

THE ROLE OF MARKETING FACULTY IN THE TECHNOLOGY TRANSFER PROCESS

Rapidly Changing Global Markets

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ABSTRACT

Global markets are changing at an accelerated rate. U.S. domestic markets are no longer isolated from global changes. The future business manager must understand these forces of change to be successful. Keeping pace with this fast changing environment is the key issue facing business faculty for several reasons:

- Even in the latest textbooks, the material covered is at least 2-3 years old.
- Articles published in scholarly journals often have narrow focus, lack practical application, sometimes do not reach concrete conclusions to merit classroom discussions.
- Current issues facing U.S. business are covered by publications such as the Wall Street Journal, Business Week, Fortune, Forbes, and other magazines. However, the material pertaining to marketing is too fragmented.

A general criticism of business schools by the business community and students alike suggests that the present course material is inadequate to prepare the students to face intense competition from foreign companies both domestically and internationally. The first step in removing this inadequacy is for faculty members to recognize and deal with it in a challenging way. This paper suggests that marketing faculty should take a lead in this area by accepting this challenge.

THE CHALLENGE OF REGAINING U.S. COMPETITIVENESS

A major problem in the United States today is remaining competitive with emerging industrial powers overseas. Everyone is aware of the inroads the Japanese have made into the U.S. economy. The automotive, steel and electronic industries have all suffered significant reduc-

tions in domestic and foreign sales to international competitors, particularly the Japanese. In addition, the U.S. now faces increasing competition from other rapidly developing countries along the Pacific rim such as Taiwan, Hong Kong, South Korea and Singapore.

The U.S. has been falling behind other nations in their ability to transfer the results of their technology to the market place. In many instances U.S. inventions have been taken overseas and turned into products which are then imported into the U.S.

One example is videotape recorders. An American company, Ampex, introduced this product in the U.S. in 1956, but failed to see its market potential. Japanese companies recognized the potential for VCRs, licensed the technology from the U.S. company, and today the Japanese control a \$10 billion world wide market [Cundiff 1988]. Robotics, automation and statistical quality control are other techniques developed first in the U.S. but they are being applied more effectively in other countries.

A process that offers hope for reversing this trend is to develop better and newer ways to transfer and commercialize science and technology. This process is known as technology transfer.

Technology transfer involves a sharing of knowledge between two or more parties. It also includes the application of research findings to the marketplace. For the discussion in this paper, the authors will define it as a sharing of knowledge between two or more businesses or between government research organizations and business for the purpose of turning an invention or idea into a marketable product.

Historically in the U.S. there has been a reluctance on the part of business to become involved with government in developing new products. Business has attempted, for the most part, to remain separate from government. In the twenty-five year period between 1945 and 1970, the Golden Age of American manufacturing, this was not a problem. However with the resurgence of other major economic powers after World War II this strategy is no longer feasible. In Japan and Europe the government works much more closely with industry often helping to finance business so that it can be competitive in world markets.

An example of a successful government sponsored consortium is Airbus. It receives part of its funding from the governments of France, Great Britain, West Germany and Spain. This has enabled the aircraft manufacturer to become competitive in the commercial airliner market--a market which has been dominated in the past by American airliner manufacturers like Boeing and McDonnell Douglas. These two companies and other American manufacturers have cried foul but the fact remains that Airbus now has over 25% of worldwide jet orders and is still growing (Rudolph 1987).

If U.S. industry wants to regain at least a portion of the sales it has lost to foreign competition, a more effective process of technology transfer is needed. To compete successfully American industry must improve its ability to transform inventions and technology to marketable products and processes.

Technology transfer can take place between other partners besides business and government. Companies in different industries, competitors in the same industry, and even universities can engage in it. Universities can provide new technology through their research labs and management and marketing guidance through their business faculty. The great resources of knowledge that exist in the academic field can be blended with the fruits of private and governmental research.

For example, "Today, the concept of 'technology exchange' is taking on a larger role. Those words now describe the process by which an entire nation harnesses its creativity and innovation in one realm -- technology research -- and translates that into leadership in a different realm: the competitive world of international business" [Rogers 1988].

Technology transfer can also be viewed as a process of harnessing our nation's research and development activities in science and technology and then transforming them into increased productivity for economic growth.

George Kozmetsky (1990) identifies five important factors regarding the nature of technology and its commercialization in a modern economy:

- Technology is a constantly replenishable national resource,
- Technology generates wealth, which in turn is the key to economic, social, and political power,
- Technology is a prime factor for domestic productivity and competitiveness,
- Technology is the driving force for new alliances among academia, business, and government
- Technology requires new managerial philosophy and practice.

It is this new managerial philosophy and practice of technology transfer that the marketing faculty should become aware of, conduct additional research on, and include in the marketing curriculum.

