	.14	.36
Age	Under 30	55	.29	.31
	30-39	111	.45	.56
	40-49	55	.25	.75
	50-59	11	.00	.27
	over 60	1	.00	.00

Control Variables

In part of the analysis, we included additional variables that might influence individual prospects of staying in the team or at the company. R&D employees differ from other workers as they especially like autonomy and dislike authority in their work (e.g. von Glinow 1988; Kim et al. 1999). Therefore team autonomy can influence the prospects of staying at the team and at the company. We measured team autonomy on a 5-point ordinal scale by asking to what extent has the team's research plan been formulated through team discussion and has been coordinated by mutual agreement and responsibility of members. A large score means few team discussions in planning and more centralized coordination, and therefore it is labeled as *authority in the team*.

Organizational tenure is a variable that is influential for individual career perspectives (Kim and Cha 2000). Longer tenured professionals continuously face a challenge of new members equipped with recent technological knowledge, and they also encounter career problems due to career plateaus (Rosen and Jerdee 1988; Kim and Cha 2000). Age and organizational tenure necessarily correlate, therefore in order to see whether age or the time spent at the team and in the organization influences the prospects of staying, we included variables *how long at the team* and *how long at the company* measured in years as control variables.

Team members differed with regard to what proportion of their working time was spent in the R&D team. Members working full-time in the team might feel more attached to the team, but also to the organization. *Time devoted to team* was measured on a 4-point ordinal scale.

We also controlled for the kind of product development (basic=1, applied=0) at the team. Surprisingly, the variable *product development* shows a considerable variation within the teams, and therefore it is included as a control variable measuring the subjective assessment of the profile of the R&D team.

Analyses with additional control variables including team size, personality variables, variables related to quality assessment and cooperation, and other structural

variables have also been conducted, but we do not report these results as for their most important implications they did not differ from the reported ones and they did not find additional significant effects.

Analysis

Individuals are embedded in teams; hence our data is hierarchically structured. The dependent variables are binary; therefore we use multilevel logistic regression (Bryk and Raudenbush 1992; Goldstein 1995). Multilevel models allow us to correct for the methodological problem that observations within the teams are not independent. In our two-level model, individual characteristics are the lower level observations and characteristics of the teams are the higher level observations.[1]

Formally, let the function P_{it} denote the propensity of member i to expect staying in the same t team or organization ten years from now. The propensity of prospects of staying is specified by the logit link function, which is the natural logarithm of the quotient of the probability of the prospect of staying P_{it}(S) and the probability of the prospect of not staying P_{it}(M) (cf. Goldstein 1995: Chapter 7):

$$P_{it} = \ln\left(\frac{P_{it}(S)}{P_{it}(M)}\right) = \alpha_0 + \beta_1 x_{1t} + \varepsilon_t + \beta_2 x_{2it} + \ldots + \xi_{it}$$

where α_0 is a baseline prospect. The baseline prospect might depend on the general economic climate and on other general background variables that are not interesting for this study. The team-level variation depends on corporate social capital (x_{1t}) and on other team characteristics. Notation ϵ_t stands for a team level error term and embodies all between-teams variation that is not covered by the team-level explanatory variables. We assume that the team level error has a zero expected value and has a normal distribution that is

$\epsilon_t \sim N(0, \sigma_2)$,

where the variance σ^2 is going to be estimated.

The inter-individual variation depends on individual-level variables (x_{2it}) as on age, on gender, on how long a person works in the team, on structural variables and on other personal characteristics. The individual-level error term ξ_{it} represents the residual inter-individual variance that is not estimated.

RESULTS

Table 4 presents multilevel logistic regression results on team prospects. Model 1, including all respondents, shows that only density and age have statistically significant effects on prospects of staying at the R&D team. In Models 2 and 3, we excluded

1 For the sake of simplicity, we did not include the company-level as a third level in the analysis. The companies in the sample are all similar with regard to their scope and they are too few (11) to test for effects of company-level variables.

respondents who are older than 49. Yet again, age exhibits next to density a positive effect on the perceived team prospects on a statistically significant level. In other words, independently from whether we excluded employees before retirement or not, the expectation to stay in the R&D team is positively influenced by the closure or density of the team, which gives support for Hypothesis 1. Besides, we also find a significant curvilinear effect of age with highest prospects of staying at the R&D team for the middle-aged (30–39) employees, which supports Hypothesis 4b. The effect of efficiency / effectivity of the network is not significant and control variables also play no relevant role in explaining team prospects.

