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The Influence of Gatekeepers on Project Performance in a Major R&D Facility*

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Abstract

Research indicates that certain boundary spanning individuals, labelled gatekeepers, can be an important linking mechanism between organizations and their external environments. This study investigates the role of gatekeepers in the transfer of information in a single R&D setting by comparing directly the performance of project groups with and without gatekeepers. Results indicate that gatekeepers perform a linking role only for projects performing tasks that are locally oriented while universally oriented tasks were most effectively linked to external areas by direct project member communication. Evidence also suggests that gatekeepers do more than mediate external information; they appear to facilitate the external communication of their more local project colleagues. Direct contact and contact mediated by gatekeepers, then, are two contrasting ways to link project groups with their external areas. The relative effectiveness of these linking mechanisms is contingent on the nature of the project's work.

THE INFLUENCE OF GATEKEEPERS ON PROJECT PERFORMANCE IN A MAJOR R&D FACILITY[1]

Oral communciation networks represent an important medium through which information and new ideas are constantly transmitted both within and across organizational boundaries (Boorman, 1975; Allen, 1977). The research reported here focuses explicitly on the effectiveness of the gatekeeping function within the actual communication networks of a major R&D facility. Gatekeepers are those key individual technologists who are both strongly connected to internal colleagues and strongly connected to sources of external technology.[2] More specifically, we will investigate the relationships between the existence of gatekeepers and project performance for different kinds of tasks and technical activities. Such comparative results should increase our understanding of the role played by gatekeepers in the effective transfer and utilization of external technology and information.

Gatekeepers and Technology Transfer

Organizational systems must be able to collect and process information from outside sources in order to keep informed about relevant external developments and technological innovations (Myers and Marquis, 1969; Utterback, 1974). One way of dealing with the growing demands of information processing is through specialization -- certain specialized individuals or groups evolving to keep abreast of relatively homogenous segments of the system's technological and work environments (Katz and Kahn, 1966; Thompson, 1967). Such differentiation, in turn, is associated with the development of more locally defined languages and orientations; that is, a locally shared semantic and cognitive field to define, label, and generally organize a complex reality (Arrow, 1974; March and Simon, 1958). Such localized definitions and specifications gradually unfold within projects from the different kinds of interactions among group members, the projects' overall objectives and task requirements, the common social and task related experiences of project members, and project norms, values, and historical perspectives (Price, 1965; Allen, 1977). These idiosyncratic developments are a basic determinant of attitudes and behaviors in that they strongly influence the ways in which project members think about and define their various problems and associated solution strategies (Kuhn, 1962; Coleman, Katz, and Menzel, 1966; Crane, 1972).

This local orientation and coding scheme development is a double-edged sword. For those who share in this common language and awareness, communication is remarkably efficient. Not only can large amounts of information be transmitted with relatively few specialized symbols, but misinterpretations between communicators are usually minimized (March and Simon, 1958; Allen, 1977; Triandis, 1960). On the other hand, if individuals do not share a common coding scheme and technical language, their work-related communication will be less efficient and more costly (Dearborn and Simon, 1958; Wilensky, 1967). This lack of perceptual and linguistic commonality can be conceptualized as communication impedance. The greater the mismatch in language and cognitive orientation, the greater the difficulties of communicating. In short, communications between two separate coding systems, without sufficient knowledge on the part of one or both communicators of the other's coding system, may lead to misperceptions and an incomplete understanding of the messages' information content (Cherry, 1965).

There is, then, a paradox. The evolution of more localized languages and coding schemes helps projects deal with their more local information processing requirements; yet, it also hinders the acquisition and interpretation of information from external areas. Nevertheless, external information is vital both in terms of feedback (Ashby, 1960) and in terms of keeping abreast of the latest scientific and technological developments. How, then, can project groups be effectively linked to external information areas?