Technology Transfer and Marketing Faculty

Presently there is a lack of awareness among business schools about the subject of technology transfer. Few colleges or universities have courses in this area. There is some work being done on a consulting basis at universities but the number of faculty involved is very small. It is not, however, a subject area that business students are exposed to in any detail. Only a limited amount of research has been conducted in this field. The result is that most marketing faculty are not even considering this area as a part of the marketing curriculum. Marketing faculty need to be alerted to the importance of this subject.

There are several means by which technology transfer can be made an integral part of a marketing curriculum. A starting point is to add a course in this area to marketing curricula. At some schools it might be appropriate to even formulate a concentration or major in technology transfer.

The closest course to this subject area presently being taught is Industrial Marketing. However, technology transfer receives only limited coverage in this course. Even the International Marketing courses being taught are in most cases barely alerting students to the acute problem of foreign competition and the need for better implementation of American technology. Many marketing students, however, do not take either of these courses and thus miss even this limited exposure to technology transfer.

Another means by which technology transfer can be promoted is to present the concept both formally and informally at professional meetings such as the American Marketing Association, Southern Marketing Association, Western Marketing Association and other regional marketing conferences. In this way faculty who are often most active in research will be reached. Also special attention can be paid to deans who would be most influential in having a course or concentration in technology transfer adopted.

Marketing faculty could also conduct seminars on technology transfer for the business community. These seminars would encourage interaction between academia and business which is needed to make technology transfer successful.

To create awareness among students technology transfer can be integrated into several courses in a marketing curriculum. It would involve updating courses to reflect the need for technology transfer. This would be similar to the concept advocated by the AACSB to incorporate international marketing concepts throughout the business curriculum.

A technique that offers significant advantages is an internship course in technology transfer for outstanding students at the senior level in undergraduate schools or graduate business students. An internship would provide students with practical experience on how to market new technology.

Experiments In Creating Technology Transfer Awareness In University Systems In South Carolina

The S.C Universities Education and Research Foundation (SCUREF) was incorporated in 1988 by the four major state supported academic institutions: The University of South Carolina, Clemson University, the Medical University of South Carolina, and South Carolina State College. The objective of SCUREF is to pool their resources and talents to develop special programs, technologies, and expertise to conduct research and enhance educational opportunities in the State of South Carolina.

One of the goals of SCUREF is to transfer technologies (inventions) from the Savannah River Laboratory, located near Aiken, SC, and owned by the U.S. Department of Energy (DOE). The support for such activities comes from the highest levels in DOE, the White House, and the legislative branch of the U.S. Government.

Under the direction of SCUREF, the first "Summer Institute for Technology Transfer (SITT)" was held in the summer of 1990 at the University of South Carolina at Aiken Campus. Fifteen students and six faculty members from SCUREF institutions spent ten weeks of their summer learning about technology transfer. After two weeks of orientation the students were assigned to three different work groups, each group supervised by two faculty members. The students selected for the program came from engineering, medical, and business schools including graduate and under-graduate programs.

About seventy documented inventions from Savannah River Laboratory (SRL) were selected for evaluation. The students conducted research to answer questions such as:

- Could the invention be used by the private sector to improve processes, increase efficiency, or to develop a new product which has unique advantages over existing technology?
- Is the invention (technology) patentable?
- What is the market potential for the new product/process based on the invention?
- Who are the potential customers? Will they pay the price of the new product based on current cost estimates?
- Who are the potential licensees who may be interested in manufacturing or marketing the product/process based on the invention?

The research included (a) students and faculty interaction with inventors at SRL, (b) evaluating samples/prototype products built by SRL based on inventions, (c) studying the test data/results developed by the researchers on the subject and (d) talking to potential customers and licensees in the U.S. domestic markets. Each group evaluated fifteen inventions and prepared detailed reports for each which included recommendations for further action.

In addition, a series of weekly public lectures was held relating to technology transfer. The speakers included nationally known experts in the field of technology transfer, patenting procedures, and seed capital. The lectures also included a panel of entrepreneurs who started new companies based on inventions from researchers in different fields.

The feedback received from students, faculty members, researchers at SRL and the quality of reports prepared, suggests that the SITT program was very successful. The program achieved several goals:

1. Provided training in the technology transfer process for the participants.
2. Local business executives, small business owners, entrepreneurs, students, faculty members, administrators from SCUREF institutions and researchers from SRL were invited to the public lecture series. This created awareness about technology transfer among business, academia and the personnel from SRL. Through this awareness process a spirit of cooperation is developing among these three groups in S.C.
3. The experience during the SITT program for each participant is creating a chain reaction. Each participant is acting as an ambassador of technology transfer at their respective institutions.

The success of the 1990 Summer program led to the 1991 summer program during which about 80 additional inventions were evaluated by participating students. In both seminars marketing faculty took a leading role. The student reports were used by a special task force created by SCUREF and the S.C. Development Board to market and license the new technologies to the private sector.

The importance of technology transfer is recognized at the highest levels in the SCUREF institutions. A special curriculum committee has been established which includes faculty members from business, law and engineering schools from four universities in South Carolina. The goal is to include the topic of technology transfer in each of the core courses offered by these schools. In addition, an elective course on technology transfer will be offered both at the undergraduate and graduate level. The course material is being compiled at this time.

