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ABSTRACT

Centers for technology transfer are available almost everywhere based on the availability of interested experts and funding. The objective of this monograph is to introduce the assured system that results in excellence in services and expectations from technology transfer. The focus is on simple techniques of potential interest for community and public interest. The following chapters are included: (1) "Introduction"; (2) "Planning for Future Growth"; (3) "Policies and Strategies"; (4) "Information Services"; (5) "Management Trends"; (6) "Technology and Administration"; (7) "Technology and Community"; (8) "Educational Technology Transfer Centers"; (9) "Selected Activities of Technology Transfer Centers"; (10) "Role of Human Factors and Psychology"; (11) "Selected International Technology Transfer Centers"; (12) "Conventional Problems and Solutions"; (13) "Evaluation Systems"; (14) "Monitoring and Control" and (15) "Future Developments." Each chapter contains references. (JLB)

EXCELLENCE CENTER

For

High Technology Transfer

Prof. M.I. ISMAIL , Ph.D., P.E.
SCI & AD INST., Canada

and

Prof. A.A. AL-TURKAIT ,Ph.D., M.A.
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ISBN-0-921478-29-1

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This book was prepared at the author's / editor own cost based on his experience in research and in University educational systems in Canada, USA, UK, Germany, France, Japan, and other countries.

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Dedicated to the Provost

and SUNY Farmingdale members

for their vabable discussions, help and support

Preface

Centers for Technology Transfer are available almost everywhere on the availability of interested experts and fund. Several non-porfit organizations are interested in technology and it's use in career development and education.

The objective of this concise volunteer monograph is to introduce the assured system to have excellency in services and expectations from Technology transfer. The focus is on the simple techniques of potential interest for community and public interest. The recognized and internationally proven techniques are presented. This is not a full survey for every word cited in regard, but it is focused on generalities of useful impact for specialists as well as public interest.

This monograph includes 15 Chapters. Chapter 1 is an introduction for Technological ideas, innovations and communications of potential interest for future development. Chapter 2 focuses on planning for future growth of such technological centers. Chapter 3 highlights the philosophies, policies and strategies for a technological centers' survival. Chapter 4 presents the various available information needed for such technological centers. The effective and cooperative efforts needed for such centers are presented in Chapter 5. Chapter 6 shows more managerial aspects for formal established of the centers. The community role and need for such technological centers are presented in Chapter 7.

The impact of such technological centers in development of educational systems are presented in Chapter 8. Selected specific excellence centers' activities are shown in Chapter 9. The role of human factors in the performance aspects of such centers are shown in Chapter 10. The international technology Transfer Centers in various countries are highlighted in Chapter 11.

Excellence centers usually have sure and simplified techniques for solution of the conventional problems whether related to technology, or human or economy of community, and politicians interest as shown in Chapter 12. Achievements of excellence centers are evaluated to the satisfaction of pre-set objectives by various systems as shown in Chapter 13.

Assurance of excellency is followed up by continuous monitoring and observation of the available achievements as shown in Chapter 14.

Future survival and progress depend mainly on cooperative, effective techniques used by such centers as shown in Chapter 15.

The appendix contains useful information for specialists as well as for conventional readers. The list of cooperative international non-profit organizations involved in Technology Transfer is an example

The authors/editors welcome comments from interested parties for future editions or publishing of this monograph or similar volunteer programs.

Farmingdale
December 7, 1993

The Editors
Prof. M.I. Ismail
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EXCELLENCE CENTERS for TECHNOLOGY TRANSFER

Prof. M.I. Ismail, Ph.D, Eng. and Dr. Adla A. Al-Turkait

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C H A P T E R 1

INTRODUCTION

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Excellence centers for technology transfer are now having the interest of the Funding agencies as well as the industrial and educational institutions. The creative programs and ideas are realized through such centers in almost all fields using appropriate technology transfer [1-3] and simplified techniques [4].

1.1 Ideas:

In this electronic information era, the world great ideas are documented and published in various forms. The patents claims do not include specific ideas, however, only new or developed materials, process or devices could be patented. International conferences are the main source for creative ideas, particularly by experts who can see and develop the presented techniques in specialized conferences. In North America and Japan as well as in other advanced countries, specialized conferences are made periodically every quarter, year or longer periods. Several periodicals are interested in listing the future meetings of professional association whether in USA or overseas. Innovations could be followed up even from the type and frequency of such conferences. Japan welcomes international cooperation in various fields including airplane industry [5].

1.2 Innovations:

In this electronic information era, anyone could cooperate with those interested in an idea of mutual interest to achieve addition of new data for better or economical achievement of the same industrial product. As an example, if someone manages to lower the cost by 5-10 folds. The approach (process, materials, device) development could be patented. Patent agencies are qualified to patent almost anything once the criteria is met. An extensive search should be done to assure that nobody has patented this concerned matter before. This search could be done now using electronic information services in few minutes instead of several weeks or even months using the conventional library printed information search. Available information saves time and efforts of most technology transfer centers. More details about patents are available elsewhere [6]. The CD=ROM'S and on-line electronic information servies give recent data [7-10].

1.3 Information

Excellence centers for technology transfer are dependent mainly on quality information and useful technology for the interest of the community and center users.

Mobile information kits, or the so called electronic information library package as proposed by the authors, simply include CD-ROM's of interest and CD-ROM drive/player and laser printer and mobile phone. All such simple and commercially available information elements could be assembled to form the proposed mobile information system in the size of hand page or suit

case of standard size at a budget suitable for any technology transfer center (less than 1 year salary of a regular secretary). Fantastic on-line and CD-ROM advances could be used for real user's interest at nominal cost for the interest of specific technology transfer centers. Effective communications are a must for excellence in technology transfer centers performance.

1.4 Communications:

Excellence in this electronic information era includes effective communication. The use of commercially available systems such as telefax, PC's, and E-Mail are now contributing for the success of most of technology transfer centers. The use of toll-free or 1-800 free calls or call-collect systems to facilitate the communication for the objective of user's satisfaction. Information transfer now include images as well as other electronic information services whether from International data banks or other private datea sources. The technology transfer centers in the 1990's might survive in the future if they cope with the future user's needs.

1.5 Future:

Those who plan for quality technology transfer centers are always targeting the establishment of potential interest of future users. The market needs and expectations from these centers towards future development of the community and future jobs for the individuals are to be considered for those interested in excellence centers in this respect. Published information should be considered, particularly from various sources as shown in Table 1.

CONCLUSIONS:

Excellence in technology transfer center performance is always dependent on the optional use of the international achievements of various world centers. Learning and utilization of others' experience and findings save not only money, but also offers and assures fast progress of proposed new technology transfer centers in any geographic location, with any available resources using world proven fast techniques for communication and information transfer.