One way to deal with the difficulties of communciating across differentiated boundaries is through gatekeepers; individual project members who are strongly linked to sources of external technology and who are also capable of translating across contrasting coding schemes. With the help of these key individuals, external information can be channelled into the organization and its project groups by means of a two-step process (Allen and Cohen, 1969). First, gatekeepers are able to gather and understand external information, and subsequently, they are able to translate this information into terms that are meaningful and useful to their more locally constrained colleagues. Gatekeepers, as a result, perform on extremely valuable function, for they may be the principal means by which external technology can be effectively transferred into the organization.

While substantial literature supports the existence of gatekeepers, there is virtually no direct evidence to support the notion that gatekeepers can enhance project performance. Project SAPPHO (Achelladeles, Jervis, and Robertson, 1971) and Carter and Williams (1957) provide case studies, while Katz and Tushman (1979) and Allen, Tushman, and Lee (1979) provide only inferential support for the positive association between gatekeepers and project performance. The initial research question, then, investigates the association between gatekeepers and project performance. Is this relationship positive across all task areas or are some areas more effectively linked to external technology through direct contact by all project members rather than through a gatekeeper? Furthermore, it is essential that we examine in more detail the role of gatekeepers with respect to information transfer. Is technology transfer most effective when gatekeepers are the primary source of external information, or can gatekeepers also serve to facilitate the external communication of their more locally oriented colleagues? Specific hypotheses are developed below.

Gatekeepers and Project Performance

The need for a two-step process of information flow hinges on the existence of communication impedance between a project group and its external information areas. To the extent that different technical languages and coding schemes exist between project members and their external technological environments, communciation across organizational boundaries will be difficult, inefficient, and prone to bias and distortion (Dearborn and Simon, 1958; Allen, 1977). Several studies, for example, have found an inverse association between the amount of external communication and both individual and project performance (Allen, 1970, Shilling and Bernard, 1964; Baker, Siegmann, and Rubenstein, 1967).

One explanation for such negative relations comes from the idea that technological tasks (unlike the sciences) are strongly local in nature in that their problems, strategies, and solutions are defined and operationalized in terms of the particular strengths, interests, and orientations of the organizational subculture in which they are being addressed. The interactions of bureaucratic interests and demands with local tasks and coding schemes are likely to produce a communication boundary that differentiates and insulates a technological project group from its outside areas. As a result, project groups in different organizations may face similar problems yet may define their solution approaches and parameters very differently (Katz and Tushman, 1979). And it is precisely because technological problems are typically defined in such local terms that most engineers have difficulty communicating effectively with outside professionals and consultants about their project-related activities. Locally oriented projects, therefore, will require gatekeepers to provide the necessary linkages to external areas, for direct contacts by other project members to sources of external technology are likely to be ineffective.

On the other hand, if external sources of information do not have different language and coding schemes from members of the project group, then it is less likely that this kind of communication impedance will exist. Work that is more universally defined (scientific and basic research work, for example) are probably less influenced and less contrained by local organizational factors. As a result, there is probably less of an impediment to external communication. Under these conditions, professional colleagues outside the project group (yet in similar disciplines or specialties) are more likely to share similar norms, values, and language schemes, thereby, permitting effective communication across organizational and even national boundaries.

Project members working on universal-type tasks are simply more capable of understanding the nature of the problems and corresponding solution approaches employed by their relevant external colleagues. Scientists from one organization, for example, can easily communicate with scientists from any other organization about their overlapping sets of scientific interests. Hagstrom (1965), for instance, found a strong positive correlation between the productivity of scientists and their level of external contact with colleagues from other universities. For universally defined tasks, then, gatekeepers may not be requred to link projects with their relevant external information areas; instead, direct peer contact by all project members may be more advantagous.

The nature of a project's work, therefore, is a key factor affecting the development of localized languages and orientations and, as a result, may affect significantly the relationship between project performance and the presence of gatekeepers within project groups. In particular, it is proposed that gatekeepers will be associated with project performance in the following ways:

Hyypothesis 1: Project groups performing locally defined tasks with gatekeepers will have significantly higher performance than project groups performing locally defined tasks without gatekeepers.

Hypothesis 2: Project groups performing universally defined tasks with gatekeepers will have significantly lower performance than project groups performing universal tasks without gatekeepers.