RECOMMENDATIONS

In any business organization, the marketing department is an integrating force. It is time that marketing faculty play such a role in business schools. One way to achieve this is to take a lead and carry out such an integration process in marketing courses. Figure 1 depicts the leadership role envisioned by the authors for the marketing faculty to integrate the process of technology transfer. Let us learn about the process of technology transfer: arrange seminars, create a new track on the subject, conduct more research, inform the AACSB of our efforts and ask their support for the integration process. We could encourage and conduct more re-

search on the subject and publish the results. Also we should inform the authors of marketing textbooks to cover the topic of technology transfer and examine the research results. With such coordinated efforts our product -- the future marketing manager--will be much more effective in regaining U.S. competitiveness domestically and in world markets.

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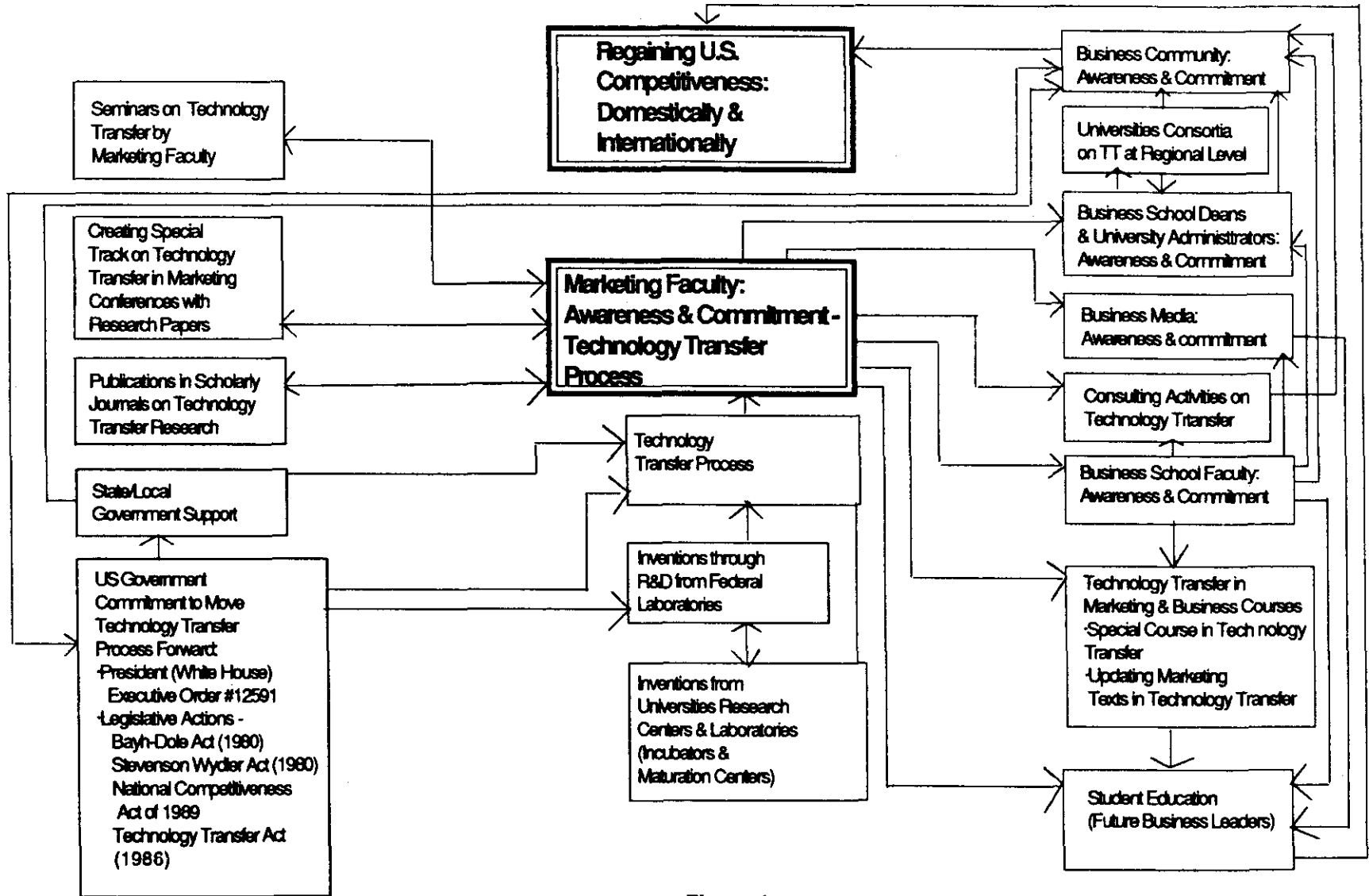


Figure 1

Marketing Faculty "Leadership Role" Suggested by Authors to Create Awareness and Commitment for "Technology Transfer Process" among Business Community, Academia, and Business Students