Exploring the Dynamics of Dual
Ladders: A Longitudinal Study

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INTRODUCTION

Organizations employing many professional specialists, engineers and scientists in particular, face the dilemma of establishing a reward system that is both stimulating to the professional and productive for the organization. This problem stems, in part, from the notion that specialist groups bring to the organization a set of attitudes and career aspirations that are in conflict with the organization's work requirements and career paths. As argued by Kornhauser (1962) and Hall (1968), many R&D professionals are socialized into their technical occupations with values and definitions of success that differ significantly from those prevailing in the traditional managerial setting. In the typical organization, for example, management expects authority to be discharged according to the hierarchical principle, delegated through a series of well-ordered job positions. Technical professionals, however, come to value the freedom to pursue their own technical interests, the responsibility for making judgements in areas of technical competence, and the ability to exercise control through their peer group.

For many years now, much has also been written about how professional incentives clash with those organizational incentives normally available to managers (see Kaufman, 1986; Raelin, 1987; and von Glinow, 1988 for recent reviews). In theory, many technical professionals are supposedly motivated by a desire to contribute to their fields of knowledge and to establish distinguished reputations within their technical disciplines. In a sense, they are strongly oriented toward work in their professions, developing strong commitments to their specialized skills and outside professional reference groups (Gouldner, 1956). Such a "cosmopolitan" orientation, however, often leads to less organizational loyalty. Managers, on the other hand, desire upward mobility in the organizational hierarchy. In a sense, they are more committed to developing their own "local" organizational careers. They do this by focusing more on the achievement of

company objectives and the acquisition of organizational approval and promotion. As one R&D professional recently framed it for us: "To have my ability recognized rather than my authority is far more rewarding." To the true professional, then, upward mobility in the managerial hierarchy is of little importance compared to autonomy in the practice of one's technical specialty. Success is, therefore, defined independent from managerial advancement. In short, the argument is that professionals acquire status and define success from the perspectives of their technical colleagues while managers build these same attributes from the perspectives of their organizational superiors.

Whether engineers and scientists in technology-based organizations are really more interested in peer recognition than they are in organizational advancement has been the subject of much debate. Many studies, including Allen (1977) and Ritti (1971), have shown, for example, that engineers are very different in their professional and organizational orientations from their more scientific counterparts. The findings of Kerr et. al (1975), Bailyn (1980), Schein (1988), and others also question whether one can truly generalize within any professional occupation while the results of Thompson et. al (1982) and Allen and Katz (1986) indicate that orientations can change significantly over time or through different career stages. Nevertheless, there is general agreement that within most organizations, there is some proportion of professionals who prefer technical problem-solving and for whom management has very little attraction.

The Dual Ladder Structure

Despite these purported "professional/managerial" differences, the highest rewards in most business organizations are conferred on those who assume additional managerial responsibility. Advancement up the managerial ladder secures increases in status, recognition, salary, influence, and power. For many professionally-oriented technologists, movement into management becomes the

most viable career strategy simply because their opportunities to achieve success without undertaking such managerial responsibilities are very limited As a result, many productive engineers and scientists feel frustrated as they are "pressured" to take on managerial and administrative roles they really do not want in order to attain higher salary and more prestige.

In addition to this source of individual frustration, the organization itself may also be adversely affected by its failure to provide alternative rewards for those technical professionals who either do not aspire to or who show no aptitude for management. As argued by Steiner (1988), Allen et. al (1988), and many others, long-term technology-based innovation requires the continued productive efforts of experienced engineers and scientists who will remain creative, current, and productive in their disciplines. The reluctant movement of highly competent individual contributors into management can seriously deplete the organization's pool of creative technical talent. Not all high performing technologists, moreover, have the interpersonal, communication, or leadership skills necessary to make an effective transition from technical specialist to technical manager (Badawy, 1988). Nevertheless, if technical professionals see managerial incentives as the only real path to higher pay and higher status, then these professionals will also feel compelled to become managers. The organization, as a result, not only loses their technical abilities but risks additional problems and discontent as their success as managers diminishes.

