# The dual ladder: motivational solution or managerial delusion?

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### Abstract

The 'Dual Ladder' reward system has been used for years by industry as an incentive system to motivate technical performance. Its effectiveness has been called into question on many occasions. The paper will report the results of a survey of nearly 1,500 engineers and scientists in nine U.S. organizations. In this survey, engineers were asked to indicate their career preferences in terms of increasing managerial responsibility, technical ladder advancement or more interesting technical Responses indicate marked dependent differences in response, particularly a strong increase in the proportion preferring more interesting project work over either form of advancement.

### INTRODUCTION

The effectiveness of so-called 'dual ladder' career systems has long been debated in both industrial and academic circles (Moore and Davies, 1977; Smith and Szabo, 1977; Sacco and Knopka, 1983). The idea was conceived somewhere in the dim past by a research manager or personnel administrator, who hoped to increase the number of career opportunities available to high performing technical professionals and thereby to sustain their motivation.

The original idea held to the implicit assumption that productive engineers and scientists were being 'forced' into administrative roles in order to attain higher salary levels and organizational prestige. Their technical talents were thereby lost to their organizations. The assumption that productive scientists and engineers had to be 'forced' into management was shown to be invalid. Many studies (Ritti, 1971; Krulee and Nadler, 1960; Bailyn, 1980) have shown

that a very high proportion of scientists and engineers in industry see their career goals in terms of eventual progress in management. In fact, a recent survey of MIT freshmen shows fully 20 percent of those choosing engineering majors citing management as their ultimate career goal.

Nevertheless, there remains some proportion of the technical staff of most organizations who prefer to remain in full contact with technical problem solving, for whom management has no attraction, and who could potentially find a technical ladder career rewarding. The basic question is just how large this proportion is.

Companies vary widely in their estimates. Some restrict technical ladder entry severely, while others promote a relatively high proportion of their staff into technical ladder positions. Companies also vary widely in their enthusiasm over the concept. A representative of one company, who requested anonymity, reported to the authors that when his company was recently considering the possibility of such a system, he informally polled the management of 13 other companies that already had such a system. Most reported varying degrees of satisfaction, but when asked if, given the chance, they would do it over again, 12 of the 13 replied definitely not.1

The problems underlying the dual ladder concept are several. First there is a general cultural value which attaches high prestige to managerial advancement. Managers are seen as important in our society in general. Vice presidents are accorded high prestige. Someone working for an industrial organization with the title of Senior Research

Conversations which one of the authors has had recently with managers of the thirteenth company question its status as an exception.

Fellow is not accorded the same degree of prestige by society at large. As a result, technical staff begin very early to think about eventually attaining a management position. Consequently when told that they have been selected for promotion to a technical ladder position, such a person hears a very different message. He hears that the organization does not think that he will make a good manager. The technical ladder promotion then becomes a consolation prize, and very often de-motivates an otherwise productive member of the staff.

Second, despite many organizations' attempts to equate pay and perquisites for the two ladders, there is one key ingredient of the managerial ladder which is missing from the technical ladder, viz., power. As an individual progresses on the managerial ladder, the number of employees reporting to that individual generally increases. When that manager requests action, those subordinates generally mobilize to accomplish the action. This is a strong external indicator of power, hence also prestige. As an individual progresses on the technical ladder, neither the number of subordinates nor visible power increase. Hence a technical ladder position is viewed inside the organization as less important than its supposedly equivalent management counterpart.

Finally, organizations tend, over time, to diverge from the initial design and intent of the system. For the first few years, the criteria for promotion to the technical ladder may well be followed rigorously, but they gradually become corrupted. The technical ladder often becomes a reward for organizational loyalty rather than technical contribution. Equally damaging is the even more prevalent tendency to use the technical ladder as a repository for failing managers (Smith and Szabo, 1977). Either of these practices will destroy whatever reward value there may be in the dual ladder system.

Given all of this, two key questions develop. First of all, what proportion if any of a laboratory's technical staff will find the technical ladder career an attractive one? Second, for those others who will never be promoted to the limited number of managerial positions, and who are not necessarily inclined toward the technical

ladder, what can be done to reward and continue to motivate them?