Table 4. Results of Multilevel Logistic Regression on Team Prospects

Independent variables	Model with all respondents	Models with respondents below age 50	
	Model 1	Model 2	Model 3
FIXED EFFECTS			
α baseline future team prospects	-2.497* (1.159)	-2.032 (1.124)	-2.653* (1.303)
Team-level variables			
Density	2.168** (0.802)	1.940* (0.765)	1.632* (0.771)
Individual-level variables			
Age 30-39[†]	1.046*** (0.317)	0.870* (0.384)	0.895* (0.396)
Gender: Female	-0.792 (0.808)	-1.050 (0.810)	-1.022 (0.823)
Constraints	1.149 (0.683)	0.996 (0.654)	0.754 (0.657)
Control variables			
Authority in the team			0.180 (0.160)
How long at the team			-0.039 (0.101)
Time devoted to team			0.073 (0.159)
Product development			0.532 (0.441)
RANDOM EFFECTS			
Team-level variance σ^2	0.611 (0.337)	0.515 (0.316)	0.388 (0.296)
-2 Log Likelihood model[#]	262.38	269.82	254.76

Notes: N=243 members in 44 teams for Model 1. N=231 members in 44 teams for Models 2 and 3. [†]Age 30-39 is a dichotomous variable.

Iterative Generalized Least Squares estimates. Numbers in parentheses are standard errors.

*** Significant at the 0.1% level * Significant at the 5% level (two-tailed). For testing random effects deviance tests are used. [#] Basis of comparison: baseline multilevel logistic regression without explanatory variables; α σ : 0.565 (0.302) for Model 1 and α σ^2: 0.480 (0.289) for Models 2 and 3.

As it is displayed in *Table 5*, we obtain different results for organizational prospects. For this dependent variable, not density, but constraints have a significant impact. As predicted by Hypothesis 2, constraints have a negative effect on organizational prospects. This effect is significant at the 5% level in Models 1 and 2, and close to the significance border in Model 3. Phrased in other words, the results imply that not social closure, but the efficiency and effectivity of the individual social networks impact positively the expectations to stay in the organization (constraints are the reverse of efficiency and effectivity).

Including respondents close to retirement provides a faulty picture about the effect of age on organizational prospects, which can be seen as a major difference in the

parameter estimates of age between Models 1 and 2. As predicted by Hypothesis 4a, age has a statistically significant positive linear effect on perceived company prospects in Model 2. When controlling for the time spent at the organization, however, the significant effect of age disappears (Model 3), which contradicts our original hypothesis. We have to conclude that it is organizational tenure that really matters for organizational prospects and not age per se.

Effects of density, gender, and control variables besides organization tenure are not significant. In Model 1, a statistically significant variation on the team-level is found, which is reduced in Models 2 and 3.

Table 5. Results of Multilevel Logistic Regression on Organizational Prospects

Independent variables	Model with all respondents	Models with respondents below age 50	
	Model 1	Model 2	Model 3
FIXED EFFECTS			
α baseline future organizational prospects	0.325 (1.022)	-0.570 (1.086)	-0.738 (1.236)
Team-level variables			
Density	0.623 (0.754)	0.473 (0.764)	-0.447 (0.775)
Individual-level variables			
Age	0.312 (0.178)	0.765*** (0.227)	0.242 (0.293)
Gender: Female	-0.329 (0.628)	-0.231 (0.655)	-0.015 (0.658)
Constraints	-1.264* (0.564)	-1.163* (0.581)	-1.156 (0.61)
Control variables			
Authority in the team			0.053 (0.165)
How long at the company			0.127** (0.042)
Time devoted to team			0.039 (0.155)
Product development			0.514 (0.427)
RANDOM EFFECTS			
Team-level variance ^{2}	0.647* (0.310)	0.607 (0.320)	0.358 (0.288)
-2 Log Likelihood model[#]	311.96	282.54	248.10

Notes: N=243 members in 44 teams for Model 1. N=231 members in 44 teams for Models 2 and 3. Iterative Generalized Least Squares estimates. Numbers in parentheses are standard errors.

*** Significant at the 0.1% level ** Significant at the 1% level * Significant at the 5% level (two-tailed). For testing random effects deviance tests are used. [#] Basis of comparison: baseline multilevel logistic regression without explanatory variables; α: 0.091 (0.188); σ^2: 0.770* (0.329) for Model 1 and α: 0.146 (0.195); σ^2: 0.834* (0.354) for Models 2 and 3.