The "dual ladder system of career advancement" is an organizational arrangement that was developed to solve these individual and organizational problems by providing meaningful rewards and alternative career paths for organizational professionals (Kaufman, 1974). Generally speaking, the dual ladder approach is the formalization of promotions along two parallel hierarchies. One hierarchy provides a managerial career path while the other provides advancement as a professional

or staff member. They promise equal status and rewards at equivalent levels in the two hierarchies. Also known as the "technical" or "individual contributor" ladder, the dual ladder was established over forty years ago to reward professionals (especially scientists and engineers) for outstanding scientific and technical performance without having to remove them from their professional work (Shepard, 1958). By providing professionally-oriented individuals with an opportunity and incentive to remain active in their fields and to stay up-to-date, the dual ladder aims to secure for the high technology firm an adequate pool of technical talent.

Although dual ladders have now been in use for some time, their success has been the focus of much agonizing debate. A critical tone pervades the literature, and a whole host of problems have been identified (Roth, 1975; Allen and Katz, 1989). Most cultures, for example, automatically associate prestige with managerial advancement. Titles of Department Head and Vice President convey images of success while titles of Senior Researcher and Lead Engineer are considerably more ambiguous and therefore more subject to skepticism[1]. Many organizations exacerbate these differences by not living up to their promised commitments of creating equal status, perquisites, resources, and other financial and symbolic rewards to those of equivalent levels in the managerial and professional hierarchies. Frequently too, management does a poor job of publicizing the technical ladder and little observable change takes place either in work activities or responsibilities after technical promotion. Another problem arises when technical promotions are debated through justifications of past contributions while managerial promotions are more positively discussed in terms of future promise and potential.

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[1] One major company solves this problem by granting those on the top rung of their technical ladder the title of vice president.

Another set of problems concerns the nature of incentives associated with each ladder. Movement up the managerial ladder usually leads to positions of increased influence and power within the organization. The number of employees under a manager typically increases with promotion and such resources can be mobilized more easily to carry out the manager's needs and demands. In sharp contrast, advancement up the technical ladder usually leads to increased autonomy in the pursuit of one's technical interests but often at the expense of organizational influence and power (Goldner and Ritti, 1967; Allen and Katz, 1989). Neither the number of subordinates nor any visible means of power increase, fostering perceptions that the technical ladder might really be less important. The issue of relevance becomes even more difficult as the organization grants professionals enough freedom to select their work with little linkage between their activities and company objectives, returns, or paybacks. Such conflicts are aggravated even more as the organization chooses to either eliminate or de-emphasize certain areas of interest. As a result, supervision of individual contributors becomes more difficult and feelings of isolation from the organization become more pronounced. According to Emmons (1977), the risk is that the technical side becomes a "parking lot" for bright technologists whose abilities to generate ideas easily outstrips the capability of the organization for dealing with them. The rewards of freedom and independence can also bring with them feelings of rejection and disconnection.

Finally, there is the inevitable tendency to "pollute" the technical side of the dual ladder. In addition to rewarding outstanding technical performers who choose to remain in the organization as individual contributors, the technical ladder becomes a repository for less successful, unnecessary, and even incompetent managers. Over time, the criteria for technical promotion are gradually corrupted to encompass not only technical contributions but also organizational loyalty, rewarding those individuals who have been "passed over" for managerial positions.

Another common practice is to use the professional ladder primarily for pacifying individuals who are technically competent and who deserve to be rewarded, but who lack diplomatic skills or management ability. When this is done, it can make the technical ladder into a consolation prize, demotivating individuals who interpret technical promotions not as a reward but simply as a signal that they are "not good enough to be a manager." Certainly, such misuses undermine the integrity of the dual ladder system.

Much has been done over the past few years to improve the formal structures of dual ladder systems to alleviate these problems. Using internal and external peer reviews, organizations have begun "policing" their technical ladders to protect their purity and prevent the "dumping ground" abuses. They have tried to strengthen their commitment to the technical side through increased publicity, recognition, career counselling, and information dissemination; through making the ladders more comparable in numbers of people, and perquisites at equivalent hierarchical levels; through clearer job descriptions, qualifications, responsibilities, performance standards and reporting relationships; and through greater involvement in organizational decision-making and in influencing technical strategy.