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TABLE 1

AVAILABLE INFORMATION ON TECHNOLOGY CENTERS RELATED FIELDS

Records	Keywords	Reference
8	Training and Business and Manufacture	*
21111	Technology	
833	Technology and Ideas	
9504	Technology and Information	
1277	Technology and Innovation	
2246	Technology and Communication	
2890	Technology and Future	
4042	Technology and References	
436	Technology and Conclusions	
357	Technology and Excellence	
28	Technology and Excellence and Transfer	
4	Technology and Excellence and Transfer and Management	
1	Technology Training Camps	**
145	Technology Transfer	
1	Technology Transfer Model	
1	Technology Transfer Models	
1	Technology Transfer Projects	
1	Technology Transition	
1	Technology Usability	
1	Technology - Bases Business Development	
1	Technology - Indepedent Module Generators	
429	International Cooperation	***

* ERIC 1982 - Sept. 1993
** Compendex 1993
*** Applied Science & Technology 10/83 through 9/30/93

CHAPTER 2

PLANNING FOR FUTURE GROWTH

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Excellence Technology Transfer Centers are usually planned to assure present and future growth. The current and future strategic and natural resources and expectations are considered for such centers [1].

2.1 Strategic Planning:

Strategic planning is used for such excellence centers with the objective of technology transfer. The current and future available manpower should have the attention for optimal involvement in such center activities. International cooperative efforts guarantee the continuous flow of information for the benefit of those involved personnel. Mutual interest, cooperative effort [2-3] and considering use of shared resources are the best policy, particularly for limited budgets or budget cuts [4-5].

2.2 Resources:

The human resources are always at the top of priorities pre-set for quality and excellence in center performance. All available experts should be involved particularly those experts interest in volunteer and international cooperative programs. Financial aspects should act in favor of such centers to assure maximum returns. Achievements should be rewarding for all parties interested in such centers. Motivated and involved professionals are good policy.

2.3 Philosophies:

Excellence technology transfer centers might adapt various philosophies which satisfy the realization of their pre-set objectives. Heavily funded centers usually care for specific equipment and research programs which justify the spent budget. Several international technology transfer centers are achieving the same objective with various budget levels according to the policies and philosophies adapted. Electronic information files show all the available literature about philosophies and other aspects of such centers [6]. The reader could get the latest publications instead of reading the last decade data or even the last year information. those with experience and "hands-on" can get their own benefit from the huge amount of literature now available from CD-ROM's and on-line search. However, careful research strategy might give the exact and useful data for the benefit of the reader. Volunteer cooperative experts and professors are for sure useful to give their free consultation to those interested. The authors offer such service free of charge to the benefit of such centers interested in international cooperative and volunteer achievements.

2.4 Achievements Principles:

Excellence centers achievements are regarded and reviewed according to various criteria. the international credits are always achieved and recognized by the reports written and published (refereed publications) in periodicals as well as in various clearinghouse data bases. Those interested in quality educational systems, get their referenced publications available by electronic

information sources, e.g. in the Educational Resource Information Center (ERIC), which is well known and available in almost all the libraries and information centers in the USA as well as other University libraries worldwide. Thousands of international Journals are available for free publications (on merit) for potential authors [7]. These international journals guarantee that the new data and useful results from such technology transfer centers, will be internationally known and available to interested readers to contribute for further progress in programs of mutual interest between Center and reader(s).

2.5 Limitations:

Excellence technology transfer centers usually face conventional, as well as unique problems. The managerial system usually use all the available resources to get rid of such problems. As an example: financial and budget problems are handled carefully by using minimum number of employers. Excellence centers for technology transfer could be a single person team using the available volunteer cooperative personnel. Motivations and credit is a must for those volunteering their time and experience. Human factors and international experience in technology transfer business is a must for such efficient low cost excellence centers. The identification of such centers by the public is an easy matter now by the use of CD-ROM's [6] for the published reports of such centers. The budget spent on such centers could be very easily identified from the yearly reports which justify the spend of such budget. Centers which spend millions of dollars produce published

reports that could be compared with other centers. Volunteers might get credit in this respect. Now all activities of such technology transfer centers are documented in the form of reports, training sessions, short courses, etc. which could be followed up through local or international information services available to readers and tax payers. Staff training assures potential benefit of the center [8]. Administration policies are also of prime interest [9]. Perfect planning of such technology transfer centers should assure or consider economic development [10]. Tables 2 and 3 show more information about technology transfer centers. There are several objectives and reasons pre-set for the various technology transfer centers.

CONCLUSIONS:

Planning of technology transfer centers for future growth is a must in the 1990's. The planners must consider the benefit of the community from the outcome of such centers. Optimal use of resources assure the continuation of progress of such center and optimal growth in the future for better job market satisfaction.

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TABLE 2

SELECTED INFORMATION ON TECHNOLOGY CENTERS

No. of Records	Request Keywords	Reference
48	Technology Centers	*
10	(Technology Centers) and Planning	
10	(Technology Centers) and Resources	
0	(Technology Centers) and Achievement	
1	(Technology Centers) and Achievements	
0	(Technology Centers) and Limitations	
1	(Technology Centers) and Conclusions	
6	(Technology Centers) and References	
0	(Technology Centers) and Philosophies	
4	(Technology Centers) and Strategies	
5	Science and Technology and Long Island	**
26	Science and Technology and New York	
142	Technology and Manufacturing	
26	Science and Manufacturing	

* ERIC 1982 - Sept. 1993
** US Government Document 1993

TABLE 3

SELECTED OBJECTIVES AND ISSUES FOR TECHNOLOGY TRANSFER CENTERS

ITEM / OBJECTIVE / REASON / TITLE	NOTES
1. Customer - driver	11
2. Knowledge - based	12
3. Industrial Training	13
4. Cooperative Education	2
5. Medical Research	3
6. Engineering and R & D	4
7. Telecommunications	14
8. Business - Science and Society	15
9. Technology Transfer for Local Government	16

C H A P T E R 3

POLICIES AND STRATEGIES

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Policies and strategies adapted for establishment of quality and excellence technology transfer centers are responsible for the international recognition and respect for some world centers. The role of University Consultant Professors in this respect is of interest [1-2].

3.1 Philosophies:

Several philosophies are used by various technology transfer centers. Depending on those who are funding the center, the selected philosophy will be in accordance to the pre-set objectives. Usually the center carries the name or even the statement of the funding agency. Although the basics of research centers and technology transfer centers are almost the same, the human impact shows the difference in centers output. To sell or transfer any technology in North America and Canada is for sure different than that in Russia or in the developing countries. Motivations might be different or even should take the various forms of acceptance to the society and community of interest to technology transfer system/centers. Those involved in technology transfer should be careful in selecting the optional policy in this respect. Strategic factors is another concern [3].

3.2 Policies & Strategies:

Although simplicity and motivation are the best policies, still each community has their own proven techniques for technology transfer. The human role factors are of prime interest. Public opinion orientation and broadcasting or TV advertisement are among the systems of proven validity. The focus on development of human resources is the main concern of most of the excellence centers concerned with technology transfer. Contracts are always signed for various reasons and are related to the selected policy of mutual interest to the center as well as to the contractor. Funding agencies have their regulations and rules, which better be followed for mutual interest benefit of technology transfer funding.

3.3 Funding systems:

Excellence centers for technology transfer might get benefit from diverse and multi-funding agencies based on submitted proposals, whether solicited or non-solicited (SP or NSP). There should be always justification for the winning proposals. International cooperative teams could help in this respect. Several international funding agencies are interested in getting the results as soon as possible with optimal cost, so they do not mind funding or partial funding the same project in various geographic locations. The UNESCO and other organizations are typical examples for the repetition of these projects in various parts of the globe with almost the same philosophy, objective and even the same technology for the benefit of certain geographic areas. The best philosophies should give the best return for all

those involved parties, e.g. the funding agency, and the society or community of concern, in addition to those employed by such luxury technology transfer centers located in poor and needy communities who do not need such huge buildings. Or those employers of the large salary levels giving to them what they already have or are not in real need of. Table 4 shows more details about the community needs from such technology transfer centers. More data is available in other chapters in this monograph.