To address these questions, technical staff from nine organizations were asked, along with a number of questions, to indicate their career preferences, whether toward management, technical ladder, or whether they might simply be interested in project assignments of challenging and exciting nature irrespective of promotion (Table 1).

### RESEARCH METHODS

The data presented in this paper were collected in a study of engineers and scientists in nine major U.S. organizations. The selection of participating organizations could not be made random, but they were chosen to represent several distinct sectors and industries. Two of the organizations are government laboratories, one in the U.S. Department of Defence the other in the National Aeronautics and Space Administration; three are not-for-profit firms doing most of their business with government agencies. The four remaining organizations are in private industry: two in aerospace, one in the electronics industry and one in the food industry.

In each organization short meetings were scheduled with the members of the technical staff to explain the general purposes of the study, to solicit their voluntary cooperation and to distribute questionnaires to each engineer individually. In addition to the usual demographic questions, the questionnaire included a number of questions about the ways in which each individual viewed his future career and the ways in which the organization structured its reward system around career factors. There are also a number of questions addressing the way in which engineers view their jobs and the importance that they attach to various features in their jobs. The central questions around which the present paper is developed are those shown in Table 1. These questions ask engineers their preference in terms of progression on either the managerial or technical ladders or in lieu of these, the opportunity to engage in challenging and exciting projects irrespective of promotion. The third question was included just for

Table 1

Format of the Question							
o what extent would you like your caree	r to b	e:					
a progression up the technical professional ladder to a							
higher-level position?	1	2	3	4	5	6	7
a progression up the managerial ladder to a higher-level							
position?	1	2	3	4	5	6	7
<ul> <li>the opportunity to engage in those challenging and exciting research activities and projects with which you are most interested, irrespective</li> </ul>							
of promotion	1	2	3	4	5	6	7

what was expected to be those few engineers who might not be interested in the traditional paths of organizational progress.

Individuals were asked to complete their questionnaires as soon as possible. Stamped, return envelopes were provided so that completed forms could be mailed to the investigators directly. These procedures not only ensure voluntary participation, but they also enhance data quality since respondents must commit their own time and effort. The response rate across organizations was extremely high ranging from 82% to a high of 96%. A total of 2,157 usable questionnaires were returned.

### RESULTS

Respondents varied in age from 21 to 65 with a mean of 43 and standard deviation of 9.6 years. Managers and those holding technical ladder positions are included. There are 374 managers and 351 engineers in technical ladder positions among the 2,157 who completed the survey.

Respondents were initially classified as being oriented toward a technical, managerial, or project-centred career if their response on one of the three scales exceeded the response on the other two by at least one scale point. Those who reported equally favouring any two of the three options were left out of the analysis. A total of 1,495 respondents indicated a preference for one

of the three options. Of these, 488 (32.6%) preferred the managerial ladder over the two alternative career paths, 323 (21.6%) preferred the technical ladder and a surprising 684 (45.8%) reported a preference for having the, 'opportunity to engage in those challenging and exciting research activities and projects with which (they) are most interested, irrespective of promotion.'

Such a large proportion of respondents preferring a somewhat non-traditional form of reward arouses suspicions that the wording in the question may have made the alternative more attractive than was intended. It would seem reasonable that, were this the case, the induced preference would not be as strongly felt as preferences based on the more substantial conviction. Increasing the margin of preference required in defining orientation does not, however, decrease the proportion of those preferring interesting projects (Table 2).

In fact, the number of engineers reporting the project preference is not as sensitive to the increased margin of specification as are the numbers preferring managerial or technical ladders. It would certainly appear from this that the project preference is relatively strongly held and is unlikely to have resulted to any significant degree from the wording of the question.

In addition, a more recent study (Epstein, in preparation), using a less strongly worded third alternative, has produced nearly identical results.