In analysis of variance terms, these hypotheses imply that there will be no main effect between the existence of gatekeepers and project performance; rather there will be a significant interaction between task characteristics and the presence of gatekeepers on project performance.

Role of Gatekeepers

As previously argued, gatekeepers are likely to facilitate the performance of project groups working on locally defined tasks. If this proposition is, in fact, supported empirically, then what are the contributions of gatekeepers such that their presence within a project seems to enhance its performance? There are at least two alternatives. The more traditional explanation is that gatekeepers are a primary linking mechanism to external sources of information and technology; information flows through these key individuals to the more local members of the project team (Tushman, 1977; Whitley and Frost, 1973). From this perspective, relevant external information is transferred effectively into the project groups because of the capable boundary spanning activities of the projects' gatekeepers.

A different explanation is that gatekeepers take an active training, development, and socialization role within their work groups. From this point of view, gatekeepers not only gather, translate, and encode external information, but they also facilitate the external communication of their project colleagues (Blau, 1963; Sundquist, 1978). Gatekeepers may work to reduce communication boundaries between their projects and external areas by directing, training, and coaching the external communications of their fellow project members. Under these conditions, both gatekeepers and other members of the project are able to effectively gather information from external areas.

If gatekeepers do permit other members to communicate effectively with external areas, then for projects with local tasks and gatekeepers, there should be a positive association between a project's external communication and its performance. If gatekeepers do not play this more active role, then there should be an inverse relation between a project's external communication and its performance.

Given the substantial importance of trying to keep abreast of all relevant technological developments; the inherent cognitive limits on information processing; and the fact that gatekeepers have their own tasks to perform, it is suggested that gatekeepers take an active role in both gathering information and facilitating the external communication of their project colleagues. Accordingly, the following is hypothesized:

Hypothesis 3: The association between external communication and overall performance for locally oriented project groups will be systematically different for projects with and without gatekeepers. Projects with gatekeepers will have a positive association while projects without gatekeepers will have an inverse association.

Since gatekeepers perform the critical role of mediating external communication for projects with locally oriented work, there will also be a positive association between the external communication of gatekeepers and their project's overall performance. To what extent, however, can project supervisors who are not gatekeepers substitute for gatekeepers and play this linking role to external areas? Supervisors of locally oriented projects face the same communication impedance as their project subordinates when communicating externally. While supervisory communication within the organization may be positively associated with performance (e.g., Likert, 1967), their communication outside the organization will be inversly related to their project's performance.

Hypothesis 4: For projects with locally oriented work, supervisors who are not gatekeepers will have an inverse relationship between external communication and project performance. Supervisory gatekeepers, however, will have a positive association between communication and project performance.

METHODOLOGY

Research Setting

This study was carried out at the R&D facility of a large American Corporation. Physically isolated from the rest of the organization, the facility employed a total of 345 professionals, all of whom participated in our study. The laboratory was organized into seven departments, each containing its own set of projects. At the time of our study, 61 separate project groups existed across the seven departments. These project groups remained stable over the data collection period, and each professional was a member of only one project.

Technical Communication

To measure actual communications, each professional was asked to keep track of all other professionals with whom he or she had work-related oral communication on a particular day. This sociometric data was collected on a randomly chosen day each week for fifteen weeks. The sampling of days was constrained to allow for equal numbers of weekdays. Respondents were asked to report all oral work related contacts both within and outside the laboratory's facility (including whom they talked to and how many times they talked with that person during the day). They were instructed not to report contacts that were strictly social, nor did they report written communications. During the fifteen weeks, the overall response rate was 93 percent. Moreover, 68 percent of all the communications reported within the laboratory were mentioned by both parties (see Weiss and Jacobson, 1969, for comparative data). Communications outside the facility, however, could not be corroborated with discussion partners.

Project communication is a measure of the average amount of technical communication per person per project over the fifteen weeks. As discussed in Katz and Tushman (1979), six mutually exclusive communication measures were operationalized for each project as follows: (1) communication within the Project; (2) communication within the project's Deparment (but not including project members); (3) communication to other Laboratory departments; (4) communication to other Organizational divisions (including marketing and manufacturing); (5) communication to external Professionals outside the organization (including consulting firms, universities, and professional societies); and (6) communication to external Operational areas (including suppliers, vendors, and customers). External or extra-organizational communication is the sum of the reported communication to professional and operational areas. Individual responses were pooled to obtain measures of project communication with each of these various areas.

