

**ORGANIZATIONAL CLIMATE,
PRODUCTIVITY AND CREATIVITY
IN AN R&D ORGANIZATION**

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EXECUTIVE SUMMARY

Creativity and productivity are extremely important to an R&D-based organization if it is to keep up with today's rapidly evolving scientific/technological knowledge bases and compete in an ever challenging global economy.

Creative behaviour will only occur if two conditions are met: the person has creative ability, and the environment within which the person works supports and encourages creative behaviour.

$$\text{Demonstrated Creativity} = f(\text{Personal attributes, Environment})$$

Through organizational policies and procedures, organizations set the tone of the working environment, which in turn, directly affects the level of creativity and productivity forthcoming from their employees.

Senior Management Support

It will be difficult, if not impossible, to develop a work environment that supports creativity or productivity if senior management does not wish it. Many of the actions outlined below that are needed to encourage creativity must be sanctioned by senior management. Without their full and active support, lower level managers will be reluctant, for example, to take the necessary steps to remove any organizational barriers that impede creativity or productivity.

Hire Creative People

The first and foremost action is to hire people who display the characteristics associated with creative employees, once it has been determined that creative people are really needed in the organization.

Among the key characteristics or attributes of creative research engineers and scientists are:

- internally motivated (self-motivated), don't respond to the kinds of incentives that motivate others;
- intellectually curious, with a diversity of interests;
- willingness to try out new approaches or ideas, and to take risks;

- able to see connections between blocks of seemingly unrelated information and put them together in unique ways in order to solve a problem;
- attracted by the challenge of a problem or situation;
- non-conformist, have unusual work patterns or behaviour, have little reverence for authority, intolerant of bureaucracy; and
- able to continue working on a project or problem to which they are committed despite counter-influences, opposition or discouragement.

Employment Contract as a Long-term Commitment

Creative scientists and research engineers require relatively long-term stability in their work environment. Despite the latest management fad concerning the “new employment contract”, studies such as those of Abraham Maslow show that for people to operate at their creative best, they must have their security needs satisfied. This will not occur if the employee is under a constant threat of unemployment.

As many management authors point out, reducing fear in the R&D environment, reducing uncertainty or insecurity, providing a stable working environment with a low rate of staff turnover, and providing stable funding are key factors in encouraging creativity and productivity.

The degree of job involvement, a factor associated with creativity, will also be negatively affected by short-term employment practices.

Allow for Freedom and Autonomy in Decisions About Work

This factor stands out above all others as being critical to the creative process with scientists and research engineers.

The main form of freedom or autonomy mentioned in the literature is freedom to determine how a project or problem will be tackled. Some organizations go as far as allowing researchers to select the project they will work on (e.g., 3M's 15% of time/resources spent on personal projects).

Other forms of freedom mentioned in the literature are freedom to follow up on ideas, freedom to change research direction when necessary, freedom to work on areas of greatest interest, freedom to follow projects from the idea stage to the “finished” product, and freedom to pursue, without penalty, ideas that do not have official approval.

Total freedom, however, is not conducive to useful creativity. Thus most authors recommend that freedom/autonomy be generally confined to the determination of approaches to solve a problem, rather than in setting the R&D agenda.

Provide Challenging, Interesting Project Assignments

The assignment of research projects is a critical managerial tool for encouraging creative and productive output from research scientists and engineers.

Challenging, interesting assignments are noted by many management authors as being a key factor in supporting creativity and productivity in an R&D environment. For this reason, creative personnel would like the freedom to select their own projects.

Challenging, interesting assignments, when successfully completed, allow researchers to gain the respect and recognition from their peers, and provide for their needs to experience achievement and self-fulfillment on the job. Uninteresting, unchallenging assignments do not allow for need satisfaction and can be a major source of demotivation.

The importance of the research project to either the organization, or to the advancement of science or engineering is a major factor in ensuring the involvement of creative personnel. This, in turn, has been noted as a factor in productive R&D organizations. The assignment of a low-importance project to a creative person will not result in creativity or productivity.