Summarizing the results, it can be stated that we have found conditional support of our structural hypotheses: Hypotheses 1 and 2. The network structure matters differently for team prospects and for organizational prospects. With regard to perceived prospects to stay in the team, the closure of the team is influential. Considering the perceived prospects to stay in the organization, the efficiency and effectivity of the individual network exert a positive impact. Hypothesis 3 cannot be rejected as the bivariate relationship between gender and perceived prospects of staying in house disappears when structural variables are included in the analysis. We cannot be conclusive, however, about Hypothesis 3 because of the limited number of female respondents in our sample. Hypothesis 4b is confirmed: age has a curvilinear

effect on perceived prospects to stay in the team. On the other hand, the bivariate relationship between age and organizational prospects is caused by organizational tenure, which in fact exerts an impact on perceived prospects to stay in the organization.

DISCUSSION AND CONCLUSION

R&D endeavors in knowledge-intensive sectors require specialists with valuable skills. Since it is very difficult to find specialists on the labor market, companies have a strong interest to hold these specialists in their R&D teams and/or in their organizations. This study addressed the question about what does make these specialists expecting to stay in house, at their R&D team and at their organization respectively.

We concentrated on structural explanations, driven by two prominent arguments in the literature about the impact of embeddedness in social structures. The first argument claims that the closure of the social structure in which the employees are embedded increases positive feelings towards the team and it contributes to expectations of staying in the team and at the organization. The second argument suggests that the efficiency and effectivity of the individual networks determine career expectations. Translated into the question at hand it can be expected that both a higher closure of the team and a higher efficiency and effectivity of the individual network increase the likelihood to stay in the R&D team and at the organization. These arguments, however, contradict each other.

Our empirical study revealed that both arguments can be confirmed regarding different horizons. Social closure contributes positively to the perceived prospects to stay in the same R&D team also ten years from now. A different picture appears when looking at the perceived prospects to stay in the same organization. As the results show, not social closure, but the efficiency and effectivity of the individual networks affect the perceived prospects to stay in the same organization ten years from now positively. Considering the results, the tension between these two arguments can be enlightened in the way that the horizon determines the effect of different network structures on perceived prospects to stay in the R&D team and at the organization. In a limited social horizon, closure, trust, positive feelings are more important for a decision to stay. In a broader social horizon, the closure of network relations is irrelevant and a more efficient and effective network will determine the decision to stay and chances of an intra-organizational career. In short, our conclusions highlight that different forms of social capital might be important for different types of career decisions. This study, therefore, provides a way how a theoretical debate between opponents of social closure and structural holes can be resolved by formulating conditional predictions.

Our empirical study also found a curvilinear effect of age on perceived prospects to stay in the R&D team with middle-aged employees (30–39) having the highest expectations. On the other hand, it is not age, but organizational tenure that determines perceived prospects to stay at the organization. These results are in agreement with

well-known phenomena, namely, that the inter-organizational mobility among the youngest employees is the highest and organizational tenure contributes to preferential attachment to the organization. We have not found any effect of gender, but with only 14 women in the sample it cannot be well-researched whether gender plays an important role or not. This is a familiar problem, as it is difficult to research gender effects in R&D settings because R&D settings are 'male dominated'.

Translated into managerial terms and strategic human resource perspectives the results have two general implications for companies in knowledge-intensive sectors. First, for organizations with a concentrated R&D activity in order to hold valuable specialists and respectively the required knowledge in house, the preferable strategy is to create a densely knit team with a pleasant atmosphere. So, the managerial approach to hold these specialists should include a concentration on team building. There are many managerial tools to achieve a high team closure, such as frequent informal meetings, a focus on face-to-face communication, more coordinated interdependencies among the team members, or a reduction of physical proximity. Second, for companies with larger R&D departments it is more important to keep these specialists not necessarily in the team, but within the organization. For this reason, career perspectives should be made explicit within the organization, not only for holding valuable specialists, but also for creating clarity, and in turn prospects to stay. The results, thus, imply two different managerial tools to increase the likelihood that employees have a prospect to stay in smaller and larger organizations. Small organizations are often unable to offer sufficient upward mobility for R&D employees outside of their team and therefore may concentrate on teaming their R&D staff in a way that members are staying. Larger organizations that are more flexible in grouping and regrouping R&D teams can engage in creating individual network structures which are perceived as full of perspectives.

The study has illustrated how important the social structure (in which employees are embedded) is for their perceived prospects to stay in house. Consequently, staying or leaving is next to other factors a matter of how social networks are moulded. Future research on perceived mobility prospects in knowledge-intensive industries should, therefore, incorporate also this facet of individual decision making in the analysis. Moreover, a longitudinal study design can help to investigate the interrelation of the dynamics of social structure and mobility prospects.