CONCLUSIONS:

Policies and strategies for excellence centers should be achieved from the available human resources for the benefit of the community and society in large. Internationally published information should be utilized by experts and volunteers for maximum return from taxpayers and funding agents involved in such technology transfer centers.

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TABLE 4

SELECTED TECHNOLOGY TRANSFER CENTERS AND THEIR POLICIES AND STRATEGIES FOR QUALITY ACHIEVEMENTS

TOPIC / TITLE	NOTES	REFERENCE
-Strategic Planning	Role of University	2
-Strategic Factors	Development of Technology	3
-Cooperative Efforts	Research and Technology Transfer	4
-Building Excellence	Training	5
-Conservation Technology Transfer	Agricultural Water	6
-Space and Defense	MIDAS Technology Transfer	7
-High Frequency Devices	Electronics	8
-Software Development	Assessment	9
-Task Force on Excellence	Efficiency and Planning	10
-Devices (Electron Beam Lithography)	Industrial Training	11

C H A P T E R 4

INFORMATION SERVICES FOR EXCELLENCE TECHNOLOGY TRANSFER CENTERS

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Excellence services from technology transfer centers depend on effective and useful information utilized of the best available information, whether electronic or printed type of information [1-2].

4.1 Electronic Information:

The use of electronic information is a must for all technology transfer centers. Both online and CD-ROM electronic information should be utilized for the benefit of such centers. Depending on the number of users and the level of information needed, the access to online or the use of CD-ROM is optimal. the cost of information retrieval includes the telecost as well as the information data bank fee or file cost. CD-ROM is cost effective for larger numbers of users. Several files such as Compendex Engineering Index and others are of prime interest to technology transfer centers. Business files are also of specific interest for technology transfer specialists. However, Applied Science and Technology are of particular interest for most of the users of such centers. Various printed information particularly those locally available are of potential interest [3-4].

4.2 Printed Information:

Excellence technology transfer centers usually are interested in various reports and printed materials related to their specific activities. Recent reference texts and books, and monographs are typical examples of printed materials. However, specific journals and magazines are usually of interest to users as well as employed people by such technology centers. The executive meeting minutes and conference proceedings add useful information sources to such centers.

4.3 Telecommunications and Conferences:

A significant part of excellence technology transfer budget is directed towards meetings and conferences with the objective of having ready useful data and information for the center objective interest. Telecomferences are common for fast information transfer, particularly with centers with unlimited budgets. Several technology transfer centers focus on specialized conferences on various parts of technology and applied research topics. Training programs and short courses offered by such centers are always of potential benefit for the users of such centers. Electronic information on technology related fields could be retrieved from various files using even the same key words. Tables 5-13 show available information retrieval related to technology transfer fields. The assurance of quality information is dependent on the software available and the management of electronic information records as show in Table 5. The use of various CD-ROM's shows various levels of information. Table 6

shows the applied science and technology file. Most of the published literature is on the international aspects and technology transfer. The published data from the USA exceeds all other countries including Japan. This is expected since the American data bases are using American resources mainly. The data retrieved from the U.S. Government file (GPO) are shown in Table 7 for various countries (keywords shows the citation of Japan is higher than most other countries). The use of various words gives different output as shown in Table 7 for the UK shows zero while the use of Great Britain gave 3 citations. The words should be selected carefully to get the best out of the selected CD-ROM in service.

The use of local electronic information, e.g. Long Island (L.I.) in New York State (Table 8) shows large numbers on manufacturing compared to other selected keywords including quality control or technology and centers.

The use of Business files (Table 9) showed large numbers of published articles on international aspects and technology transfer which are similar in trend with the data available from the applied science and technology (Table 6). As expected, business file has large number of literature on the management (Table 9).

The use of Reader's Guide Abstracts (Table 10) showed similar trend in the information to other files towards the large number of citation on Technology related information with focus on the international and the economic aspects (Table 10).

The use of Social Science Index for retrieval of information

using the keywords science (table 11), showed lower number of citations compared to data in other related files.

The Educational Resources Information Center (ERIC) CD-ROM's shows a large number of citations on technology as shown in Table 12. The information retrieved from ERIC are more oriented towards the educational fields as shown in Table 13.

It is expected that recent monographs in technology transfer give the trends in the available literature on various aspects of interest. Recent monographs are available [20].

CONCLUSIONS:

Achievements and other information related to technology transfer must be available to technology transfer centers. the electronic information and printed materials are of potential interest for performance of such excellence centers. Effective and quality information should be available at users satisfaction.

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TABLE 5

SELECTED INFORMATION ON TECHNOLOGY TRANSFER FIELDS

(RETRIEVED FROM DIALOG, COMPENDEX PLUS CD-ROM 1991-1993)

TOPIC / INFORMATION	NOTES	REF. #
-Quality Information	Software & Effective Communication & Coordination	5
-Management of Information	Quality Assurance: A Free-Based Service, Managed Recorded Information Service	6-7
-Management of Information Technology Service	Data available where needed Networks and PC's	8
-Control and Management	Software	9
-Telecommunications	Information Management	10
-Industrial Engineering & Management	Recorded Services	11
-Managing Software Technology	Technology Transfer	12

TABLE 6

TECHNOLOGY

Applied Science & Technology Data Coverage: 10/83 thru 10/28/93

ENTRIES	SUBJECT
80	Technical workers/training
84	Technical Writing
*	Technicians
433	Technological Change
54	Technology
1	Technology and State
1	Technology and State/Commonwealth of Independent States
1	Technology and State/Great Britain
37	Technology and State/United States
512	Technology Transfer
*	Technology Transfer Between Countries
3	Technology/Africa
1	Technology/Australia
6	Technology/Bibliography
1	Technology/Brazil
1	Technology/Canada
1	Technology/China
1	Technology/Colorado
10	Technology/Developing Countries
4	Technology/Eastern Europe
19	Technology/Economic Aspects
1	Technology/Europe
4	Technology/France
1	Technology/Georgia
2	Technology/Germany
2	Technology/Germany (West)
34	Technology/Great Britain
7	Technology/History
1	Technology/Hungary
2	Technology/India
1	Technology/Indonesia
209	Technology/International Aspects
2	Technology/Israel
2	Technology/Italy
44	Technology/Japan
5	Technology/Korea (South)
1	Technology/Massachusetts
1	Technology/New Jersey

TABLE 6 (con't)

ENTRIES	SUBJECT
8	Technology/Pacific Region
1	Technology/Patents
2	Technology/Russia (Republic)
1	Technology/Saudi Arabia
2	Technology/Scotland
1	Technology/Singapore
89	Technology/Social Aspects
1	Technology/Southeast Asia
12	Technology/Soviet Union
1	Technology/Spain
26	Technology/Study and Teaching
1	Technology/Sweden
1	Technology/Texas
1	Technology/Thailand
1	Technology/Turkey
156	Technology/United States
1	Technology/Vietnam
14	Technology/Western Europe

