

before your men, your battalion will follow you. Moreover, they will never doubt your leadership or courage in the future."

6. *Expect positive results:* Show self-confidence and work to get favorable results.
7. *Take care of people:* This is the basic reciprocity doctrine of Confucius: "If you take care of people, people will take care of you." Starbucks is said to practice this doctrine by taking care of their employees first (e.g., financially supporting their college education), then customers, and finally shareholders.
8. *Put duty before self-interests:* The mission and the employees must be more important than one's own self-interests.

The preceding list of attributes neglects to include the all-important quality of strategic thinking and the leader's capability to create vision. Without vision, a person with the aforementioned attributes is merely a hardworking taskmaster who is responsible, goal oriented, and socially assertive.

4.10 Conclusion

Leading is another key function of engineering management. It encompasses the specific managerial activities of making decisions and selecting, developing, motivating, and communicating with people. Carrying out these specific activities well will make an engineer into a strong engineering manager.

Decision-making plays an important role in the career of an engineering manager. In the engineering community, the rational decision-making method is regarded as a standard. Engineering managers need to become familiar with a number of other decision support tools so that the right tool can be fittingly applied to specific circumstances.

This chapter offered guidelines for engineering managers to become better prepared for the special cases of (1) introducing major corporate changes, (2) working as a new leader in an engineering management environment, and (3) achieving superior leadership.

Engineering managers are encouraged to practice various guidelines associated with leadership whenever they find opportunities to do so.

QUESTIONS

1. Preparation of the company product that was promised to a major customer is running late, and there is intense pressure on the production team to deliver the product. The director of production is eventually told by the company president to deliver, "or else." The director therefore decides to ship the product, even though it had not gone through all of its testing procedures. Members of the production team become upset due to their uncertainty about the functionality and reliability of the shipped product. The director, however, insists that "We will just have to take that chance."

As the director of production, how would you have acted differently?
2. As advised by the company president, the sales department received a set of specific recommendations provided by an outside management firm to reorganize for maximum effectiveness. The sales manager believes that a few of the sales staff

may disagree with the recommended changes. The sales manager herself is also not fully convinced of the merits of all of the recommendations, but she wants to implement them, at least in part.

How should she proceed?

3. The engineering director of the company is called on to send one engineer abroad to assist in the installation of equipment. There are three qualified candidates, each working for a different manager under the director. The director knows that all three engineers will want to go, but their superiors will oppose any of them going for fear of losing time in completing their own critical projects. How should the director make the choice?
4. The marketing department needed to submit a proposal to a global customer, and it called a review meeting the next morning. By the time Bill Taylor, the design manager, was informed in the late afternoon, all of his design staff had left for the day and there was no one available. Bill Taylor decided to work on the proposal himself through the night so that he could talk with his design staff the next morning, one hour before the marketing review meeting.

All of the staff agreed with the proposed design except Henry King, a senior staff member who is recognized as the most experienced and best designer in the group. His objections were that the current design was too complex and that it would take another week to modify the design to ensure its functional performance.

In order to pacify him, Bill Taylor invited Henry King to come along to the marketing review meeting so that Henry King would feel the pressure that marketing was exerting on design. Unexpectedly, Henry King stood up at the marketing review meeting and reiterated all of his design objections, causing tremendous embarrassment to Bill Taylor and his superior, Stanley Clark, the design director. Bill Taylor became furious.

What should Bill Taylor and Stanley Clark do?

5. Jerry Lucas is the division director. As branch chief, Bob Sanford reports to Jerry Lucas. Bob Sanford has four section chiefs reporting to him.

Bob Sanford is technically competent, with extensive experience in solid rocket propulsion; he is also regarded as the best expert in this field. He is highly dedicated to his work, but inexperienced in managing technical people, as he has been on the job for only two years. Bob Sanford handles his subordinates quite roughly. He reverses his section chiefs' decisions without prior consultation with them. He demands that no information or data be transmitted to persons outside the group without his knowledge and concurrence. He also bypasses his section chiefs to go to people and encourages them to come to him directly with problems. Rumors have it that he places spies or informants within the group. As expected, he delegates no decision-making authority to his section chiefs and regards all of his section chiefs as technically incompetent. He creates an atmosphere of fear and suspicion, with low group morale.