REFERENCES

Balkundi, P. and Harrison, D.A. (2006): Ties, Leaders, and Time in Teams: Strong Inference about Network Structure's Effects on Team Viability and Performance. *Academy of Management Journal*, 49: 49–68.

Brass, D.J. (1985): Men's and Women's Networks: A Study of Interaction Patterns and Influence in an Organization. *Academy of Management Journal*, 28: 327–343.

Brüderl, J., Preisendörfer, P. and Ziegler, R. (1993): Upward Mobility in Organizations: The Effects of Hierarchy and Opportunity Structure. *European Sociological Review*, 9: 173–188.

Bryk, A.S. and Raudenbush, S.W. (1992): *Hierarchical Linear Models. Applications and Data Analysis Methods*. London: Sage.

Burt, S.R. (1992): *Structural Holes: The Social Structure of Competition*. Cambridge, London: Harvard University Press.

Carli, L.L. and Eagley, A.H. (2001): Gender, Hierarchy and Leadership: An Introduction. *Journal of Social Issues*, 57: 629–636.

Cassirer, N. and Reskin, B. (2000): High Hopes: Organizational Position, Employment Experiences, and Women's and Men's Promotion Aspirations**.** *Work and Occupations*, 27: 438–463.

Cohen, B.P. and Cohen, E.G. (1991): From Groupwork among Children to Innovation Teams. *Advances in Group Processes*, 8: 235–251.

Cohen, B.P. and Zhou, X. (1991): Status Processes in Enduring Work Groups. *American Sociological Review*, 56: 179–188.

Coleman, J.S. (1988): Social Capital in the Creation of Human Capital. In: Ganzeboom, H. and. Linderberg, S. eds.: *Verklarende Sociologie.* Amsterdam: Thesis Publishers.

Coleman, J.S. (1990): *Foundations of Social Theory*. Cambridge: Harvard University Press.

Correll, S.J. (2001): Gender and the Career Choice Process: The Role of Biased Self-Assessments. *American Journal of Sociology*, 106: 1691–1730.

Evetts, J. (1993): Women and Management in Engineering: the 'Glass Ceiling' for Women's Careers. *Women in Management Review*, 8: 19–25.

Feldman, D.C. (1989): Careers in Organizations: Recent Trends and Future Directions. *Journal of Management*, 15(2): 135–156.

Filippin, A. and Ichino, A. (2005): Gender Wage Gap in Expectations and Realizations. *Labour Economics*, 12: 125–145.

Finlay, W. and Coverdill, J.E. (2000): Risk, Opportunism, and Structural Holes. *Work and Occupations*, 27: 377–405.

Gabbay, S.M. and Zuckerman, E.W. (1998): Social Capital and Opportunity in Corporate R&D: The Contigent Effect of Contact Density on Mobility Expectations. *Social Science Research*, 27: 189–217.

von Glinow, M.A. (1988): *The New Professionals: Managing Today's High-tech Employees.* Cambridge, MA: Ballinger Publishing.

Goldstein, H. (1995): *Multilevel Statistical Models.* London: Edward Arnold Publishers.

Granovetter, M.S. (1973): The Strength of Weak Ties. *American Journal of Sociology*, 78: 1360–1380.

Griffin, A. (1997): *Drivers of NPD Success: The 1997 PDMA Report*. University of Illinois.

Grossman, G. and Helpman, E. (1991): *Innovation and Growth in the World Economy.* Cambridge, MA.: MIT Press.

Homans, G.C. (1974): *Social Behavior: Its Elementary Forms*. New York: Harcourt Brace Jovanovich.

Hopecroft, R.L. (1996): The Authority Attainment of Women: Competitive Sectors Effects. *American Journal of Economics and Sociology*, 55: 163–184.

van der Hulst, R. (2004): *Gender Differences in Workplace Authority. An Empirical Study on Social Networks*. Groningen: ICS Dissertation Series.

Igbaria, M., Kassicieh, M. and Silver, M. (1999): Career Orientations and Career Success among Research, and Development and Engineering Professionals. *Journal of Engineering and Technology Management*, 16: 29–54.

Jehn, K.A. and Shah, P.P. (1996): Interpersonal Relationships and Task Performance: An Examination of Mediating Processes in Friendship and Acquaintance Groups. *Journal of Personality and Social Psychology*, 72: 775–790.