Table 2

Sensitivity Analysis of the scale margin used in defining career orientation							
Margin of	number of respondents preferring:						
preference scale point)	managerial ladder	technical ladder	interesting projects				
1	458	302	642				
	(32.7%)	(21.5%)	(45.8%)				
2	290	128	393				
	(35.8%)	(15.8%)	(48.4%)				
3	151	50	213				
	(36.5%)	(12.1%)	(51.4%)				

# Orientation as a Function of Age

Career preferences, as one might expect, are significantly related to age (F=18.25; df=2, 1,399; p < 0.001). The proportion of engineers citing a preference for interesting projects increases almost monotonically with age (Figure 1). This may be due, partially, to a realization that advancement opportunities along the two traditional ladders are diminishing with age. This can be only partially true, since such a high proportion of those in their twenties indicate this preference. In fact, it is the most preferred alternative for all engineers, save those from 25 to 30.

The technical ladder career attracts the smallest proportion of engineers in all ages. The proportion indicating this preference hovers around 20 percent showing only a mild peak among those in their thirties. The proportion preferring a managerial career peaks in the late twenties and declines steadily thereafter.

# Career Preference as a Function of Position

As one might expect, managers report a marked preference for a managerial career. There is some diminution with age (Figure 2) with a concomitant increase in preference for interesting projects. Only for a brief period in their late thirties do managers show any interest in the technical ladder.

Most of the engineers, who are on the technical ladder, prefer one of the other two alternatives. The younger ones tend to prefer management over the technical ladder. Older technical ladder engineers indicate a preference for interesting projects.

# Characteristics of Engineers as a Function of Orientation

Those engineers, citing different career preferences, differ in a number of other interesting ways as well (Table 3). As expected, those preferring the technical ladder are more concerned with their professional reputation, while those preferring management are more concerned with organizational matters. They prefer more to work on projects of importance to the organization and on those they see as having a potential for advancement.

The project oriented engineers are apparently not so concerned with the externalities. They seem much more influenced by the intrinsic nature of the task. They prefer technically challenging projects, having the freedom to be creative and original and working with competent colleagues.

The three orientations seem to appeal to very different kinds of people. Of course if individuals shift their orientation over time, as the data of Figure 1 suggest, then it is certainly possible that all of these other preferences change as well in order to

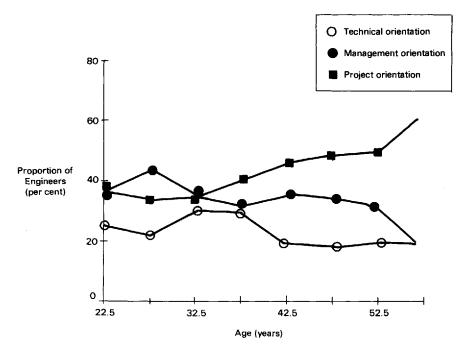


Figure 1 Career preferences of Engineers in nine organizations as a function of age (N=1402)

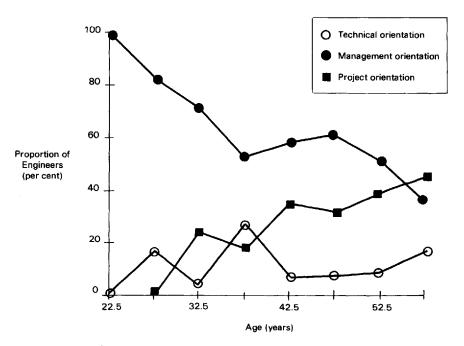


Figure 2 Career preferences of managers as a function of age (N=374)

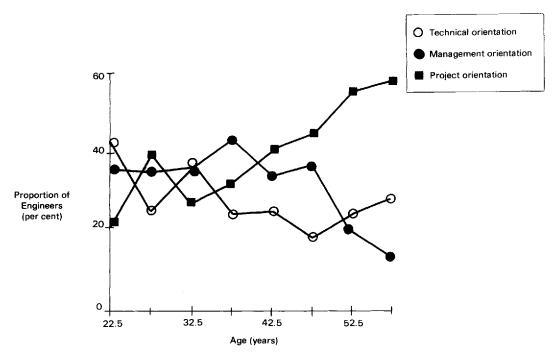


Figure 3 Career preferences of technical ladder engineers as a function of age (N = 351)