Bob Sanford does not report to Jerry Lucas candidly on project progress and on difficulties he encounters. He does not understand his own responsibility of building teamwork, enhancing group morale, and creating employee satisfaction while achieving the goals of his group. He is lacking the skills and willingness to resolve conflicts within the group.

Finally, the section chiefs as a group go in to see Jerry Lucas and complain about the lack of authority and the oppressive atmosphere in the section.

What should Jerry Lucas do? I should note that this problem was condensed and adopted from Shannon (1980).

6. The board of directors receives a proposal from a business partner to jointly set up an assembly plant in a Third World country. This new plant will assemble final products with key components made by the company. Financial terms are attractive and the future marketing outlook is bright. There is just one problem. The Third World country is not a democracy, has a poor human rights record, neglects to protect its own environment, and does not safeguard workers' rights. An investment placed by the company would boost this country's economy and thus the political position of its current dictator. Should the company accept the proposal? Explain why.
7. What are some important characteristics of effective leaders? Which of these characteristics are more difficult for engineers to acquire?
8. The plant manager noticed a need to lessen the amount of waste materials, which occur in the production process. A task force was set up, composed of the plant manager and two of her supervisors, to examine the problem. They met for three months and regularly published the task force objectives and findings on the plant bulletin board.

The plant manager found, to her surprise, that the workers on the shop floor exhibited limited interest in the task force and ignored the bulletin board entirely. At the end of the three-month period, the task force came up with several excellent recommendations, which required changes in work practices. Most of the workers implemented the recommended changes very reluctantly, and some even secretly worked to sabotage the new practices. Eventually, all recommendations were withdrawn.

What went wrong? How should the plant manager have handled this case?

9. The project was running late and the section manager thought that it was time for a pep talk with his staff. He realized that he was considered to be somewhat autocratic by his staff, but this time he thought that he would impress on them that he was really one of the members of the team and that they would work together as one in order to succeed.

The section manager thought he made quite a good speech. He pointed out that the project was running late and that, if they failed, the customer could cancel the contract. He explained further that, as manager, he was responsible for the success of the project, and so everyone would be equally to blame for the failure of the project.

Unexpectedly, a group of staff came in to see him a few days later to clarify whether they were all under threat of unemployment, should it turn out in the future that they were indeed late and the contract was canceled by the customer.

What went wrong? What would you have done differently?

10. A regional sales manager suspected that one of her customers was having financial troubles. However, she was reluctant to mention it to her superior because she felt that she could be wrong. She kept quiet for several months, continuing to take large orders from this customer and hoping that the customer could recover from their

troubles. Eventually, the customer went bankrupt and defaulted on the payment of several large bills. What went wrong? What would you have done differently?

11. Company X selects someone who is weak technically, but very strong in group-process skills, to lead a team in developing a new engineering product. Would such a person be successful as a team leader? What can be done to ensure that the engineering product developed by the team will be satisfactory from the technical standpoint?
12. Conflicts between technologists and managers may arise when the technical professionals with the skills to make a decision have to deal with a manager, who has the right to decide. Why do such conflicts often exist in organizations wherein everyone works toward the same common goal?
13. Company X makes the decision to substitute aluminum for steel in a component of its product. What factors probably have contributed to this decision? At what managerial level would this decision most likely have been made?
14. As the department head, you urgently need to find an experienced person to fill a vacancy. The work involves close cooperation and coordination with others inside and outside of the department. Candidate A has exactly the experience required, but appears to be very unsociable. Candidate B has experience in a related job and seems to have a pleasant personality, though is not an extrovert. Candidate C has business experience in a different industry and is extremely sociable. All three candidates have scored sufficiently high on intelligence tests to qualify for the job in terms of general ability. Which candidate would you choose, and why?
15. Joe Engineer has just graduated from the University at Buffalo. He earned a 3.8 GPA for his master of engineering degree. Before he finished all academic work, he sent out numerous job applications and received three specific job offers, A, B, and C. All of them require him to make a decision for acceptance or rejection within one week.