Although the literature has used a number of slightly different criteria to empirically define gatekeepers (Allen, 1970; Whitley and Frost, 1973), conceptually, they are defined as those internal stars (i.e., high internal communicators) who also maintain a high degree of external communication. This study operationalized gatekeepers as those individuals who were in the top fifth of their intra-department communication distribution and who were also in the top fifth of the extra-organizational communication distribution. Gatekeepers were identified in 20 project groups while 40 projects had no gatekeepers within their memberships.

Project Task Characteristics

In R&D settings, tasks can differ along several dimensions, including time span of feedback, specific vs. general problem-solving orientation, and generation of new knowledge vs. utilization of existing knowledge and experience (Rosenbloom and Wolek, 1970). Based on these dimensions, the following task categories were developed with the laboratory's management to form a universal (reserach) to local (technical service) task dimension.

a. Basic Research: Work of a general nature intended to apply to a broad range of applications or to the development of new knowledge about an area.

b. Applied Research: Work involving basic knowledge for the solution of a particular problem. The creation and evaluation of new concepts or components but not development for operational use.

c. Development: The combination of existing feasible concepts, perhaps with new knowledge, to provide a distinctly new product or process. The application of known facts and theory to solve a particular problem through exploratory study, design, and testing of new components or systems.

d. Technical Service: Cost/performance improvement to existing products, processes, or systems. Recombination, modification and testing of systems using existing knowledge. Opening new markets for existing products.

Using these definitions, respondents were asked to select the category which best characterized the objectives of their project and to indicate, on a three-point scale, how completely the project's objectives were represented by the selected category. The twelve possible answers were scored along a single scale ranging from completely basic research to completely technical service.

As in Pelz and Andrews (1966), respondents were also asked to indicate what percentage of their project's work fell into each of the four categories. A weighted average of the percentages was calculated for each respondent. The scored responses to these two questions were averaged (Spearman-Brown reliability = .91).

Since projects are the unit of analysis, the homogeneity of project members' perceptions of their task characteristics was tested to check for the appropriateness of pooling (see Tushman, 1977 for details). As pooling was appropriate, individual member responses were combined to get project scores. The distribution of project task scores clustered into three distinct categories: (1) Research (a combination of basic and applied research categories); (2) Development, and; (3) Technical Service. Research projects carried out universally oriented scientific work (for instance, developing new knowledge in glass physics), while development and technical service work was locally oriented in that they worked on organizationally defined problems and products.

<u>Project Performance</u>

Since comparable measures of project performance have yet to be developed within R&D settings, a subjective measure similar to that used by Lawrence and Lorsch (1967) was employed. Each Department Manager (N=7) and Laboratory Director (N = 2) was separately interviewed and asked to evaluate the overall technical performance of all projects with which he was technically familiar. If he could not make an informed judgement about a particular project, he was asked not to rate that project. Based on these interviews, each project was independently rated by an average of 4.7 managers on a seven-point, Likert-type scale ranging from very low to very high. As the performance ratings of the nine judges were sufficiently intercorrelated (Spearman-Brown reliability = .81), the individual ratings were averaged to yield overall project performance scores.

Demographic Data

During the course of the study, demographic data was also collected from the laboratory's professionals, including their age, educational degrees, years in the laboratory, and years in their current project.

RESULTS

Gatekeepers and Project Performance

As previously discussed, there should be no overall main effect between the presence of gatekeepers and project performance. Instead, there should be significantly different relationships depending upon the projects' task characteristics. Hypothesis 1 predicted that locally oriented tasks (i.e., development and technical service projects) would show a positive association between gatekeeper existence and project performance. Hypothesis 2, on the other hand, predicted that universal tasks (i.e., research) would show an inverse relation between gatekeeper existence and project performance.