Exploring the Promotional Dynamics of Dual Ladders

Despite these design changes, we still know very little about how technical professionals make sense out of the dual ladder system. One of the most persistent themes in organizational theory is that individuals build perceptions through their interactions and experiences with others (Weick, 1968; Salancik and Pfeffer, 1978). According to this social constructionist point of view, the success or failure of a dual ladder system will be defined not so much by structural features per se but by the actual promotional dynamics occurring within the organization. If the "better" people move along a particular ladder, for example,

then perceptions of success or the "right" track are more likely to be defined by this pattern.

Underlying this argument is the idea that scientists and engineers do not have well-defined notions of success and failure as they graduate and enter organizations to practice their technical specialties. Colleges and universities do not provide them with good definitions. Instead, success is characterized in very general terms such as "advancement", getting ahead", or "making a difference". Better definitions of success, therefore, must emerge from the organizational context in which individuals find themselves. Without a firm prior definition, how technologists come to view the organization's technical and managerial ladders will be influenced more strongly by their organizational contacts than by their professional socialization during their years of study.

According to the results of many studies, the most important set of contacts affecting one's organizational career success, develops through the mentoring relationship of one's immediate supervisor (Kanter, 1977; Kram, 1986). As discussed by Schein (1980) and Katz (1988), a professional's boss plays a critical role in helping to develop a more accurate assessment of an individual's skills and abilities, in understanding the norms and values of the local organizational context, and most important, in defining how the individual becomes socialized and accepted within the setting as a contributing member. Studies have also suggested that working for supervisors who are themselves promoted enhances the promotion chances of their subordinates (Webber, 1976; Katz and Tushman, 1983).

If supervisors influence the career outcomes of their technical subordinates, then engineers and scientists working for supervisors promoted along different ladders might, themselves, be affected differently in their subsequent promotions.

Technical professionals working for supervisors who receive a managerial promotion, for example, might then follow a very different pattern of promotions from their technical peers working for supervisors who receive a technical ladder promotion.

This research will investigate the career outcomes of technical professionals reporting to supervisors who were promoted on the two ladders. The key issue is not only whether one's chances for promotion are improved by working for more influential and promotable bosses, but whether and how promotional paths are affected.

The Influence of Gatekeeping Supervisors. Reasearch in RD&E environments consistently show that technological gatekeepers are extremely important in the effective transfer and utilization of external technology (Allen, 1977). Allen and Cohen (1969) define gatekeepers as those technical professionals who are strongly networked to both internal colleagues and external sources of technical information. They are also high technical performers who are interpersonally approachable and helpful. Findings by Tushman and Katz (1980) indicate that such individuals have a significant effect on the overall technical performance of development projects, while Katz and Tushman (1983) show their strong impact on the long-range retention of young technical professionals. Since many gatekeepers are also project supervisors, this study will also contrast how the promotional patterns of gatekeeping supervisors, in comparison to the other supervisors, influence the career outcomes of their technical subordinates.

The Influence of Communication. Over the past 20 years, empirical studies have demonstrated that interpersonal communication, rather than the written media, is the principal means by which technical professionals collect and disseminate important ideas and information. As shown by Graen and Ginsburgh (1977) and

Katz and Tushman (1983), it may not be the supervisor's hierarchical status per se that is important in enhancing the career outcomes of subordinates. More beneficial are the higher levels of work-related communication that are fostered by certain supervisors. Katz and Tushman (1983), for example, showed just how important gatekeeping supervisors could be in facilitating higher levels of internal communication to reduce turnover. In a related study Katz and Tushman (1981) found that promotions of project supervisors were strongly related to prior communication patterns. A higher level of internal communication was positively associated with managerial promotions but more isolated supervisors were promoted on the technical side. In a similar vein, this study will also examine the communication behaviors of technical professionals to see if supervisory relationships systematically affect either internal or external patterns of interaction, and whether any observed differences can be linked to promotional differences within the dual ladder system.

The Influence of Project Task Characteristics. One of the conclusions produced by research on the management of technology is that not all RD&E projects are alike in the way they function on in the way they should be managed. Because of strong differences in work requirements, there are substantial communication and information processing differences among groups involved in research, development, and technical support activities (Tushman, 1981). External communication with outside R&D colleagues, for example, has been found most important in applied research, while contact with other corporate areas, e.g., marketing, manufacturing and finance, is most important in development (Allen, Tushman, and Lee, 1979). Technological gatekeepers, moreover, are most important in development work but not particularly helpful in research areas (Tushman and Katz, 1980). As a result of such important task differences, the influence of supervisory promotions and communication patterns on the career

outcomes of technical professionals will be systematically examined in the research, development, and technical support areas.

