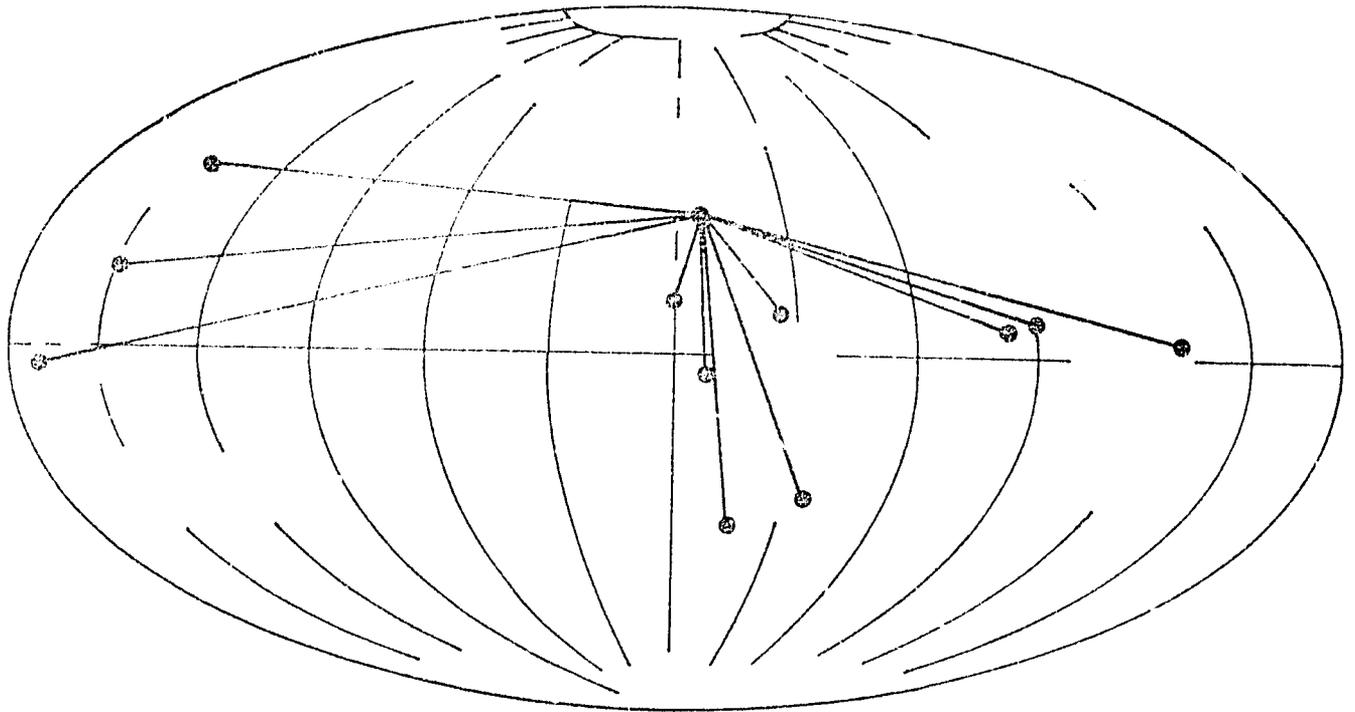


EMPLOYMENT GENERATION THROUGH STIMULATION OF SMALL INDUSTRIES



THE FUTURE PROSPECTS OF INTERNATIONAL TRANSFER AND
DIFFUSION OF TECHNOLOGY FOR SMALL BUSINESS

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Presented at The Fourth International Symposium
on Small Business
October 10-13, 1977, Seoul, Korea

by

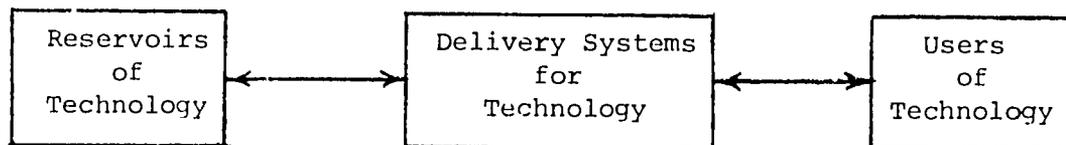
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THE FUTURE PROSPECTS OF INTERNATIONAL TRANSFER AND
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It is a pleasure for me to be here in Seoul again and to have the opportunity to present to this distinguished gathering some observations about technology transfer for small business. I speak to you today from a background of 25 years of economic development, of which the last 16 have been heavily involved in technology transfer to small business and industry. It's a fast-changing world, however; I learn something new each day and I hope today will be no exception.

The concept of technology transfer is simple. It is in the implementation of transfers where the complexity arises.

Reduced to simplistic terms, technology transfer which leads to technological development can be thought of as having three main elements -- reservoirs of technological information, a variety of delivery systems, and a universe of technology users.



As one examines these elements, however, the complexities of the transfer become more apparent. The reservoirs of knowledge are scattered all over the world -- in the minds of people, in libraries, in laboratories, in industries, in computers, and so on. One of the most persistent, vexing challenges about the reservoirs of knowledge is know where the technology is located so it can be retrieved. An essential characteristic of a good technology delivery system is knowledge about locations of and access to centers of technological information.

Often it is not knowledge that is needed so much as "know-how," the ability to translate technical information into a useful tool to accomplish some function. "Know-how" implies a certain pragmatic "how-to-do-it" ingredient based on analysis and experience. "Know-how" frequently resides more in the minds of men than in the written word.