The means reported in Table 1 clearly indicate that, in general, the performance of projects with gatekeepers are not significantly different from the performance of projects without gatekeepers. As a result, a two-way ANOVA was employed to test for the interaction effect between task characteristics and gatekeeper existence on project performance. As expected, there were no main effects on project performance for either the existence of gatekeepers or for task characteristics. There was, however, a strong disordinal interaction effect ($F = 4.73$; $P < .01$; $DF = 2, 54$).

Insert Table 1 About Here

More specifically, the breakdown of performance means, as shown in Table 2, strongly supports the second hypothsis. Research projects with gatekeepers were significantly lower performing than research projects without gatekeepers. In fact, the correlation between the existence of gatekeepers and project performance was signficantly negative ($r = -.47$; $P < .05$). It may be that research projects are more effectively linked to external areas through direct member contact.

Insert Table 2 About Here

There is also partial support for hypothesis 1 in that development projects with gatekeepers were significantly more effective than development projects without gatekeepers. In sharp contrast with research projects, the correlation between gatekeeper existence and development project performance was strongly positive ($r = .51$; $P < .01$). Unlike research projects, then, development projects seem to be linked to external areas more effectively through the use of gatekeepers. Technical service projects, on the other hand, exhibit no significant difference between projects with and without gatekeepers. As a result, the mechanisms used by technical service projects to import external information remain unclear. The performance scores displayed in Figure 1 highlight the differential impact of gatekeepers on research vs. development projects. Technical service projects are not plotted as their performances were unaffected by the presence or absence of gatekeepers.

Insert Figure 1 About Here

Role of Gatekeepers

Hypothsis 3 argued that for locally oriented tasks, gatekeepers do much more than simply channel information from external areas to project groups. They may also act to reduce communication inpedance through the training, directing, and socializing of their fellow project colleagues. If gatekeepers serve this dual role then both gatekeepers and their peers will be able to communicate effectively with external information areas. In contrast, locally oriented projects without gatekeepers will have no clear effective link to external areas.

Results reported through Table 3 support these ideas. For development and technical service projects without gatekeepers there was a consistent inverse association between members' extra-organizational communication and project performance. For locally oriented projects with gatekeepers, however, a significantly different pattern emerged -- extra-organizational communication was positively associated with project performance. Moreover, these positive correlations became even more significant after the direct communication effects of gatekeepers were removed! Finally, the significant correlational differences between those development and technical service projects with and without gatekeepers strongly supports the argument that gatekeepers can have an important affect on the ability of project members to communicate effectively with external sources of technological information.

Insert Table 3 About Here

Since members of research projects do not face a communication impedence when communicating externally, it should not be surprising that Table 3 shows that the extra-organizational communication of research projects was positively associated with project performance independent of gatekeeper existence within the groups. Gatekeepers, as a result, may not play an important information transfer role in the more universally oriented research projects, while they seem to play a vital role in the more locally defined development and technical service projects.

Finally, when there are no gatekeepers within a given subset of development and technical service project groups, then to what extent can project supervisors substitute for gatekeepers in linking their projects to external information areas? Because supervisors who are not gatekeepers face the same communication impedance as their project subordinates with respect to extra-organizational communication; it was hypothesized that, in general, supervisors could not substitute for gatekeepers on locally oriented projects.

The correlations reported in Table 4 support this position. For development and technical service projects, the greater the external communication of project supervisors who were not gatekeepers, the lower their project's performance. Generally speaking, therefore, supervisors may not be an effective linking mechanism to external domains. However, the association between external communication and project performance was very different for those supervisors who were also gatekeepers. The greater the external communication of these specific individuals, the greater their project's performance.[3] Given such significant correlational differences between supervisors who are gatekeepers and supervisors who are not gatekeepers, it becomes clear that supervisory status alone can not deal with the requirements for effective linkage to external information areas. Thus, hypothesis 4 is strongly supported.

Insert Table 4 About Here

Alternative Explanations

Given the nature of the preceding results, alternative explanations must be examined. It is conceivable, for example, that restricted variances in either the performance or communication measures could explain the changing pattern of correlations across different categories. Accordingly, for all pairwise correlational comparisons, means and standard deviations were checked to ensure that none were significantly different.

