THE RELATION OF INTERNAL COMMUNICATION AND R&D PROJECT PERFORMANCE AS A FUNCTION OF POSITION IN THE R&D SPECTRUM, WP 936-77, MAY 1977

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THOMAS J. ALLEN & DENIS LEE & MICHAEL L. TUSHMAN

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Thomas J. Allen, Denis Lee and Michael L. Tushman

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INTRODUCTION

The evidence (Allen, 1964; 1966; 1970; Baker, et. al., 1967; Goldhar, et. al., 1976) that internal communication is strongly related to R & D project performance is, to state it mildly, overwhelming. One study after another lends support to the proposition that the best source of information for an R & D engineer is a colleague within his own organization. Good internal communication, therefore, assumes a paramount importance for the management of an R & D organization.

Other studies (Allen, 1964; 1966; Allen, et. al., 1977; Hagstrom, 1965) have shown the relation between project performance and communication outside of the laboratory to be a function of whether the project involves research, development or technical service activities. In fact, the relation shifts from a positive to a negative one, depending on the nature of the project.

Given these results, it is logical to inquire whether the nature of a project's task might affect the importance of internal communication, as well. It is entirely conceivable that internal communication might be more important for development of technical service projects, than research projects, for example.

The present research is a first attempt to differentiate among the internal communication requirements of projects in research, development, and technical service.

RESEARCH SETTING & METHOD

Organizational Setting

The organization studied was the central R&D laboratory of a medium to large size American corporation in a technology-based industry. Manufacturing and marketing are decentralized in the company, with facilities located in different parts of the country. R&D, however, is centralized and the facility is geographically separated from the rest of the organization. The laboratory's activities cover basic research and development of new products and technologies, as well as the assistance of marketing and manufacturing areas in product development and engineering. All of the company's products are related in that they share a common technological core. The basic technology facing the company may be characterized as being relatively mature and the laboratory has been a leading developer of that technology.

The laboratory consists of seven groups or divisions, one of which is located about five miles from the main facility. Two of the divisions cover more basic research and advance development, and are funded by corporate headquarters, while the other five are funded through the various marketing and manufacturing areas.

Each division is further organized according to project areas, each with a supervisor or head. Each project area focuses on specific problems or technologies Also, the project areas within each division are usually work related in that they face similar market and manufacturing constraints and often work in joint tasks. It should be pointed out that these project areas are not short term project groups in the team/task mission sense, although within any given project area there may be several short-term tasks.

The total R&D laboratory employs about 735 people, about half of whom are in various support roles. This study focuses only on the members of the technical staff and thereby limits the population to about 345 professionals. The seven divisions average about 40 professionals per division, although one of the divisions is much larger than the others (107 professionals). There are 63 project areas in the laboratory distributed throughout the different divisions. The projects average about 5.3 members, with a range of 2 to 15 members. Because of transfers and reorganization, data from two projects were eliminated from the study.

Data Collection

A survey methodology was used to sample all work related communications over a period of fifteen weeks. Data were collected via questionnaires which were distributed on randomly selected days. The sampling days were chosen so that there would be an equal number of each of the different weekdays in the sample. At the end of each sampling day, every professional staff member in the laboratory was asked to recall each work-related communication contact, both within and outside the organization. Each respondent was asked not only to write down the names of those persons with whom he had work discussions, but also to check off the content of the conversation (i.e., problem definition or evaluation, idea generation, information location, and administrative matters). The first three of these categories will be aggregated as technical communication for the purposes of the present paper. As a result of travel, absences, etc., there was an average of 10 returns per respondent. After accounting for absences, the response rate was about 90 percent.

Measurement of the Dependent Variable-Communication

The self-reported (raw) communication data were first aggregated over the 15 weeks. Missing data (e.g., vacation, sickness, out-of-town, non-returns, etc.)

were adjusted by normalizing the reported communications to an average frequency per 10 (sampling) days. Within the laboratory, communications were measured between (ordered) pairs of individuals. In order to facilitate the analysis, aggregate measures of communication were classified according to the affiliations of the discussion partners, i.e., the different internal organizational areas.

More specifically, internal communications were categorized according to progressively larger but mutually exclusive organzational units; i.e, .

i) Project Communication: Communications with other professional members within one's immediate project.

ii) Intra-Divisional Communications: Communications with other professional members outside of one's project but within the same division.

iii) Inter-Division Communication: Communications with professional members in other divisions (i.e. within the laboratory but outside of one's division).

iv) Communication with Other Parts of the Firm: Communications with people in the organizational operating units (i.e., people who are outside of the laboratory but within the company). Organizational communication is further broken down into:

- marketing communications
- manufacturing communications
- miscellaneous organizational communications (i.e. communications with people in organizational areas other than marketing and manufacturing).

The classification of communication measures by organizational location is shown schematically in Figure 1.

For intra-organizational communication inside the laboratory, the average frequency between pairs of individuals may be represented by communication networks

(i.e. di-graphs). These communication linkages may also be represented in the following matrix forms: i.e.

Let C_{ij} represent the (adjusted) frequency of communication between person i and person j, as reported by person i. (Note that in general C_{ij} does not necessarily equal C_{ji}.)

The Project Communication Matrix, $\underline{P}$, representing the communication flows within the project, consists of elements C_{ij}; $i,j = 1,....n$

where n = number of people in the project

and $C_{ii} \equiv 0 \quad i = 1,....n$

The Division Communication Matrix, $\underline{D}$, representing the communication flows inside the division, consists of a partitioned matrix with sub-matrices $\underline{P}_{ij}$, $i,j = 1...k$

where $\underline{P}_{ii}$ is the project communication matrix for project i

$\underline{P}_{ij}$ is the inter-project communication matrix between project i and project j (for data as reported by people in project i), $i,j = 1,....1 \; i \neq j$

k is the number of projects in the division

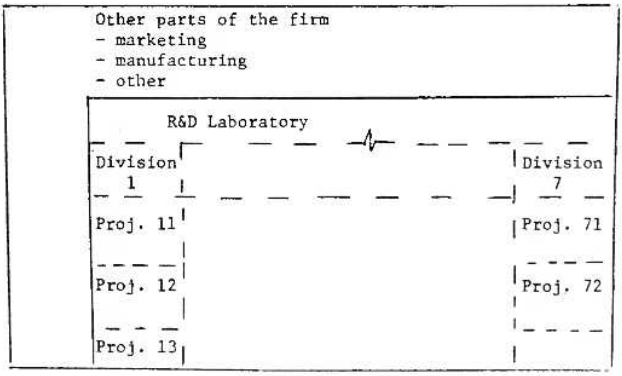

Fig. 1 Schematic View of Organization