Technical Performance. Technical creativity and performance in the past and present is the usual criterion for promotion to the technical ladder. Organizations hope, however, that these individuals will continue to be high technical performers and will continue to contribute technically to the organization. Many companies, however, are disappointed with the continued technical contributions of professionals promoted on the technical ladder. As a result, this study will also try to ascertain whether particular work experiences are especially effective in keeping technologists productive in a dual ladder system. Are technologists promoted from research settings to the technical side more likely to remain high performing than their counterparts from development and technical support areas? Given the problem of technical obsolescence, does age have any effect on a person's ability to remain productive? And finally, just how important is one's network of contacts, both inside and outside the company, for remaining a strong individual contributor in an organization whose work assignments are highly interdependent?

RESEARCH METHOD

This study was conducted among the 345 technical staff members of a large RD&E facility, divided into seven separate functional departments. A total of 61 projects, organized around different disciplines and product-based problems were identified across these departments. Only professionals assigned to these projects at the beginning of our data collection participated in this study. Each technologist was a member of only one project and worked for a single project supervisor.

Communications and Gatekeeping Supervisors. As described by Katz and Tushman (1979), each professional reported (on specially provided lists) those individuals with whom they had work-related communications on a randomly chosen day each week for 15 weeks. Using this method, we could accurately obtain for each technical professional six mutually-exclusive measures of communications as follows:

> 1. Departmental communication: The amount of communication with technical peers within the individual's functional department (including project).
>
> 2. Laboratory communication: The amount of communication with technical colleagues within the other six functional departments.
>
> 3. Supervisory communication: The amount of communication with the individual's immediate project supervisor.
>
> 4. Managerial communication: The amount of communication with the department manager.
>
> 5. Corporate communication: The amount of communication with individuals outside the RD&E facility but within other corporate divisions, primarily marketing, manufacturing, and finance.
>
> 6. External communication: The amount of communication with outside RD&E professionals.

Since gatekeepers are defined having high internal and external networks, this study defined gatekeepers empirically as those project members for whom both departmental and external communications were both in the top fifth of their respective distributions. This definition is consistent with prior studies, including, Allen (1977), Whitley and Frost (1973) and Tushman and Katz (1980). Based on these calculations, 15 (25%) of the project supervisors were also functioning as technological gatekeepers while 46 (75%) of the project supervisors were not.

Project characteristics. Using definitions described in Katz and Tushman (1979), respondents indicated how well the objectives of their work fell into the categories of research, development, or technical support. As in Pelz and Andrews (1966), project members also indicated the percentages of their project activities that fell into each of these three possible project categories. A weighted average of these two answers is used to calculate a score for each project member. To categorize projects reliably, these individual scores are then averaged within projects to yield a classification of 14 research, 24 development, and 23 technical support projects.

Promotion and Performance. Five years after the collection of the data on communication and reporting relationships, the authors returned to the organization to collect promotional data for all the original participants, i.e., all technical project members and project supervisors. In this organization, all technical and managerial ladder positions and titles start above the project supervisory level. Because the nature of our study had not involved anonymity, we could easily determine from the facility's personnel list of names and titles the promotional histories of our participants over the five years. For each technical professional and project supervisor, we could determine whether they were: (1) promoted on the technical ladder, (2) promoted on the managerial ladder, (3) not promoted above the project level, or (4) had left the organization. Finally, several high level managers, who were concerned about the overall effectiveness of dual ladders were asked to evaluate the current technical contributions of those who had been promoted along the technical side and for whom they had sufficient knowledge. A four point Likert scale ranging from low to high was used with individual ratings averaged to yield overall performance scores. Unfortunately, comparable performance ratings for those promoted along the managerial ladder could not be obtained.