Table 3

Importance of job characteristics as a function of career orientation									
		orientatio							
perceived importance of:	managerial	technical ladder	project	p					
being able to pursue own ideas	5.72	5.70	5.82	NS					
building a professional reputation	5.74	5.82	5.26	0.001					
working with competent colleagues	5.77	5.83	5.94	0.05					
working on technically challenging tasks	6.04	6.29	6.32	0.001					
working on organizationally important projects	5.36	4.74	4.70	0.001					
working on projects leading to advancement	5.94	5.06	4.09	0.001					
working on professionally important projects	4.92	5.11	4.81	0.01					
having freedom to be creative and original	5.78	5.99	6.07	0.001					

preserve a logical system. The present data, being cross-sectional, cannot determine whether actual changes in individual orientation of engineers preferring management have increased in recent years with a concomitant decrease in those who are interested more in engineering work. If there is a change over time, it would seem to be a major reorientation of the individual's motivational base. It is important to note the positioning of the questions in the questionnaire. Those dealing with motivational issues were intentionally placed several pages ahead of the career orientation questions. So the responses to those questions were not prompted by any thought on the part of the engineer as to career preferences.

Choosing two of the motivational variables, which show a significant difference across orientations, we see a fairly stable preference by orientation across different ages (Figures 4 and 5). Young engineers with a project orientation value the freedom to be creative and original at least as much

as their older colleagues. Similarly, those with a management orientation prefer to work on organizationally important projects without regard to age.

# Perception of the Reward System

Following the question about career orientation respondents were asked to indicate the most likely form of reward for high performance in their job. They were given the same three alternatives, management promotion, technical ladder advancement or interesting project assignments.

A relatively high proportion of the younger engineers see the technical ladder as the most likely reward. For those over 30, this diminishes considerably and interesting project assignments are seen to be the most likely form of reward (Figure 6). Only about 20 to 25 percent of respondents see a management promotion as the most likely reward. This is less sensitive to age than

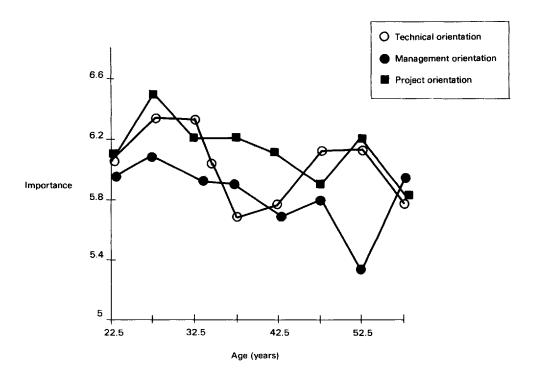


Figure 4 Importance of having freedom to be creative and original

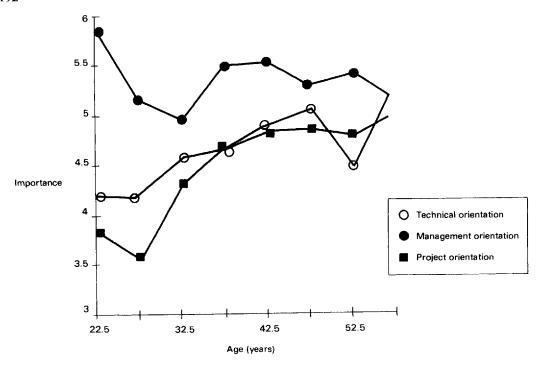


Figure 5 Importance of working on organizationally important projects

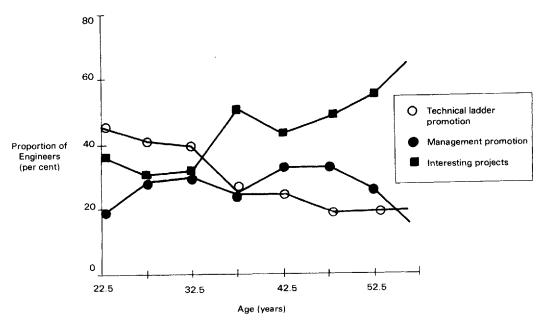


Figure 6 Perception of rewards for performance as a function of age (N=1061)

either of the other two alternatives and doesn't decrease much in likelihood with age, at least before the age of 50.