Kanter, R.M. (1977): *Men and Women of the Corporation*. New York: Basic Books.
Kim, Y. and Cha, J. (2000): Career Orientations of R&D Professionals in Korea. *R&D Managament*, 30: 121–138.
Kim, Y., Min, B. and Cha, J. (1999): The Roles of R&D Team Leaders in Korea: a Contingent Approach. *R&D Management,* 29: 153–166.
Kratzer, J. (2001): *Communication and Performance*. Amsterdam: Thesis Publishers.
Kratzer, J., Leenders, R.Th.A.J. and van Engelen, J.M.L. (2004): Stimulating the Potential: Creativity and Performance in Innovation Teams. *Journal of Creativity and Innovation Management*, 13: 63–70.
Kratzer, J., Leenders, R.Th.A.J. and van Engelen, J.M.L. (2005): Informal Contacts and Performance in Innovation Teams. *International Journal of Manpower*, 26: 513–528.
Leenders, R.Th.A.J. and Gabbay, S.M. (1999): *Corporate Social Capital and Liability*. Boston: Kluwer Academic Publishers.
Leenders, R.Th.A.J., van Engelen, J.M.L. and Kratzer, J. (2003): Virtuality, Communication, and New Product Team Creativity: A Social Network Perspective. *Journal of Engineering and Technology Management*, 20: 62–92.
Leenders, R.Th.A.J., van Engelen, J.M.L. and Kratzer, J (2007): Systematic Design Methods and the Creative Performance of New Product Teams: Do They Contradict or Compliment Each Other. *Journal of Product Innovation Management*, forthcoming.
Morris, J.M. and Villemez, W.J. (1992): Mobility Potential and Job Satisfaction: Mixing Dispositional and Situational Explanations. *Work and Occupations*, 19: 35–58.
McGuire, G.M. (2000): Gender, Race, Ethnicity, and Networks. *Work and Occupations*, 27: 501–523.
Ohlott, P.J. and Ruderman, M.N. and McCauley, C.D. (1994): Gender Differences in Manager's Developmental Job Experiences. *Academy of Management Journal*, 37: 46–67.
Ornstein, S. and Isabella, L.A. (1990): Age vs. Stage Models of Career Attitudes of Women: A Partial Replication and Extension. *Journal of Vocational Behavior*, 36: 1–19.
Ornstein, S. and Isabella, L.A. (1993): Making Sense of Careers: A review 1989–1992. *Journal of Management*, 19(2): 243–267.
Reagans, R. and McEvily, B. (2003): Network Structure and Knowledge Transfer: The Effects of Cohesion and Range. *Administrative Science Quarterly*, 48: 240–267.
Reagans, R. and Zuckerman, E. (2001): Networks, Diversity, and Productivity: The Social Capital of Corporate R&D Teams. *Organization Science*, 12: 502–517.
Rice, R.E. (1994): Relating Electronic Mail Use and Network Structure to R&D Work Networks and Performance. *Journal of Management Information Systems*, 11: 9–29.
Roloff, M.E. (1987): Communication and Reciprocity within Intimate Relationships. In Roloff, M.E. and Miller, G.R. eds.: *Interpersonal Processes: New Directions in Communication Research.* Newbury Park, CA: Sage.
Rosen, B. and Jerdee, T.H. (1988): Managing Older Workers' Careers. *Research in Personnel and Human Resources Management,* 6: 37–74.
Seibert, S.E., Kramer, M.L. and Liden, R. (2001): A Social Capital Theory of Career Success. *Academy of Management Journal,* 44: 219–237.
Singh, J. (2005): Collaborative Networks as Determinants of Knowledge Diffusion Patterns. *Management Science*, 51: 756–770.
Sullivan, S.E. (1999): The Changing Nature of Careers: a Review and Research Agenda. *Journal of Management*, 25: 457–484.
Super, D. (1957): *Psychology of Careers*. New York: Harper & Brothers.

Super, D., Thompson, A. and Lindeman, R. (1988): *Adult Career Concerns Inventory: Manual for Research and Exploratory Use in Counseling*. Palo Alto, CA: Consulting Psychologists Press.

Tharenou, P. (1997): Explanations of Managerial Career Advancement. *Australian Psychologist*, 32: 19–28.

Valcour, P. M. and Tolbert, P. (2003): Gender, Family and Career in the Era of Boundarylessness: Determinants and Effects of Intra- and Inter-organizational Mobility. *International Journal of Human Resource Management,* 14: 768–787.

Wasserman, S. and Faust, K. (1994): *Social Network Analysis*. Cambridge: University Press.

Yoon, J. and They, S. (2002): A Dual Process Model of Organizational Commitment. *Work and Occupations*, 29: 97–124.