TABLE 7 S & T

G P D ON SILVER PLATTER (1976 - 8/93)

RECORDS	REQUEST
5	SCIENCE and TECHNOLOGY and (LONG ISLAND)
26	SCIENCE and TECHNOLOGY and (NEW YORK)
4	SCIENCE and TECHNOLOGY and CANADA
2	SCIENCE and TECHNOLOGY and FRANCE
48	SCIENCE and TECHNOLOGY and JAPAN
5	SCIENCE and TECHNOLOGY and GERMANY
3	SCIENCE and TECHNOLOGY and (GREAT BRITAIN)
1	SCIENCE and TECHNOLOGY and (SAUDI ARABIA)
1	SCIENCE and TECHNOLOGY and GULF
1	SCIENCE and TECHNOLOGY and KUWAIT
5	SCIENCE and TECHNOLOGY and EGYPT
2	SCIENCE and TECHNOLOGY and ISRAEL

TABLE 8 Technology

Long Island, NY, UNION LIST OF SERIALS

RECORDS	REQUEST
0	TECHNOLOGY CENTERS
5	TECHNOLOGY and CENTERS
92	MANUFACTURING
23	QUALITY CONTROL
0	TECHNOLOGY JOBS
0	TECHNOLOGY and JOBS
0	TECHNOLOGY and MARKET
0	MANUFACTURING and JOBS

TABLE 9

SELECTED DATA ON TECHNOLOGY

Business Periodicals Index Data Coverage: 7/82 thru 10/26/93

ENTRIES	SUBJECT
10	TECHNOLOGICAL INNOVATIONS/MATHEMATIC MODELS
1	TECHNOLOGICAL INNOVATIONS/MEASUREMENT
13	TECHNOLOGICAL OBSOLESCENCE
*	TECHNOLOGICAL UNEMPLOYMENT
1	TECHNOLOGIE CENTRUM CHEMNITZ (FIRM)
*	TECHNOLOGISTS, MEDICAL
112	TECHNOLOGY
*	TECHNOLOGY ADMINISTRATION (U.S.)
2	TECHNOLOGY AND ENVIRONMENT
2	TECHNOLOGY AND ETHICS
307	TECHNOLOGY AND LABOR
1	TECHNOLOGY AND LABOR/CASE STUDIES
4	TECHNOLOGY AND LABOR/INTERNATIONAL ASPECTS
240	TECHNOLOGY AND STATE
2	TECHNOLOGY AND STATE/ASIA
2	TECHNOLOGY AND STATE/CANADA
2	TECHNOLOGY AND STATE/CHINA
1	TECHNOLOGY AND STATE/COMMONWEALTH OF INDEPENDENT STATES
1	TECHNOLOGY AND STATE/DENMARK
14	TECHNOLOGY AND STATE/EUROPEAN COMMUNITY COUNTRIES
4	TECHNOLOGY AND STATE/GERMANY
1	TECHNOLOGY AND STATE/GREAT BRITAIN
1	TECHNOLOGY AND STATE/INDONESIA
8	TECHNOLOGY AND STATE/INTERNATIONAL ASPECTS
5	TECHNOLOGY AND STATE/JAPAN
1	TECHNOLOGY FLAVORS AND FRAGRANCES INC.
1	TECHNOLOGY FLAVORS & FRAGRANCES INC./ACQUISITIONS AND MERGER
1	TECHNOLOGY FUND, INC.
1	TECHNOLOGY INCORPORATED
*	TECHNOLOGY INDUSTRIES
1	TECHNOLOGY PARTNERS
1	TECHNOLOGY PARTNERSHIP LTD.
*	TECHNOLOGY POLICY
2	TECHNOLOGY RX INC.
1	TECHNOLOGY SERVICE GROUP INC.
1	TECHNOLOGY SERVICE GROUP INC./CONTRACTS
1	TECHNOLOGY SOLUTIONS CO.
245	TECHNOLOGY TRANSFER
4	TECHNOLOGY TRANSFER/ASIA
1	TECHNOLOGY TRANSFER/AWARDS
1	TECHNOLOGY TRANSFER/BRAZIL

TABLE 9 (con't)

Business Periodicals Index Data Coverage: 7/82 thru 10/28/93

ENTRIES	SUBJECT
2	TECHNOLOGY TRANSFER/CANADA
9	TECHNOLOGY TRANSFER/CASE STUDIES
7	TECHNOLOGY TRANSFER/CHINA
1	TECHNOLOGY TRANSFER/CROSS-CULTURAL STUDIES
17	TECHNOLOGY TRANSFER/DEVELOPING COUNTRIES
24	TECHNOLOGY TRANSFER/ECONOMIC ASPECTS
2	TECHNOLOGY TRANSFER/EUROPEAN COMMUNITY COUNTRIES
1	TECHNOLOGY TRANSFER/FAR EAST
8	TECHNOLOGY TRANSFER/GREAT BRITAIN
2	TECHNOLOGY TRANSFER/INDIA
2	TECHNOLOGY TRANSFER/ISRAEL
9	TECHNOLOGY TRANFER/JAPAN
1	TECHNOLOGY TRANSFER/KUWAIT
3	TECHNOLOGY TRANSFER/MANAGEMENT
1	TECHNOLOGY TRANSFER/MEXICO
1	TECHNOLOGY TRANSFER/NETHERLANDS
1	TECHNOLOGY TRANSFER/NORTHERN IRELAND
2	TECHNOLOGY TRANSFER/OECD COUNTRIES
1	TECHNOLOGY TRANSFER/PERSIAN GULF REGION
1	TECHNOLOGY TRANSFER/POLAND
2	TECHNOLOGY TRANSFER/RUSSIA (REPUBLIC)
1	TECHNOLOGY TRANSFER/SAUDI ARABIA
2	TECHNOLOGY TRANSFER/SOVIET UNION
2	TECHNOLOGY TRANSFER/SPAIN
1	TECHNOLOGY TRANSFER/TAIWAN
1	TECHNOLOGY VENTURE INVESTORS
1	TECHNOLOGY/ARGENTINA
1	TECHNOLOGY/ASIA
1	TECHNOLOGY/AUSTRALIA
1	TECHNOLOGY/BANGLADESH
18	TECHNOLOGY/CANADA
2	TECHNOLOGY/CARIBBEAN REGION
1	TECHNOLOGY/CENTRAL EUROPE
17	TECHNOLOGY/CHINA
2	TECHNOLOGY/COMMONWEALTH OF INDEPENDENT STATES
1	TECHNOLOGY/DENMARK
33	TECHNOLOGY/DEVELOPING COUNTRIES
8	TECHNOLOGY/EASTERN EUROPE
6	TECHNOLOGY/EUROPEAN COMMUNITY COUNTRIES
6	TECHNOLOGY/FRANCE
3	TECHNOLOGY/GERMANY
3	TECHNOLOGY/GERMANY (EAST)
4	TECHNOLOGY/GERMANY (WEST)
12	TECHNOLOGY/GREAT BRITAIN

TABLE 9 (con't)