Furthermore, it is important to make sure that the composition of projects with and without gatekeepers do not differ in some other meaningful way. It has been suggested that project behaviors such as communication and innovation might be influenced by demographic characteristics including age, educational level, and project tenure, see Pelz and Andrews (1966) and Katz (1979). To rule out such rival possibilities, we compared the different project groupings along these important demographic variables. As there were no statistically significant differences, rival hypotheses based on such demographic differences are less plausible.

DISCUSSION

The awareness and acquisition of outside technology is vital for R&D based organizations. Moreover, there are at least two distinct methods by which R&D project groups can draw upon external technological developments and information: (1) direct contact by all project members and (2) contact mediated by technological gatekeepers. The main purpose of our research was to compare the effectiveness of these alternative processes and secondly to examine more extensively the role that gatekeepers can play in facilitating the transfer of external information.

With respect to the first issue, our results suggest that the effectiveness of these two linking mechanisms is strongly contingent on the degree to which communication impedance separates project groups from their external information areas. Generally speaking, as project tasks become more specialized and more locally defined, it is likely that language and cognitive differences between the project and its extra-organizational domains will increase, intensifying communication impedance and resulting in more tendentious information flows. For the average locally oriented technologist, therefore, communication across organizational boundaries become more troublesome and less effective. It is not that relevant and important information does not exist with outside sources, rather it simply becomes more difficult to mesh external ideas, suggestions, and solutions with internal technology that has become more locally defined and constrained. Therefore, for locally oriented tasks, an inverse relation between external communication and project performance was hypothesized. Gatekeepers, as a result, would be an especially important linking mechanism to external technology for these kinds of project groups.

With respect to more universally defined tasks, however, it was hypothesized that project members would be less constrained by local norms, values, and languages, resulting in less external communication impedance. For these research type tasks, it was hypothesized that direct interaction by all project members with their relevant external information areas would be more effective than external contacts mediated through gatekeepers.

These hypotheses were strongly supported for the research and development project groups within our sample. Locally defined development projects with gatekeepers were significantly more effective than development projects without gatekeepers. For the more universally oriented research projects, though, there was a significant inverse relation between gatekeeper existence and project performance. Instead of relying on gatekeepers to keep informed, higher performing research projects relied more heavily on direct external contacts by all project members to keep up with outside developments and changes.

Contrary to expectations, the performances of technical service projects were not positively related to the presence of gatekeepers. If members of technical service projects can not communicate effectively with external areas (e.g., Rosenbloom and Wolek, 1970; Katz and Tushman, 1979), and if there is no clear association between gatekeeper existence and the performances of these projects, then how are technical service groups effectively linked to external areas? Furthermore, if development and technical service tasks are both locally oriented, then why should the results for these task areas be so different?

One possible explanation for these contrasting results may stem from differences in the nature of the work performed by development and technical service project groups. Development projects usually involve a more dynamic technology, new knowledge and/or new products. Uncertainty is relatively high in these projects and the locus of relevant task expertise is more likely to reside with project members. To keep abreast of such dynamic technologies and to introduce them effectively into appropriate development projects, what is needed are specialized individuals who keep current technically, are readily conversant with the technologies, and who are contributing to their project's work in direct and meaningful ways, i.e., technological gatekeepers (Allen, 1977).

Technical service project members, on the other hand, tend to work with more mature technologies, existing knowledge and/or existing products. Task uncertainty, therefore, is relatively low and the locus of task expertise may lie at more senior hierarchical levels (Rosenbloom and Wolek, 1970). Because these technologies are more stable and more easily dealt with by higher supervisory levels within the formal organization, the specialized gatekeeper role may not be needed to keep project colleagues informed about or to introduce new technological developments. Instead, the managerial hierarchy may be capable of keeping project members sufficiently informed about external events and information through formal operating channels. Technical service projects, then, may be linked to external areas not by technical gatekeepers within the project but by more senior levels of the hierarchy (Frost and Whitely, 1971; Walsh and Baker, 1972).