RESULTS

In this type of longitudinal study, it is important to analyze samples of individuals who are comparable. In the ideal case, one should conduct a cohort-type of analysis, comparing professionals who are as similar in age and organizational experience as possible. In this organization, the ages of technical professionals promoted on both the technical and managerial ladders covered too wide a spectrum, ranging from the mid 20's to the mid 50's. Further examination of these distributions, however, reveals that 70 percent of those promoted on the technical side were in the 27-45 age range at the start of our study while 70 percent of those promoted managerially were in the 27-35 age range. All of the analyses reported here, therefore, are based on samples of professionals who fell within these age ranges at the start of our study and who remained within the organization over the succeeding five years. Despite the organization's strong growth during the five year interval, almost 37 percent of the original respondents had left. Previous studies have hinted that gatekeeping supervisors may play a strong role in the personal growth and development of project members, providing them with better work opportunities, increased exposure, and more effective information networks. The results (Table I) show how one's career outcomes are related in this organization to working for a gatekeeping supervisor. As reported in Table IA, 3.5 percent of those professionals working for a gatekeeping supervisor at the start of our study were later promoted on the technical ladder. Surprisingly enough, over four times as many (14.1%) of those not working for a gatekeeping supervisor received technical promotions. In fact, of the 18 professionals who received a technical ladder promotion, only one had been working for a gatekeeping supervisor.

A very different pattern appears for management promotions (Table 1B).

Looking at those professionals who had worked for a gatekeeping supervisor, one discovers that 41.2 percent received a management promotion, while only 15.2 percent of those not assigned to a gatekeeping supervisor received such a promotion - a significant difference in a direction opposite to that of Table 1A. In this organization, half of the 14 engineers receiving managerial promotions had reported to a gatekeeping supervisor.

TABLE I

Proportions of Engineers Promoted on Technical and Managerial Ladders as a Function of Their Supervisors' Gatekeeping Role			
A. Prior Role of Supervisor	Proportion Promoted to Technical Ladder	N	p
Assigned to Gatekeeping Supervisor	3.5%	28	
	*		0.05
Not Assigned to Gatekeeping Supervisor	14.1	121	
	Proportion Promoted to Management		
B. Assigned to Gatekeeping Supervisor	41.2	17	
	**		0.05
Not Assigned to Gatekeeping Supervisor	15.2	46	

* Analysis based on engineers in the 27 to 45 age range in which 70 percent of the technical promotions occurred.

** Analysis based on engineers in the 27 to 35 age range in which 70 percent of the managerial promotions occurred.

Since all but one of the gatekeeping supervisors in the organization were

promoted on the management ladder, it is also important to see how the career outcomes of professionals working for gatekeepers compares with other possibilities. This includes working for supervisors who were (1) promoted managerially, (2) promoted technically, (3) not promoted, or (4) had left the organization. In contrast to the findings for gatekeeping supervisors, the data (Table IIA) show that a large percentage (41.7%) of those professionals working for supervisors promoted on the technical ladder were themselves promoted technically. This is more than four times the rate for the other three categories, each of which is below 10 percent. In this organization, then, over

TABLE II

Proportions of Engineers Promoted on Technical and Managerial Ladders as a Function of Their Supervisors' Promotion Record			
A. [*] Supervisor' Career Progress	Proportion of Subordinates Promoted to Technical Ladder	N	p
Promoted Managerially	7.7%	65	0.01
Promoted Technically	41.7	24	0.01
Not Promoted	9.1	11	0.01
Left the Organization	5.6	36	0.01
B.	Proportion of Subordinates Promoted to Management		
Promoted Managerially	30.0	30	N.S.
Promoted Technically	9.1	11	N.S.
Not Promoted	11.1	9	N.S.
Left the Organization	23.1	13	N.S.

[*] Analysis based on engineers in the 27 to 45 age range in which 70 percent of the technical promotions occurred.

[**] Analysis based on engineers in the 27 to 35 age range in which 70 percent of the managerial promotions occurred.

half of those professionals promoted technically not only were not working for a gatekeeping supervisor, but were working for supervisors who followed the technical track. The results from Table IIB, on the other hand, are not nearly as strong as those found in Table IB. Only 30 percent of the engineers reporting to supervisors promoted managerially received a similar promotion. This reduced rate stems from the fact that less than 10 percent of those working

TABLE III

Proportion of Engineers Promoted on the Technical Ladder as a Function of Their Supervisors' Promotion Record and Previous Area of Work

Area of Work	Supervisor's Career Progress			
	Promoted Managerially	Promoted Technically	Not Promoted	Left the Organization
Applied Research	13.3%* (N=15)	66.7%* (N=12)	--- (N=0)	0* (N=7)
Product or Process Development	5.0 (N=40)	12.5 (N=8)	0 (N=5)	6.7 (N=15)
Technical Support	10.0 (N=10)	25.0 (N=4)	16.7 (N=6)	7.1 (N=14)