Business Periodicals Index Data Coverage: 7/82 thru 10/28/93

ENTRIES	SUBJECT
11	TECHNOLOGY/HISTORY
*	TECHNOLOGY/HISTORY/BIBLIOGRAPHY
1	TECHNOLOGY/HUNGARY
3	TECHNOLOGY/INDIA
404	TECHNOLOGY/INTERNATIONAL ASPECTS
1	TECHNOLOGY/ISRAEL
52	TECHNOLOGY/JAPAN
6	TECHNOLOGY/KOREA (SOUTH)
1	TECHNOLOGY/LATIN AMERICA
158	TECHNOLOGY/MANAGEMENT
32	TECHNOLOGY/MARKETING
2	TECHNOLOGY/MEXICO
2	TECHNOLOGY/NETHERLANDS
1	TECHNOLOGY/PERSIAN GULF REGION
7	TECHNOLOGY/PLANNING
6	TECHNOLOGY/RUSSIA (REPUBLIC)
1	TECHNOLOGY/SAFETY MEASURES
97	TECHNOLOGY/SOCIAL ASPECTS
1	TECHNOLOGY/SWITZERLAND
3	TECHNOLOGY/TAIWAN
1	TECHNOLOGY/TANZANIA
15	TECHNOLOGY/WESTERN EUROPE
1	TECHNOLOGY/YUGOSLAVIA
1	TECHNOLOGY ZIMBABWE
1	TECHNOPHONE LTD.
1	TECHNOPRIBOR (FIRM)
2	TECHNOSERVE INC.
2	TECHNOVATION TRAINING INC.
1	TECHOPS, INC.
1	TECHSONIC INDUSTRIES INC.
1	TECHTRON
4	TECK CORP.

TABLE 10

Selected Data on Technology

Readers' Guide Abstracts Data Coverage: 1/83 thru 10/28/93

ENTRIES	SUBJECT
6	TECHNOLOGICAL INNOVATIONS/EXHIBITIONS
20	TECHNOLOGY
33	TECHNOLOGY AND CIVILIZATION
2	TECHNOLOGY AND CIVILIZATION/ANECDOTES, FECTIAE, SATIRE, ETC
155	TECHNOLOGY AND STATE
1	TECHNOLOGY AND STATE/AUSTRALIA
2	TECHNOLOGY AND STATE/CANADA
1	TECHNOLOGY AND STATE/CHINA
3	TECHNOLOGY AND STATE/FRANCE
2	TECHNOLOGY AND STATE/GERMANY (WEST)
2	TECHNOLOGY AND STATE/GREAT BRITAIN
1	TECHNOLOGY AND STATE/HISTORY
1	TECHNOLOGY AND STATE/IRELAND
3	TECHNOLOGY AND STATE/JAPAN
1	TECHNOLOGY AND STATE/SINGAPORE
2	TECHNOLOGY AND STATE/SOVIET UNION
*	TECHNOLOGY AND STATE/UNITED STATES
6	TECHNOLOGY AND STATE/WESTERN EUROPE
*	TECHNOLOGY AND THE ARTS
2	TECHNOLOGY ASSESSMENT
*	TECHNOLOGY ASSESSMENT OFFICE (U.S.)
1	TECHNOLOGY CENTER (SAN JOSE, CALIF.)
1	TECHNOLOGY IN ART
2	TECHNOLOGY IN ART/EXHIBITIONS
16	TECHNOLOGY REVIEW
1	TECHNOLOGY SOLUTIONS CO.
115	TECHNOLOGY TRANSFER
*	TECHNOLOGY/AFRICA
2	TECHNOLOGY/ANECDOTES, FACETIAE, SATIRE, ETC.
1	TECHNOLOGY/ASIA
2	TECHNOLOGY/AUSTRALIA
5	TECHNOLOGY/AWARDS
6	TECHNOLOGY/BIBLIOGRAPHY
8	TECHNOLOGY/CANADA
14	TECHNOLOGY/CHINA
1	TECHNOLOGY/CHINA HISTORY
1	TECHNOLOGY/COMMONWEALTH OF INDEPENDENT STATES
13	TECHNOLOGY/DEVELOPING COUNTRIES
3	TECHNOLOGY/EAST ASIA
3	TECHNOLOGY/EASTERN EUROPE
145	TECHNOLOGY/ECONOMIC ASPECTS
*	TECHNOLOGY/ENVIRONMENTAL ASPECTS
3	TECHNOLOGY/ETHICAL ASPECTS

35

TABLE 10 (con't)

Readers' Guide Abstracts Data Coverage: 1/83 thru 10/28/93

ENTRIES	SUBJECT
1	TECHNOLOGY/ETHICAL ASPECTS/BIBLIOGRAPHY
1	TECHNOLOGY/EUROPE
3	TECHNOLOGY/FRANCE
1	TECHNOLOGY/GERMANY (EAST)
4	TECHNOLOGY/GERMANY (WEST)
2	TECHNOLOGY/GREAT BRITAIN
2	TECHNOLOGY/HANDBOOKS, MANUALS, ETC.
9	TECHNOLOGY/HISTORY
1	TECHNOLOGY/HISTORY/STUDY AND TEACHING
2	TECHNOLOGY/INDIA
1	TECHNOLOGY/INDONESIA
*	TECHNOLOGY/INFORMATION SERVICES
475	TECHNOLOGY/INTERNATIONAL ASPECTS
2	TECHNOLOGY/ISRAEL
56	TECHNOLOGY/JAPAN
3	TECHNOLOGY/KOREA (SOUTH)
1	TECHNOLOGY MARKETING
1	TECHNOLOGY/MIDDLE EAST/HISTORY
*	TECHNOLOGY/MORAL ASPECTS
*	TECHNOLOGY/PERIODICALS
1	TECHNOLOGY/POLAR REGIONS
*	TECHNOLOGY/POLITICAL ASPECTS
1	TECHNOLOGY/PUBLIC RELATIONS
4	TECHNOLOGY/RUSSIA (REPUBLIC)
1	TECHNOLOGY/SAUDI ARABIA
1	TECHNOLOGY/SCANDINAVIA
1	TECHNOLOGY/SCOTLAND
91	TECHNOLOGY/SECURITIES
1	TECHNOLOGY/SINGAPORE
101	TECHNOLOGY/SOCIAL ASPECTS
3	TECHNOLOGY/SOCIAL ASPECTS/ANECDOTES, FACETIAE, SATIRE, ETC.
1	TECHNOLOGY/SOUTHEAST ASIA
43	TECHNOLOGY/SOVIET UNION
24	TECHNOLOGY/STUDY AND TEACHING
2	TECHNOLOGY/STUDY AND TEACHING/CHINA
1	TECHNOLOGY/STUDY AND TEACHING/GREAT BRITAIN
1	TECHNOLOGY/SWEDEN
2	TECHNOLOGY/TAIWAN
5	TECHNOLOGY/TAXATION
2	TECHNOLOGY/TERMINOLOGY
1	TECHNOLOGY/THAILAND
1	TECHNOLOGY/UKRAINE
*	TECHNOLOGY/UNITED STATES
15	TECHNOLOGY/WESTERN EUROPE