Work assignments can also play a major role in preventing technological obsolescence among researchers. Challenging projects that demand that researchers must learn new techniques or acquire new knowledge provide opportunities for growth and self-development.

Many management authors also point out that having clear goals or objectives on work assignments is important to creativity and productivity.

Provide Adequate Resources

To encourage creativity and productivity, the researchers must be provided with adequate resources in terms of personnel, equipment, facilities and time.

It is extremely frustrating to a professional to be give a challenging, interesting assignment, but not the necessary resources to complete it in an effective manner.

Stable financial support is a major factor in sustaining the researcher's commitment and enthusiasm for a project and in encouraging creativity. Resources should also be available to follow up on unplanned ideas as they evolve during a project.

Creative workers must be provided with sufficient time for reading, discussion and thought and creative reflection.

While pressure in the form of deadlines is thought to encourage creativity, the deadline should be set in consultation with the staff, otherwise it is counterproductive.

More time can be made available for creative people to conduct their research by reducing their administrative burdens.

Encourage Risk Taking

Risks will be taken only if it is safe to take them. If an organization severely penalizes employees for taking risks and failing, then no risks will be taken. If success in trying something new is not rewarded then employees will play it safe and stick with the status quo, no matter how ineffective present practice is. This is the situation in many government organizations where the emphasis is on "not rocking the boat".

Encouragement to take risks and try something new, and to be open to new ideas is noted by many management authors as an important factor in encouraging creativity.

Ensure a Responsive and Equitable Reward and Recognition System

Although creative scientists and research engineers are generally self-motivated, it is important that an organization has in place a system of rewards and recognition that reinforces the creative behaviour of its research staff. This is considered to be a major factor by most of the authors reviewed.

Intrinsic (internal) rewards (psychological need satisfaction) are seen to be associated more with creativity than extrinsic rewards such as salary or promotion. Thus management should ensure that its actions provide for intrinsic rewards or forms of recognition.

Among the intrinsic rewards sought by R&D staff are:

- the feeling of self-fulfillment that comes from completing a difficult task;
- recognition for hard work and good performance from peers and colleagues;
- experiencing significant achievement for a job well-done;

- having the opportunity to grow and develop as a professional;
- having the authority to make decisions about their work;
- appreciation of their creative contributions and ideas; and
- receiving constructive feedback on their progress.

Extrinsic rewards, which are sought out by researchers who look to their employer for recognition and reward, must be provided in a fair and equitable manner, otherwise demotivation and conflict can occur.

Lack of a dual promotion ladder for researchers has been associated with low creativity.

Employ Managers who Can Operate in a Consultative Style

The immediate supervisor is the most important environmental influence in the work of the research engineer and scientist. Because of the many special characteristics of creative personnel, they must be managed in a way that makes use of those characteristics.

The major factor associated with a manager is his or her style of management. It is vital that the manager of creative personnel has a consultative (or participative) style of management. As freedom and autonomy have been identified as critical factors in promoting creativity, the manager must be comfortable in allowing the researcher considerable latitude in the conduct of the research.

As many of the management authors state, the effective R&D manager must combine technical skills and know-how with people-oriented leadership skills that enable him or her to bring the best out in their research staff.

An autocratic manager would be unable to share decision making and authority with employees and would want to micro-manage to the point where individual initiative and creativity would be stifled.

Encourage Effective, Timely Communications

Information is the life-blood of a research organization. The work environment should encourage communication among the research staff and others in the organization, as well as among the research staff and knowledgeable researchers elsewhere.

Internal communication should not be tied to the organization's authority structure. Researchers should be free to contact anyone in the organization regardless of rank or organizational unit. To facilitate this, there should be an atmosphere of openness and trust.

External information acquisition should be facilitated by visits to other laboratories, conference attendance, a good library and computer facilities, visits by world experts, and a rejection of the Not Invented Here Syndrome.

There should also be a tolerance for conflict; an organization that suppresses conflict, suppresses creativity. Researchers should be free to raise controversial ideas.

Tolerate Non-conformity

Organizations that wish to encourage creativity must be tolerant of individual work styles. Creative people do not fit the "9 to 5" mold. They may consider organizational norms for dress as irrelevant.