Company A has an annual sales revenue of \$5 billion dollars and is located in New York City. The job of "engineer" pays \$95,000 a year, plus full benefits (e.g., 401(k), health insurance, four weeks vacations per year, education assistance, and relocation assistance). The city living is, of course, exciting and fun, but very expensive. The company has a structured training program for new employees to become familiar with its operations. His future boss is friendly and acts professionally. Joe believes that he can get along well with him. The work is in line with his basic technical training. As it is typically the case with big companies, other employees in the department are all quite smart and the internal competition among coworkers is relatively strong. He envisions that he may be able to get a promotion to the next level in five years' time. New York City is huge and there are at least five competitors to Company A offering similar products/services in the city. Another potential benefit of working in New York City is that Joe may be able to meet a lot of interesting young people and find a future spouse.

Company B is a \$500 million midsize company located in Rochester, New York. The job of "engineer" pays \$80,000 a year plus full benefits, which are similar to that of Company A. Rochester is a midsize city with some cultural and entertainment activities. Its cost of living is reasonable. Rochester is close to the Finger Lakes region, a well-known recreational area. The next large city is Toronto, which is about two hours away by car. The future boss is quite enthusiastic about Joe's

employment at the company and is eager to welcome him. The work is of a technical nature, but offers some managerial development opportunities that Joe likes. Joe believes that he could be promoted in the next three years and allowed to assume a higher level of responsibilities thereafter. The city has only a few large companies, such as Xerox and Kodak, but no company that competes directly against Company B. Joe thinks that it may be a bit more difficult, if not absolutely impossible, to meet a lot of interesting young people in Rochester.

Company C is a \$50 million small company located in Buffalo, New York, where Joe did some summer work during his school years. The job of "engineer" pays \$70,000 a year and offers some benefits. The benefits are not as good as in either Company A or B. Buffalo is slightly larger than Rochester, but is still way behind New York City in terms of culture and entertainment activities. Like Rochester, Buffalo suffers from a declining industrial base. There have been no new companies relocating into the Buffalo or the Rochester areas in recent years. Company C has no competitors operating in Buffalo or nearby regions. Joe knows his future boss because of his earlier summer work at the site. The work is quite exciting, as the future boss views Joe as one of the bright new stars and shows a significant willingness to personally train Joe for higher-level roles and responsibilities. Being in a small company, Joe understands that he needs to face up to the challenges of getting involved quickly in many disciplines beyond the principal one that forms the basis of his master's degree. Because Buffalo is also a regional city, Joe believes that it could be hard for him to meet a lot of interesting young people and subsequently find a mate.

Which job would you elect to accept? Explain the detailed decision-making methodologies and reasons that you used to arrive at your decision.

16. Preparation of the company product that was promised to a major customer is running late, and there is intense pressure on the production team to deliver the product. The director of production is eventually told by the company president to deliver, "or else." The director therefore decides to ship the product, even though it had not gone through all of its testing procedures. Members on the production team become upset due to their uncertainty about the functionality and reliability of the shipped product. The director, however, insists that "We will just have to take that chance." As the director of production, how would you have acted differently?

Appendices

Appendix 4.A: Factors Affecting One's Influence on Others

This section discusses the various factors known to affect a person's influence on people. It is advisable that the engineering manager pay attention to them (Cialdini 2006).

1. Credibility

A person's credibility is based on the following six attributes:

a. *Composure (ways to handle oneself)*

A degree of poise, stability, and patience; skills to handle a crisis situation effectively; humor under stress; self-confidence; and ability for public speaking are