Examining the reward value of each form of promotion separately produces some very interesting results. The technical ladder promotion is seen by young people of all three orientations to be a reward for high performance. Naturally it is those with a technical ladder orientation who themselves feel more strongly about this (Figure 7). After the age of 40 however, there is, on the average, general disagreement with the proposition that high performance will lead to a technical ladder promotion. This is true to some degree even for those oriented toward the technical ladder career.

As for a management promotion coming as a reward for performance only the managers really believe this to be true (Figure 8), and even their belief diminishes with time. At no point, however, do they disagree with the proposition. Everyone else, particularly those engineers with a project orientation, disagrees that a management

promotion would result from high job performance.

Interesting projects are seen as a reward for performance by those with the project orientation and by young engineers with a technical ladder orientation (Figure 9). At no point do those with a managerial orientation agree with this possibility.

In general, with the possible exception of the technical ladder oriented engineers, those with different orientations tend to see performance rewarded in the direction favoured by their orientation. In the case of those inclined toward the technical ladder this is true while they are young but diminishes considerably with time. Of course there is no way of filtering cause from effect in these observations. It may be that the perceived reward system is the basis for the orientation. On the other hand it may very well be that the orientation is acquired for other reasons and through a rationalization process the engineer comes to believe that high performance will advance him in the desired direction.

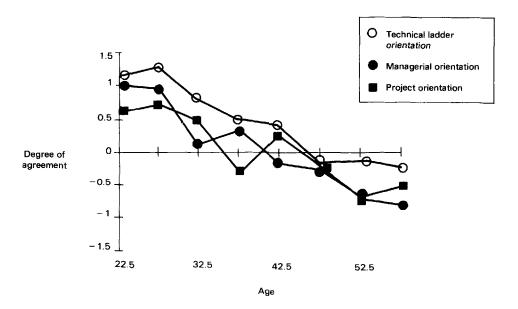


Figure 7 Agreement with the statement that high performance leads to technical ladder promotion as a function of career orientation

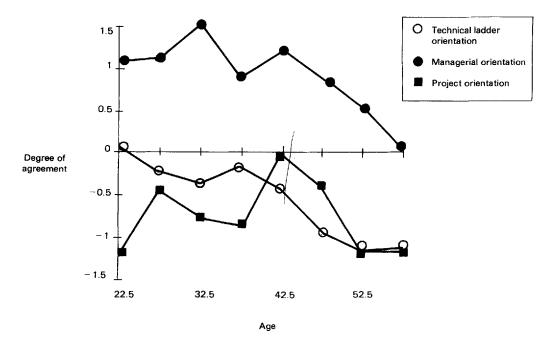


Figure 8 Agreement with the statement that high performance leads to managerial promotion as a function of career orientation

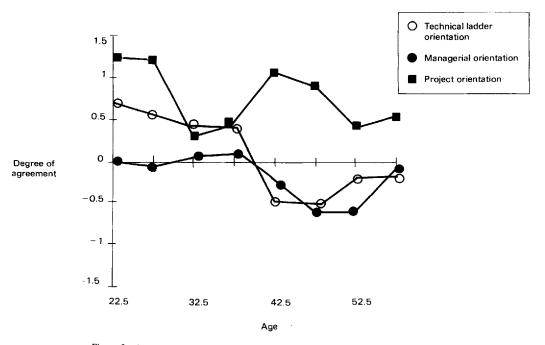


Figure 9 Agreement with the statement that high performance leads to interesting project assignments as a function of career orientation

# Perceptions as a Function of Position

Finally, grouping individuals as a function of their actual position rather than orientation produces some interesting results. Roughly 30 percent of the engineers already on the technical ladder indicate a preference for that type of career trajectory. On a seven-point scale, their degree of preference averages between 5.0 and 5.5 (Figure 10). Only about 10 percent of managers would prefer a technical ladder career. Only for a brief period in their late thirties do managers seem attracted by the relative freedom of the technical ladder, but they recover from that fairly quickly.

When it comes to preference for a managerial career, managers are unequivocal (Figure 11). They rate it higher than anyone. Interestingly, technical staff rate the

managerial career higher than do other engineers, particularly as they become older.

Interesting project assignments increase in desirability for all engineers, managers included, as they age (Figure 12). Although younger managers do not seem to place a very high value on the nature of the work that they are asked to do, they eventually come to feel almost as strongly about this as do their subordinates.