TABLE 11
Selected Data on Technology

Social Sciences Index Data Coverage: 2/83 thru 10/28/93

ENTRIES	SUBJECT
8	SCIENCE AND STATE/SOVIET UNION
1	SCIENCE AND STATE/SOVIET UNION/HISTORY
1	SCIENCE AND STATE/TAIWAN
23	SCIENCE AND STATE/UNITED STATES
2	SCIENCE AND STATE/UNITED STATES/HISTORY
1	SCIENCE AND STATE/WEST AFRICA
*	SCIENCE AND HUMANITIES
6	SCIENCE AND THE SOCIAL SCIENCES
9	SCIENCE AS A PROFESSION
2	SCIENCE CONSULTANTS
*	SCIENCE COUNSEL (GERMANY: WEST)
19	SCIENCE FICTION
2	SCIENCE FICTION FILMS
1	SCIENCE FICTION/BIBLIOGRAPHY
1	SCIENCE FICTION/CONFERENCES
*	SCIENCE FICTION/FILMS
2	SCIENCE FILMS
1	SCIENCE MUSEUMS
1	SCIENCE MUSEUMS/CANADA
2	SCIENCE AND LAW
15	SCIENCE AND POLITICS
1	SCIENCE AND STATE
5	SCIENCE AND STATE/AFRICA
1	SCIENCE AND STATE/CANADA
40	SCIENCE AND STATE/CHINA
2	SCIENCE AND STATE/FRANCE
1	SCIENCE AND STATE/FRANCE/HISTORY
*	SCIENCE AND STATE/GERMANY
2	SCIENCE AND STATE/GERMANY/HISTORY
8	SCIENCE AND STATE/GREAT BRITAIN
3	SCIENCE AND STATE/INDIA
4	SCIENCE AND STATE/INTERNATIONAL ASPECTS
7	SCIENCE AND STATE/JAPAN
1	SCIENCE AND STATE/KOREA (SOUTH)
1	SCIENCE AND STATE/MONGOLIA
8	SCIENCE AND STATE/SOVIET UNION
1	SCIENCE AND STATE/SOVIET UNION/HISTORY
1	SCIENCE AND STATE/TAIWAN
23	SCIENCE AND STATE/UNITED STATES
2	SCIENCE AND STATE/UNITED STATES/HISTORY
1	SCIENCE AND STATE/WEST AFRICA
*	SCIENCE AND THE HUMANITIES
6	SCIENCE AND THE SOCIAL SCIENCES
9	SCIENCE AND THE PROFESSION
2	SCIENCE CONSULTANTS

TABLE 11 (con't)

Social Sciences Index Data Coverage: 2/83 thru 10/28/93

ENTRIES	SUBJECT
*	SCIENCE COUNSEL (GERMANY: WEST)
19	SCIENCE FICTION
2	SCIENCE FICTION FILMS
*	SCIENCE FICTION PROGRAMS
1	SCIENCE FICTION/BIBLIOGRAPHY
1	SCIENCE FICTION AND CONFERENCES

TABLE 12

**SELECTED INFORMATION FROM
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
1982-SEPT. 1993**

ENTRIES	SUBJECT
184	TECHNOLOGY CENTER
1	(TECHNOLOGY CENTER) and PHILOSOPHIES
0	(TECHNOLOGY CENTER) and POLITICS
2	(TECHNOLOGY CENTER) and FUND
2	(TECHNOLOGY CENTER) and CONCLUSIONS
60	(TECHNOLOGY CENTER) and REFERENCES
492	(INFORMATION SERVICES and TECHNOLOGY
96	(INFORMATION SERVICES) and TECHNOLOGY and CENTERS
18	(INFORMATION SERVICES) and TECHNOLOGY and CENTERS and TELECOMMUNICATIONS
1	CONCLUSIONS and INFORMATION SERVICES and TECHNOLOGY and CENTERS and TELECOMMUNICATIONS
4	CONCLUSIONS and REFERENCES

TABLE 13

SELECTED INFORMATION (ARTICLES) FROM THE

EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Topic	-Notes	Ref. #
-Information Policies	-Information Transfer	13
-Information Technology	-for Developing Countries	14
-Academic Library	-Management	15
-Technology Advancement	-Rehabilitation	16
-Artificial Intelligence	-Educational Technology	178
-Magnetic Information Technology	-Magnetic Tapes	18

C H A P T E R 5

MANAGEMENT TRENDS

Adla A. Al-Turkait, College of Basic Education, Kuwait

M.I. Ismail, SCI & AD INST., Canada

Management and administration systems are directed more towards cooperative and simple approaches to achieve quality products to satisfy market needs from available technology [1].

5.1 Cooperative Efforts:

Motivated technology clients and employers of technology transfer centers are achieving preset business goals at faster rates. The conventional standard managerial procedures benefit from such technology transfer experts/centers consultations. Skill and previous experience with the society and community culture awareness are of vital importance for the success of any technology transfer center. The training could be of potential interest for both the center personnel as well as the users.

Quality management and cooperative efforts are needed for market satisfaction with technology transfer. Table 14 shows selected recent literature [1-7]. Optimal utilization of available human resources and information assures the quality of technology transfer [1].

5.2 Role of Training:

Accelerated and effective training programs are of potential interest for fast return of most of the technology centers. Several international programs of proven validity for various fields in technology transfer, are available for their benefit.

The conventional problems associated with technology transfer are detailed in various monographs and literature [1]. The reader can simply use CD-ROM's available to him/her to get the most up-to-date published date [8-9].

Training depends not only on administration and management, but also language is of potential interest for various technological fields [1]. Several international conferences and specific meetings can assure the offer of fast information on technology transfer on the "know how" and other aspects of technology transfer. Training of the leaders in technology transfer always has the priority, then comes the directly involved personnel. Those who have "hands on" and "real experience" are more efficient in selling ideas and programs to others interested in low risk investment. Most of such technology transfer centers invite experts and world leaders in their fields for short visit or symposium or short course delivery. Mutual interest in user's benefit through technology trasfer success is usually rewarding. Conferences are of major interest for advertising the new technology impact on the society and the need for such programs to develop the community.

Public opinion orientation is usually monitored from such conference outcomes. Several models are utilized in this respect.

5.3 Models for Public Opinion Monitoring:

Technology transfer centers are targetting satisfaction of public as well as funding agencies and politicians. Several

techniques are used in this respect. Advertisement in media papers and TV programs is the fastest. Teleconferences, symposia and symposia.

Refereed publications from such technology centers could be used in various information systems in the community. Educational systems might benefit from such technology transfer topics. the applied as well as social topics have potential interest. Partial funding of graduate programs might have the fast return to the benefit of such technology centers. Electronic information systems whether at local or at international levels from successful models include social and culture impact as well as the technology role in benefit of the current and future economic and market situation. Centers who claim excellency should be backed strongly by the media with proven return particularly to taxpayers on short or long term bases. Table 15 shows selected available information in U.S. Government electronic files (CD-ROM's) for those interested in specific details related to technology transfer and other related managerial fields.

CONCLUSIONS:

Management and administration excellency in technology transfer centers focus mainly on society and community need satisfaction. The cooperative efforts and mutual benefits exchanged between centers and users are of mutual and major interest for the continual performance of such centers to the public interest.