Generally speaking, our findings seem to suggest that the beneficial effects of techncial gatekeepers are strongly contingent on both the nature of the project's work and the stability of the involved technologies. For locally oriented development projects with more dynamic technologies and where task expertise is located within the project, gatekeepers may be needed to link effectively with external information areas. Where the project is locally oriented but the technologies are more well-defined and stable (as in technical service projects), then the projects may be able to rely on the formal hierarchy as its external linking mechanism rather than relying on technical gatekeepers. Engineers and scientists on more universally oriented research projects may also have little need for the specialized role of gatekeepers; direct external communication by all research project members appears most effective. Thus, it would appear that it is the combination of localized yet dynamic technologies that creates the need for technological gatekeepers within R&D project groups.

The Gatekeeping Role

What role do gatekeepers perform in linking local development projects to external areas? The data indicate that gatekeepers not only bring in technical information from external areas, but perhaps more importantly, they facilitate the extra-organizational communication of their more locally oriented colleagues. In development projects, gatekeepers may actually increase the information processing capabilities of their groups by reducing the communication impedance separating most of their project colleagues from external areas. As a result, development projects with gatekeepers may be in a better position to take advantage of external technology since the number of members capable of communicating across organizational boundaries can increase, thereby, lessening their dependence on gatekeepers for gathering and disseminating external information. In research-type tasks, on the other hand, gatekeepers may not be a critical source of external information; nor does it appear that they serve in any communication facilitating capacity. In higher performing research projects, members did not rely on specialized individuals for their external information. In a sense, they seemed to function as their own gatekeepers!

It is also important to note from our findings that development project supervisors were not able to substitute for gatekeepers in linking their project groups to external areas. Unlike gatekeepers, the extra-organizational interactions of supervisors who were not gatekeepers were inversely associated with project performance. While such supervisors may have well developed and useful internal linkages, they cannot fulfill the same external functions as their gatekeeping counterparts. Such findings suggest distinguishing between these two types of project supervisors. Locally oriented supervisors might be more useful and helpful with respect to administrative or budgeting kinds of activities, while gatekeeping supervisors may be more contributive with regard to technically related activities.

Conclusions

In conclusion, gatekeepers perform a critcal role within R&D settings that often goes unrecognized. By realizing the importance of gatekeeping activities for development-type project tasks, R&D managers might be able to link their product and/or process development efforts to sources of external technology more effectively. A manager might want to examine, for example, the extent to which the more important technologies among the various development project activities are actually being "covered" by a gatekeeping type person. The degree to which gatekeeping activities can be managed, however, may be limited. Gatekeeping is an informal role in that other project engineers must feel sufficiently secure and comfortable psychologically to approach gatekeepers with their technical thoughts, problems, mistakes, and questions without fear of personal evaluation or other adverse considerations (Allen, 1977). Therefore, to the extent that the organization tries to formalize such a gatekeeping function, it runs the risk of inhibiting the very kinds of interaction that it wishes to promote.

This is not meant to imply that gatekeeping cannot be managed or helped; on the contrary, it can. In fact, a number of R&D facilities have instituted official gatekeeper programs. What is important to recognize is that the interest of gatekeepers in external technology cannot be suddenly "decreed" or assigned by management. Typically, such outside professional interests are a "given" and cannot be easily started or developed by the organization, although they can, of course, be made easier to puruse. What can be more easily influenced is the degree to which gatekeepers are actually present in project groups and used effectively in internal project interactions and activities. They should be placed, for instance, in a work position where other project engineers can communicate with them easily, frequently, and verbally. Moreover, the evolution of sufficient internal contacts and communications to be an effective gatekeeper takes time. In the present sample, for example, all of the gatekeepers had been working in their present project groups for a period of almost two years or more! In short, the external side of the gatekeeping role is usually being performed by the gatekeeper anyway. It is the internal side that can be fostered, augmented, and made more effective.

FOOTNOTES

1. This is an equally co-authored piece of research, conducted at the R&D facility of a major midwest American Corporation. The authors would also like to thank Professor Thomas J. Allen for his collaborative efforts and ideas with respect to this research project.