### CONCLUSIONS

It is very clear from the data that, while young engineers generally seek managerial advancement, a substantial proportion report a preference for what has come to be known as 'technical ladder' advancement in

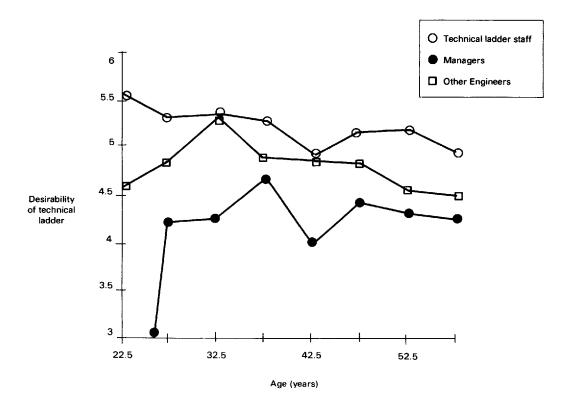


Figure 10 Preference for technical ladder as a function of job classification

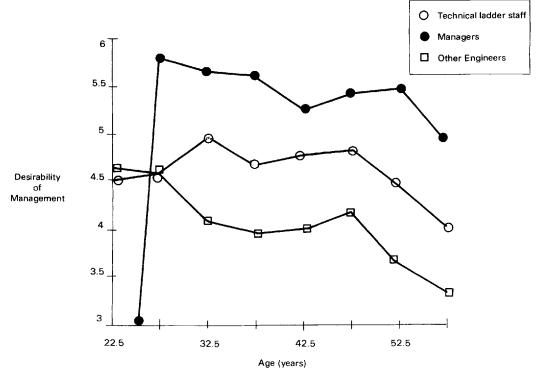


Figure 11 Preference for managerial career as a function of job classification

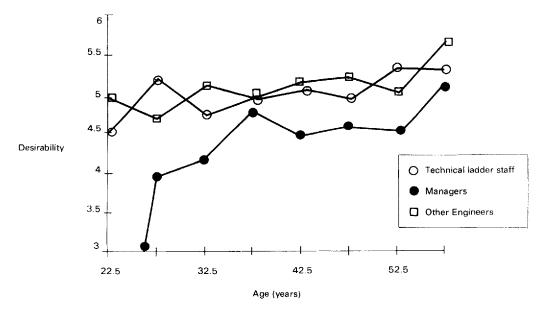


Figure 12 Preference for interesting projects as a function of job classification

the organization. Both of these more careeroriented motivations decline with age and are replaced with a desire for more interesting work content, without regard to organizational standing.

An open question remains over the degree to which this result from rationalizations by those who have given up on the possibility of promotion or whether it is a real change of attitude with age. The latter could be the result of an increased awareness of the costs (increased travel, longer hours, administrative burden, etc.) that are often associated with organizational advancement.

The existence of a substantial proportion of young engineers who indicate the 'interesting project' preference and the fact that engineers with this orientation differ significantly on several other parameters, indicates that there is some underlying substance distinguishing this group. Managerially-oriented engineers differ from those with a technical orientation, and project-oriented engineers differ significantly from both of them.

The increasing concern for work is very important and largely neglected in the case of older engineers. Work assignments for older engineers are often made with the implicit assumption of the inevitability of technical obsolescence. That inevitability has been seriously challenged in recent years (Cf. Cole, 1979; Kaufman, 1975). Furthermore such an assumption leads to work assignments that are inherently challenging and thereby creates a selffulfilling prophecy, guaranteeing obsolescence. Recent research (Felsher, et. al., 1985) shows that instead of age being the cause of obsolescence, the failure of management to provide challenging work and to emphasize the need for technical currency is the more likely cause. If older engineers seek more challenging work and seldom find it, can there be any wonder that they often allow themselves to sink into obsolescence?

The present research results reinforce the formula for career growth proposed by Katz (1982). Older engineers can be challenged by modifying job assignments and thereby forcing the acquisition of new knowledge. That they seek this type of challenge is quite evident in the data.

## **ACKNOWLEDGMENTS**

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