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TABLE 14 Quality Management Data

Topic Related to Technology Transfer	Notes	Ref. #
-Technology Transfer	-Effective Methods	1
-Quality Management	-Teamwork	2
-Entrepreneurship	-Market Economy	3
-Cooperative Education	-Industry & Education	4
-Academic/Industrial Cooperation	-High Technology 14119	5
-Business-Administration Education	-Industrial Engineering	6
-Science and Technology Course	-Business and Industry	7

TABLE 15
Selected Data on Management

(Ref. GPD on SilverPlatter (1976 - 8/93)

No. of Records		Keywords
#104:	0	(TECHNOLOGY TRANSFER) and MANAGEMENTS
#105:	24	(TECHNOLOGY TRANSFER) and MANAGEMENT
#106:	6	REFERENCES and TECHNOLOGY TRANSFER and MANAGEMENT
#107:	0	REFERENCES and CONCLUSIONS
# 87:	46	SCIENCE and TECHNOLOGY and CALIFORNIA
# 88:	5	SCIENCE and TECHNOLOGY and MICHIGAN
# 89:		
# 90:	5	SCIENCE and TECHNOLOGY and TEXAS
# 91:		
# 92:		
# 93:	0	MANAGEMENT and (ADMINASTRATION TRENDS)
# 94:	0	MANAGEMENT and ADMINASTRATION
# 95:	6	MANAGEMEN
# 96:	14	MANAGEMENT and ADMINSTRATION
# 97:	3	ROLE OF TRAINING
# 98:	0	MODELS and (PUBLIC OPINION)
# 99:	84	MODELS and PUBLIC
#100:	727	TECHNOLOGY and TRANSFER
#101:	0	TECHNOLOGY TRANSFER CENTERS
#102:	0	(TECHNOLOGY TRANSFER) and CENTERS and MANAGEMENT

C H A P T E R 6

TECHNOLOGY AND ADMINSTRATION

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Technology transfer is still art as well as science. Simple ideas and approaches might be of interest for various users of technology transfer centers. In depth studies and referred data are needed for credit and recognition of the center achievement. Simplified techniques are always available particularly from experts who know the complicated and sophisticated systems and have the power and desire to simplify technical and administrative matters for the benefit of the users of technology.

6.1 Simple Tools and Technology Transfer:

The advances in various technological fields made the previously seen as complicated tools looks like simple tools compared to those which are already highly developed. Children's toys are typical examples for the utilization of advances in technological fields. Still simple tools sell better if they give all what is needed. The technology transfer market in academia is not an exception. Several tool design take months before optimization. Now the concept is realized by computer programs in more efficient and simple ways. Various softwares could be utilized commercially at less cost than before. Supermarkets give the public all what is available in technological products for their satisfaction. Customers can

select tools for further realization of their own innovations. the author (MII) has used simple tools in electronic stores for assembly of his own patented devices in high technology business. The legal aspects are of prime interest for right and royalty of inventors and producers of such devices. The users of patented devices and processes in various technology fields are interested in market economy and benefit [3].

6.2 Lease and Technology Transfer:

Excellence centers for technology transfer usually supply the users with the optimal choice for the technology transfer where on lease basis or by whole sale including training and back up information for development and trouble shooting. Lease is always selected and preferred in technology which changes at faster rates such as software and PC's etc. for advantageous liaisons [4]. Efficient coordination is needed for such lease business for benefit of all parties involved particularly for the excellence centers for technology transfer.

6.3 Coordination and Technology Transfer:

Excellence Technology transfer centers depend largely on efficient expert coordinators for optimal use of such centers. Administrative as well as technological experience should be at the top level for those selected for Coordinator job(s). The optimal use of electronic information particularly the CD-ROM's available in such centers in business and technological fields, are of definite benefit to improve the coordinator background and are the trusted supply for needed information for better

performance of such centers. Published data on various topics of interest could be available as soon as are available to Coordinator and the technology transfer team get it for their benefit. Table 16 gives more details on recent published dated related to lease administration and technology transfer for those interested in specific details.

6.4 International and National Cooperative Team:

Cooperative team work has the chance for its success now at higher levels more than in any previous time due to the advances in telecommunications. Telefax connections can make the team in direct contact despite their geographic separation. In 15 seconds, one page information could be transferred from one location to another on the Globe using the available commercial telefax services. Other electronic information transfer systems are even faster. E-mail and other PC systems are typical examples for efficient and fast communication techniques for technology transfer in the 1990's.

Readers interested in specific technology transfer should consult their online or CD-ROM services for latest publications related to the specific item (keyword) of interest [8].

CONCLUSIONS:

Advances in administration and information systems are of potential interest for technology transfer centers. Coordination and cooperation are of prime interest for the progress of such centers.

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TABLE 16

Selected Data on Administration

(*REF. GPD on SilverPlatter (1976 - 8/93)

No. of Records	Keywords/Topic/Title	Reference
0	(TECHNOLOGY TRANSFER) and MANAGEMENTS	*
24	(TECHNOLOGY TRANSFER) and MANAGEMENT	
6	REFERENCES and TECHNOLOGY TRANSFER and MANAGEMENT	
0	CONCLUSIONS and TECHNOLOGY TRANSFER and MANAGEMENT	
15	TECHNOLOGY and ADMINSTRATION	
0	SIMPLE TOOLS	
602	TECHNOLOGY TRANSFER	
0	(TECHNOLOGY TRANSFER) and LEASE	
371	LEASE	
1	LEASE and TECHNOLOGY	
37	COORDINATION and TECHNOLOGY	
0	COORDINATION and (TECHNOLOGY TRANSFER)	
1	COOPERATIVE and TECHNOLOGY and TEAM	
6	REFERENCES and ADMINSTRATION and TECHNOLOGY	
-	ADVANTAGEIOUS LIAISONS	4
-	MANAGEMENT DEVELOPMENTS & QUALITY ENGINEERING EDUCATION	5
-	MANUFACTURING OF WOOD PRODUCT x LANGUAGE	6
-	MANUFACTURE OF FINISHED GOODS	7

C H A P T E R 7

TECHNOLOGY AND COMMUNITY

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Marinah SUNY, Farmingdale Electrical Engineering Technology

Excellence Technology Transfer Centers are of a direct use for community development. City planners usually design future city development areas as related to the available or planned locations for excellence technology transfer centers. Almost in every main American city their are locations for such activities. Even science and technology cities are now existing in various countries in the East as well as in the West. Canada, USA, Japan, Germany, UK, France, Kuwait and Saudi Arabia are typical examples. Millions of dollars are spent. The return should be for the community benefit and satisfaction. Such benefits include training of human resources.

7.1 Training on High Technology:

The presence of excellence technology centers present unique opportunities for those interested in training on new tools, devices, machines or processes. On-job training in such centers present a real help for the community career development. Those holding jobs in such centers could start their own business after they master certain technology of interest. Innovation centers in certain countries are typical examples. Employees are in a situation to develop their own businesses and have a better chance to start their own technology business later on.

Motivated personnel usually benefit from such on-job training businesses. However, several technology transfer centers are making business out of the training programs for community interest. Various short courses and workshops are tailor made for mutual satisfaction of both the center and the community. The economic impact is important in this respect.

