§ 206:45. Management guide on technology management

Every company, regardless of its size and activities, is touched in some way by technology. For example, the use of computer hardware and software has now become commonplace for recording the terms of business transactions and creating and maintaining business records and even the smallest firms need to be attentive to improvements in computing tools that can lead to lower costs and greater efficiencies. Technology becomes even more important for the firm as its activities expand to include product development and manufacturing and it looks to stake out a technology-based competitive advantage. Given the importance of technology in so many of the activities engaged in by their companies, the founders and other members of the executive team need to understand the science and practice of technology management and the steps that should be taken to develop and implement the company's technology strategy, conduct technology assessments and audits, create an effective management structure for technology, develop and implement plans for acquiring necessary technologies, and perfect and protect the company's legal rights to use its intellectual property. Some of the fundamental principles of technology management for founders and other members of the executive team include the following:

1. While the competitive advantage offered by technology will vary from among industries and markets, it is fair to say that companies have often leveraged technologies to reduce costs associated with production and distribution of products, increase efficiencies in production and distribution processes, support product differentiation strategies based on higher levels of quality and/or reliability, facilitate circumvention of barriers to entry and competition with established firms, trigger a radical change in the basis for competition in a specific industry and/or create new markets and industries through discovery of solutions to problems that are important to consumers.

2. Effective technology management requires the development and implementation of a clear technology strategy that defines the role that technology is expected to play in the overall business strategy of the firm. The technology strategy will determine the focus of the company's internal research and development activities, as well as the need to look to outside sources for technology, and also impacts the selection of market sectors for the company's new products and the way those products are positioned in the eyes of potential customers. There is no single method for defining and determining the technology strategy of a company or business unit; however, one possibility is to focus on the degree to which the company is dedicated to becoming a "technology leader," as opposed to pursuing a "follower strategy," and the balance that should be struck between these two extremes across the company's technology portfolio. Selection of a technology strategy requires consideration of the likely rate of diffusion and adoption of new technologies or innovations, both within companies and among their customers. A variety of factors influence diffusion and adoption including politics and governmental policies; societal culture; understanding of, and experience with, elements of information systems (i.e., people, hardware, software, communications networks, and data resources); and economic, geographic, and geopolitical factors, particularly income levels and characteristics of populations (i.e., skills, educational qualifications, literacy rates, productivity, and the cost of labor).

3. Key issues relating to technology management include identification and evaluation of potentially valuable technologies, selection and implementation of strategies to access needed technologies, identification of markets for exploitation of new technologies, creation of the optimal organizational structure for management of new technologies, establishment of procedures for perfecting and maintaining intellectual property rights associated with new technologies, and establishment of scanning and forecasting procedures to anticipate future trends in technology development and use.

4. Companies should designate one person, often a "chief technology officer," who will be responsible for the advance of existing strategic technologies and identification of the future technology requirements of the company and who will be responsible for a number of different activities including technology audits, benchmarking the company's technology portfolio in relation to competitors, technology forecasting, defining the strategic technology requirements of the company, and establishing procedures and practices for keeping informed of new developments and acquiring and protecting those technologies that are crucial to the business strategies of the company.

5. As part of the administering the technology strategy for the entire company, senior management must also conduct regular assessments of the individual technology policies and practices of each internal department or business unit. Technology-based activities should be reviewed against strategic benchmarks and progress made by other participants in the relevant markets and industries. In addition, legal review and compliance efforts should focus on creation of intellectual property assets, identification and perfection of ownership rights, procedures for maintaining legal usage rights, and procedures for avoiding infringement of the legal claims or contractual rights of others.

6. Companies may elect to develop desired technologies using internal resources; however, in most instances companies lack the capital and resources to do all of the work on their own even if success would give them maximum flexibility and allow them to harvest all of the benefits of the work. The reality is that as companies establish priorities with respect to research and development, they typically rely on one or more methods for acquiring new technologies from outside parties, including contract R&D arrangements, purchasing and licensing arrangements, joint development arrangements, joint ventures, and strategic alliances and acquisitions.

7. Investment in the development or other acquisition of key technologies is only warranted if the company will be able to appropriate and protect the advantages of such technologies. The most commonly used methods for appropriating the gains from innovation include reliance on statutory intellectual property rights and non-statutory protection of trade secrets, complimentary assets, multiple technologies, and lead time.

8. Companies may use their proprietary rights with respect to valuable technologies in licensing arrangements to gain access to the technology assets and other unique skills and resources of other companies. Technology rights can also be used as contributions to new business ventures and can serve as barriers to technology strategies of competitors. In addition, the value of technologies can be enhanced through "knowledge management," which include the processes and techniques used by an organization to create, acquire, transfer, and protect the information and knowledge necessary for the organization to be successful, and the steps that must be taken to identify improvements to the existing knowledge base that must be pursued in order to respond to competitive challenges and changes in the operating environment.