Many management authors who study creativity in the R&D setting advise that organizations should, within reason, tolerate "oddball" behaviour from their creative personnel. To do otherwise, will engender feelings of frustration in the creative worker who will view pressures to conform as unwarranted intrusion on his or her autonomy and a lack of respect for their creative contribution to the organization (i.e., the organization is more concerned about how they look or behave, rather than their creative output).

FACTORS OR ACTIONS THAT DEPRESS CREATIVITY

As noted earlier, the conditions that inhibit or depress creativity are generally the absence of the factors that have been identified as those that encourage creativity.

The unsupportive actions or factors that depress creativity (and productivity) can be grouped as follows:

Inappropriate Managerial Actions

Management having an autocratic management style is a major suppresser of creativity within an R&D organization. The following are some of the inappropriate managerial actions that will discourage creativity:

- lack of freedom to choose R&D projects, or at least to determine how the research should be conducted;
- setting of unrealistic work loads, and deadlines;
- assignment of unchallenging and/or uninteresting work;
- setting unclear goals and objectives;
- discouraging and penalizing risk-taking;
- restricting communications and the flow of technical information; and
- lack of consultation with the scientific staff on decisions concerning them.

Lack of Appropriate Rewards or Recognition for Creativity

Creativity and productivity must be constantly and consistently encouraged. Uncreative organizations:

- provide little or no recognition for creative work;
- lack enthusiasm for the work of R&D personnel;
- place too much emphasis on external monetary rewards; and
- lack an equitable parallel promotion ladder for scientific personnel.

Overall Negative Work Environment

The following environmental factors result in depressed creativity:

- many managerial levels involved in decision-making;
- confining all communications to the formal organizational structure;

- general discouragement of novel approaches to problem solving (i.e., overemphasis on the status quo);
- resources tightly controlled with no “spare” built in to support unexpected ideas; and
- overly formal organizational structure.

FACTORS OR ACTIONS THAT SUPPORT R&D PRODUCTIVITY

Many of the factors or actions that promote creativity also promote productivity. As before, senior management must want to promote productivity and take actions to ensure that it occurs.

Among the key actions or factors that encourage R&D productivity are:

- the employment of competent R&D managers and staff;
- managerial interest in, and respect for their employees;
- establishment of high performance standards;
- constantly striving to improve the operation of the organization;
- adequate delegation of responsibility and authority;
- effective time management;
- investment in the future through funding of strategic basic research activities;
- being receptive to new ideas and approaches;
- minimization of organizational politics;
- encouragement of healthy competition between groups;
- existence of equitable compensation and promotion policies;
- examination of past performance, good and bad, to learn how to improve;
- allowing research staff to focus their energies on research;

- existence of resources to follow up on new ideas, and
- senior management's having high expectations of the contribution R&D will make in meeting corporate goals.

FACTORS OR ACTIONS THAT INHIBIT R&D PRODUCTIVITY

Among the key factors or actions that reduce productivity are:

- ineffective planning, direction and control;
- inflexible program funding guidelines;
- excessive administrative burdens that distract the research personnel from conducting research;
- inability to recruit and hire the very best people;
- overinflated organizational structures;
- poor internal communications;
- inadequate investment in independent R&D efforts;
- lack of a people-orientation by management;
- lack of effective performance appraisal and feedback;
- technological obsolescence;
- ineffective reward systems that do not link compensation and recognition to productivity and performance;
- lack of a dual promotion ladder for scientific personnel; and
- ineffective management development.

Based on this review of the R&D management literature, it is apparent that organizational environment, of which managerial style and senior management support are important elements, is a critical intervening variable between potentially creative, productive scientists or engineers, and creative, productive performance.

Management can take concrete actions to establish a work environment that increases the probability of creative performance among its scientific staff, assuming that potentially creative people have been hired in the first place.

However, if management requires that everyone conform to unwise, restrictive policies, if the work assigned is uninteresting and lacks challenge, and if there are no opportunities for the research staff to learn new skills or gain new knowledge to keep them current, then in all probability, creativity and productivity will be stifled.