* P < 0.01

Analysis based on engineers in the 27 to 45 age range in which 70 percent of the technical promotions occurred.

for non-gatekeeping supervisors promoted managerially were also promoted to management positions. This low rate is comparable to the rates of those reporting to supervisors promoted technically or not promoted. It is even less than half the rate of those whose supervisor had left. Gatekeeping supervision is by far the most instrumental factor for high rates of managerial promotion, fostering over 64 percent of such promotions.

The data in Table III are the same results as those in Table IIA but analyzed by the project areas in which professionals had worked. Although the sample

sizes are small, the highest rate of technical promotion occurs for those who worked on applied research projects for supervisors promoted on the technical ladder. Two-thirds of these professionals received technical promotions over the five year period, a rate considerably higher than those in the other 11 cells. Contrastingly, with respect to managerial promotions, those professionals who had worked on development projects for gatekeeping supervisors received the highest rate of managerial promotion. Two-thirds of them received management positions. One must be careful, however, in interpreting this result, since sample sizes are again very small. Nevertheless, this rate is significantly higher than the managerial promotion rates for any other project or supervisory category (the rate in development work with a non-gatekeeping supervisor, for example, was only 18.5%).

Clearly, gatekeeping supervisors have significant impact on the managerial promotion rates of their technical subordinates, especially in development efforts. What is it that brings about these higher rates of promotion? As previously discussed, gatekeepers may influence the communication networks of other professionals, enhancing their exposure and linkages to important information sources. An analysis is, therefore, made to ascertain whether engineers reporting to gatekeepers have significantly different interaction patterns than those not reporting to gatekeeping supervisors. The results portray a strong influence by gatekeepers over the communication activity of their technical staff except in the applied research area (Table IV). Engineers reporting to gatekeepers have much more contact with their departmental colleagues and their gatekeeping supervisors than those engineers working for a non-gatekeeping supervisor. More important, however, is the finding that in both the development and technical support areas, engineers working for gatekeepers have four times as much contact with their department managers. It appears that gatekeeping supervisors can strongly promote the hierarchical

integration of their technical staffs.

TABLE IV

Mean Level of Engineers' Communication as a Function of Supervisor's Gatekeeping Role and Nature of Work			
Direction of Communication	Communications per Month		
	Applied Research	Product/Process Development	Technical Support
Departmental Colleagues			
Engineers with a Gatekeeping Supervisor	99.3	193.0*	153.7*
Engineers without a Gatekeeping Supervisor	93.6	109.7*	91.8*
Laboratory Colleagues			
Engineers with a Gatekeeping Supervisor	28.8	23.5	11.2
Engineers without a Gatekeeping Supervisor	22.7	22.6	10.4
Immediate Supervisors			
Engineers with a Gatekeeping Supervisor	24.3	26.5	28.7
Engineers without a Gatekeeping Supervisor	21.8	17.3	19.2
Department Manager			
Engineers with a Gatekeeping Supervisor	5.6	8.5**	10.9**
Engineers without a Gatekeeping Supervisor	3.4	2.1**	2.7**
Other Functions in the Company			
Engineers with a Gatekeeping Supervisor	3.8	21.9	19.6
Engineers without a Gatekeeping Supervisor	5.8	21.6	24.0
External Professionals			
Engineers with a Gatekeeping Supervisor	3.2	1.8	0.6
Engineers without a Gatekeeping Supervisor	2.6	1.1	1.0

*$p < 0.05$
**$p < 0.01$

Analysis based on engineers in the 27 to 35 age range in which 70 percent of the managerial promotions occurred.

Finally, we wished to see if we could get some better insight into why some

engineers remain more effective technical contributors on the technical ladder. An examination of the current technical performance data for professionals promoted to the technical track did not reveal any significant differences in current performance either by age or by nature of work. In addition, none of the prior measures of communication relate significantly to current technical performance except for communications with other functions. There is a strong positive relationship between the degree to which professionals interacted with other corporate areas and the extent to which they were contributing effectively to the organization five years later (Table V). This relationship remains strong even when reexamined by age and by project area.