On the other end of the technology transfer process is the universe of potential users of technology. There are millions of small businesses in this world and they are all potential users of technology. The scope and diversity of their technological needs is seemingly endless. As a member of an organization which strives to respond to all inquiries, regardless of their source or content, I can attest to the fact that Georgia Tech rarely receives a repetitious request for information. Since it is manifestly impossible with limited resources and people to know everything about everything, the importance of knowing where information is stored looms very large in such an operation.

Suffice it to state that tens of thousands of reservoirs of technology exist and that there are millions of potential users of some aspects of the technology. The problem is getting the technology which can be helpful moved out of storage and transmitted to the potential user in a useful form. This is where the technology delivery system comes into play and it is a critical aspect of technology transfer.

What must an ideal delivery system do? First, it must identify the problem or fill the need. Second, it must identify and locate the technology which may solve the problem or fill the need. Third, it must deliver the technology to the user. Fourth, it must adapt, modify, and/or interpret the technology for the user and assist in its utilization. Fifth, it must follow up to insure correct usage and continuing viability of the technological application. Finally, it must consistently repeat this process as often as required.

Obviously, there are few, if any, technology delivery systems which achieve this ideal consistently. They are less than ideal for any number of reasons.

How do we transfer technology to the potential user in a timely manner? The choice of delivery methods depends on what kind of technology we are trying to transfer -- is it printed technical information, patents, trade secrets, journals, reports and analyses, machinery, equipment, or know-how?

Printed technical information, patent descriptions, reports and analyses may be mailed to the potential user. Though widely used, this simple approach to technology transfer is less productive than other techniques. The continual provision of technical information in specific subject areas at periodic intervals also can be achieved by mail. Obviously hardware, such as imported machinery, equipment, and spare parts, requires different delivery methods. Education involves the transfer of knowledge and technology to individuals.

There are many future possibilities for more effective transfer and diffusion of technology to small business. I shall mention only three to you because of the limitations of time.

In Georgia Tech's experience, the most effective transfer system for information is to provide the relevant information along with auxiliary services, information adaptation and modification, or interpretation directly to the potential user in a person-to-person interchange. This cannot always be done in the case of international technology transfer because of distance and expense and the frequent lack of an informed individual to effect the transfer to the potential user of the technology.

In Georgia this problem has been overcome by establishing a series of industrial field offices around the state manned by technology transfer professionals. One of the functions of these offices is to contact business and industry,

ascertain the problem and information needs, and refer the problems and information requests to the main office, which then researches the inquiries. When answers are found, they are forwarded to the office originating the inquiry. Field people from that office then go to the business or industry which occasioned the action to deliver the required information, explain it where necessary, show how it can be useful to the business or industry, and provide any assistance that may be required after the technology has been utilized. Some proportion of the identified problems or technology requests never are sent to the main office because solutions can be provided at the field office level and continuously monitored thereafter.

This system has been highly successful in Georgia, achieving a much higher frequency of effective technology transfer than through simple provision of literature or other types of technology transfer. The system has been a major factor in company expansion, diversification, and employment generation.

Such a system requires two major elements -- a central staff with an information center and a decentralized office system staffed with capable and skilled professional people. It requires an allocation of usually scarce resources to establish such a system, but it is the most effective method of transferring technology we have found. Organizations with which Georgia Tech is linked around the world are utilizing this approach in the Philippines, Indonesia, Nigeria, and Paraguay, and we understand Korea is considering establishing such an industrial extension system.

The second future possibility I would suggest to you is on-line computer information bases. There are several such systems existing in the U.S. and other countries of the world. They involve the storage of vast quantities of information on computer, which can be retrieved by a remote computer terminal and a telephone line. For example, Georgia Tech is linked to a system of

geographically dispersed data banks which contain more than 16 million citations from a number of fields of human endeavor. This massive data collection can be searched quickly, by use of a remote terminal and a telephone, for problem-solving answers to the problems and needs of small business. Obviously, not every small business needs such a linkage, but banks, associations of industries or government organizations can provide services to large numbers of small businesses. As the use of computers expands and the knowledge bases are stored, this will become an increasingly important tool to serve small business.

The third possibility I would suggest to you involves the use of satellites for direct and instantaneous exchange of technological information. Imagine, if you will, a small business conference like this one today, involving a group of people in Seoul, another group in Manila, one in Tokyo, and still another in Singapore. A speaker in Seoul is being recorded by a TV camera which is relaying the speaker's words and image to a satellite in the sky from which it is being transmitted almost instantaneously to TV monitors before each of the other conference groups in Manila, Tokyo, and Singapore. A man in Singapore asks the speaker in Seoul a question. The speaker in Seoul sketches a diagram on a chalkboard which all conference groups see instantly. An instantaneous technology transfer is taking place.

This "satellite teleconferencing" is technically possible today. It is being studied as a means of greatly speeding up the technology transfer process, and broadening human understanding and knowledge. It obviously has considerable potential.

SLIDE PRESENTATION

In conclusion, let me state a firm belief. . . The technology to achieve more effective small business problem solving exists today. The real challenge is how to harness the technology in an organizational system which involves problem

identification, problem analysis, problem solution, and solution transfer to the small businessman in a relevant, effective, and rapid fashion. This is the challenge -- future generations can tell how well we have met that challenge.