2. This research makes a basic distinction between gatekeepers and individuals who simply have substantial boundary spanning activities (BSA). To satisfy a gatekeeping function, an individual must be strongly connected both internally and externally. The assumption in many previous boundary spanning studies, including Keller at al. (1976), Leifer and Huber, (1977), Bacharach and Aiken (1977), is that those individuals reporting high BSA are also well-integrated internally, transferring and disseminating their information to others in the organization. Such an assumption, however, is often unjustified. Evidence suggests that unlike gatekeepers, individuals with high BSA are frequently isolated and are often low performing individuals (Allen, 1970; Roberts and O'Reilly, 1979). Or, as von Hippel (1976) has found, those individuals who serve representational roles (and are, therefore, high on BSA) are often not an effective or highly utilized source of information for other relevant organizational members.

3. Previous research has found that usually between 50 and 80 percent of the gatekeepers are also first-level supervisors. These roles, then, are not independent but can be complementary (Allen, 1977). Our research analyses distinguishes among supervisors who are also gatekeepers, supervisors who are not gatekeepers, and gatekeepers who are not supervisors. Unfortunately, there are simply not enough cases to investigate the association between the external communication of gatekeepers who are not supervisors and project performance.

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TABLE 1

Project Performance As A Function of Gatekeeper Presence

	Mean Project Performance	Standard Deviation
Projects With Gatekeepers (N=20)	4.70	0.702
Projects Without Gatekeepers (N=40)	4.53	0.729
Mean Difference =	0.17+	

+ significantly different at the $p < .10$ level.

TABLE 2

Project Performance As A Function of Project Type and Gatekeeper Presence

PROJECT TYPE	MEAN PERFORMANCE FOR PROJECTS WITH GATEKEEPERS	MEAN PERFORMANCE FOR PROJECTS WITHOUT GATEKEEPERS	T-Value FOR MEAN DIFFERENCES
Research	4.22 (N=5)	4.92 (N=9)	-1.88**
Development	4.91 (N=8)	4.15 (N=15)	3.10***
Technical Service	4.80 (N=7)	4.67 (N=16)	0.38

**p < .05; ***p < .01

TABLE 3

Correlations Between Project Performance and External Communications
By Project Type and Gatekeeper Presence

PROJECT TYPE	MEASURES OF EXTERNAL COMMUNICATIONS	CORRELATIONS WITH PERFORMANCE FOR PROJECTS: WITH GATEKEEPERS	WITHOUT GATEKEEPERS
RESEARCH	a) All project members	.53	.46*
	b) All project members excluding the project's gatekeeper (in the first column) or the project's supervisor (in the second column)[a]	.37 (N=5)	.70** (N=9)
DEVELOPMENT	a) All project members	.31	-.45**
	b) All project members excluding the project's gatekeeper (in the first column) or the project's supervisor (in the second column)	.55* (N=8)	-.21 (N=15)
TECHNICAL SERVICE	a) All project members	.31	-.19
	b) All project members excluding the project's gatekeeper (in the first column) or the project's supervisor (in the second column)	.64* (N=7)	-.03 (N=16)

*p < .10; **p < .05

a 80%, 75%, and 71% of the gatekeepers in the research, development, and technical service project groups, respectively, were also project supervisors.

Note 1: Underlined pairwise correlations are significantly different at the p < .10-level.

TABLE 4

Correlations Between Project Performance and the External Communications of Project Supervisors By Project Type and Gatekeeper Presence

PROJECT TYPE	Correlations Between Project Performance and External Communications For: Project Supervisors who are also Gatekeepers	Project Supervisors who are not Gatekeepers
DEVELOPMENT	.37 (N=6)	-.51** (N=15)
TECHNICAL SERVICE	.77* (N=5)	-.34* (N=16)

*p < .10; **p < .05

Note: The underlined correlations are significantly different at the p < .10 and p < .05 levels, respectively.

FIGURE 1

Mean Performance of Development and Research Projects By Gatekeeper Presence