TABLE V

Correlation Between Communication with Other Functional Areas in the Company by Engineers Promoted on the Technical Ladder and Performance Five Years Later			
	N	r	p
All Engineers	18	0.66	0.01
Engineers in:			
Applied Research	9	0.81	0.01
Development and Technical Support	9	0.64	0.05
Engineers Who Were:			
Under 39 Years	9	0.74	0.01
39 or Older	9	0.65	0.01

DISCUSSION

The research findings reported here demonstrate very clearly just how much the relationships and contacts taking place within a given organizational context can affect the dynamics of a dual ladder system. As hypothesized, professionals do not have well-defined preconceived notions of success upon graduation; instead, their careers and perceptions develop from their organizational experiences. In

particular, our results suggest that first-level supervisors play a strong role in the shaping of the professional's outlook toward the dual ladder system. In this organization, there were very different patterns of influence on the promotions of individuals to the technical and managerial ladders. Those supervisors who were promoted on the technical ladder strongly affected their subordinates who tended to follow that path, especially if they were working in applied research. Very few managerial promotions took place for professionals reporting to these supervisors; in fact, only one such promotion occurred. In contrast, professionals working for gatekeeping supervisors were not only more likely to be promoted but were more likely to assume management positions. Very few of the professionals reporting to gatekeeping supervisors received a promotion on the technical side. There was, as before, only one such occurrence.

By examining these kinds of dynamics, organizations can gain insight into the success of their dual ladder systems. The promotional data reported in this paper not only supports the disproportionate influence that supervisors have on the career outcomes of their subordinates, but also points out the concerns that can emerge in a dual ladder system if these influence patterns become highly restrictive. Technical professionals in this organization, for example, who value or want a managerial career but who find themselves working for supervisors "going technical" may feel frustrated and disenchanted as they see less visible support for their career choice. Similar dissatisfaction could emerge for those professionals wishing to remain individual contributors but who find themselves working for supervisors who strongly favor the managerial side. In a dual ladder system, such mismatches need to take place if organizations are to fully utilize the talents of their technical work force across the full spectrum of RD&E activity. Past research also shows that supervisors promoted technically are less well integrated into the communication network within their organizations than their managerially promoted counterparts. If these supervisors are also strongly

instrumental in the socialization of those professionals who follow them to the technical side, then it is likely that such isolation will become self-sustaining. Perhaps this is a reason why so many companies feel that those on the technical ladder are disconnected from what is going on in the organization. If the technical ladder involves greater freedom over what one does, and if those on the ladder have less interaction with others in the organization, the tendency may be to choose work that is even less interdependent, i.e., less mainstream, thereby aggravating the situation even more.

Much of the controversy surrounding dual ladders revolves around the issue of power: those on the management side have it; those on the technical side do not. The promotional patterns revealed in this study highlight part of this problem. Given the role that gatekeepers play in their technical environments, they represent a strong source of both formal and informal power. It makes sense, therefore, that the ladders these individuals choose to follow will greatly affect the allocation of power. In this organization, all but one of the technological gatekeepers were promoted to the management track. Such a one-sided situation is probably not conducive to a meaningful and equitable distribution of power across the two ladders. How gatekeepers are promoted and distributed across the dual ladder may be very critical to the ultimate success of the organization's dual ladder system.

Finally, our findings suggest that professionals promoted to the technical side are more likely to remain effective if their work experiences prior to promotion are not narrowly defined but involve interaction with other corporate areas. This was a very robust finding in that the relationship held up in all sub-analyses. There may be many alternative explanations for this strong relationship. By being exposed to other parts of the organization, perhaps these individual contributors were able to develop linkages to those places that became important sponsors or recipients

of their work. Perhaps these experiences gave them a greater awareness of how to present ideas and information more effectively to other parts of the organization. Although many such possibilities exist, the beneficial effects of these kinds of cross-functional interactions need to be validated and better understood, for the ultimate success of a formal technical ladder will depend on the organization's perceptions of the "returns" from this population. Finally, readers must note that all of the analyses presented in this paper may be idiosyncratic to this organization. Nevertheless, it is through studies of the present sort that we will learn more about the true dynamics of dual ladders so organizations can take more specific action to improve their systems and the phrase "the dreaded dual ladder" will not be so commonly heard.

(References are available from the authors upon request)