7.2 Economic Aspects:

It is believed that the most effective factor for the success of technology centers after the efficient management, is the economic aspect and available budget. Most of such centers need huge budgets to start and need backing, particularly for the first 5 or more years until they become self funding or fund generating system to keep quality and future growth of such centers. Government and taxpayer funds are usually available for State supported and governmental centers. Politicians and public opinion support is of major interest for many centers to grow or even to survive. However, private sector centers usually have their unique and also successful centers which serve their pre-set objectives. Optimal use of available resources is a must in this respect. Public support is of prime importance for all centers.

7.3 Public Opinion Orientation

Successful politicians usually consider the language of interest of the community. Technology games always have the public interest. In developed countries they care for selling their product to the developing countries. The latter are

interested in getting technology at minimum cost. Public opinion is oriented towards the return and benefit to the community. Share of benefits is the best policies for mutual interest of all parties involved in the technology and its transfer business. Several models are of interest for various nations and for various technologies.

Electronic information files supply the reader with the up-to-date information related to the preselected keywords. Table 17 presents selected data from the U.S. Government file. The largest amount of reports are on the fields of "technology" and so the expected levels of the fund are spent in research and development. The number of citations or reports on technology transfer is less than 5% (Table 17). Information center's services are capable of giving all the published literature for the satisfaction of the pre-set objectives and strategies used to generate such data. More details are available elsewhere [1-2]. Trends in benefits of technology transfer to the community is well known [10].

CONCLUSIONS:

Excellence technology transfer centers are of definite benefit to the community. Training and other economic benefits are of definite interest for public opinion orientation towards the importance of such centers to the community and taxpayers satisfaction, particularly for future development.

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TABLE 17

Selected Information on Technology

(Ref. GPD on SilverPlatter (1976 - 8/93)

No.	Records	Request
# 1:	15925	TECHNOLOGY
# 2:	602	TECHNOLOGY TRANSFER
# 3:	727	TECHNOLOGY and TRANSFER
# 4:	2	TECHNOLOGY CENTERS
# 5:	74	TECHNOLOGY and CENTERS
# 6:	2	#4
# 7:	773	MANUFACTURING
# 8:	2	MANUFACTURING CENTERS
# 9:	11733	SCIENCE
# 10:	0	SCIENCE and TECHNHOLOGY
# 11:	4004	SCIENCE and TECHNOLOGY
# 12:	25	#11 and SOCIETY
# 13:	34	#11 and COMMUNITY
# 14:	1	#11 and MANKIND
# 15:	25	#12
#110:	602	TECHNOLOGY TRANSFER
#111:	0	(TECHNOLOGY TRANSFER and LEASE
#112:	371	LEASE
#113:	1	LEASE and TECHNOLOGY
#114:	37	COORDINATION and TECHNOLOGY
#115:	0	COORDINATION and (TECHNOLOGY TRANSFER)
#116:	1	COOPERATIVE and TECHNOLOGY and TEAM
#117:	6	REFERENCES and ADMINSTRATION and TECHNOLOGY
#118:	9	COMMUNITY and (TECHNOLOGY TRANSFER)
#119:	9	TRAINING and (HIGH TECHNOLOGY)
#120:	175	(ECONOMIC ASPECTS) and TECHNOLOGY
#121:	7	(PUBLIC OPINION) and TECHNOLOGY

TABLE 18

Selected Information on Technology

Topic	-Notes	Ref. #
-Windows to the World	-Distance Education	3
-Leadership in Science and Technology	-Academic Standards & Research Needs	4
-International Vision	-Future of Society & Information -International Cooperation	5
-Educational Media and Technology	-Communications - Satellites -Networks and Distance Education	6
-Educational Trends	-Organizational Change	7
-Engineering Career Development	-Students Industry Sponsored Projects	8
-Construction Industry	-Project Management -Sewage Treatment	9

C H A P T E R 8

EDUCATIONAL TECHNOLOGY TRANSFER CENTERS

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Educational centers include technology as future target for achievement of society and community development. Several approaches are used including developed curricular and quality educational courses used to achieve educational goals [1].

8.1 Courses and Curricular:

Educational system benefits from technology transfer centers at a higher degree particularly for graduate programs in high technology. Technical school programs benefit from visits and sharing of various programs offered by the community technology transfer center(s). In-Situ workshops commonly available in such technology transfer centers usually are of definite help. Simple and fewer steps and stages are usually involved for effective technology transfer in education business. Curriculum and course syllabus could be modified to make use of the available educational resources in the local centers of interest to the curriculum. The information transfer is dependent on the language and techniques used in teaching and lecturing [2].

8.2 Language and Learning:

Educational systems in the 1990's are focusing on learning rather than memorization. The language used in lectures are usually selected by the lecturer to fit well with the ability of the learning group. Even in using the standard international

English language, the teacher could select simple statements and selected specific examples from the student's community and culture which assures the effectiveness of the learning process. Technology transfer centers give the opportunity to learners to learn fast by observation or experimentation in various fields of interest. The author (MII) used to teach technology and engineering students various courses in English language using the USA standard texts for curricular in Canada, the Middle East and other parts of the world selecting examples close to the audience (student) background and community culture and general knowledge. Other models are of interest for better learning process.

8.3 Models for Technology Education

Educational systems in technological fields depend on various parameters. The student/learners background and qualifications are of the most importance. Visual and observational techniques are considered for fast learning. Experimental approach proved it's excellency in various technological fields. The cooperative short term research projects from the curriculum proved to be rewarding not only for graduate/undergraduate students, but also to the teacher who shares the research plan and strategies for the short term project to guarantee the achievement of the pre-set objectives in few hours with the cooperative volunteer student involvement. The teacher should carefully plan such projects with the objective of selling the idea to the student to have their

volunteer interest. Rewarding for the project report and original data generated by the student should be granted to students who participate without any punishment to those who did not join such cooperative short term projects from curriculum. The teacher might give the student the free choice to put his own research problem or topic of short project related to the curriculum. Time management is important. Such project activities should not take more than 5% of the curriculum time, if it is not clearly planned in the standard curriculum proposed by the school which the teacher should follow in his educational system. Table 19 shows more details about the available U.S. Government electronic files (CD-ROM) related to educational technology and other related fields. Most of such information is related to economic and technological aspects due to their importance. Table 20 shows specific details related to selected educational systems and technology transfer.

Educational planning is of prime interest for society development in future [12].

CONCLUSIONS:

Educational systems benefit from the presence of technology transfer centers attached to the Universities or standing on their own. The development of the curriculum, as well as the In-Situ training get the best for student interest. Visits and cooperative efforts are mostly mutually welcomed in this respect.

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TABLE 19

Selected Data on Technology

(Ref. GOD on SilverPlatter (1976 - 8/93)

No. of Records	Keywords
1	COOPERATIVE and TECHNOLOGY and TEAM
6	REFERENCES and ADMINSTRATION and TECHNOLOGY
9	COMMUNITY and (TECHNOLOGY TRANSFER)
9	TRAINING and (HIGH TECHNOLOGY)
175	(ECONOMIC ASPECTS) and TECHNOLOGY
7	(PUBLIC OPINION) and TECHNOLOGY
0	EDUCATIONAL TECHNOLOGY CENTERS
194	EDUCATIONAL TECHNOLOGY
0	TECHNOLOGY COURSES
3	TECHNOLOGY CURRICULUM
4	TECHNOLOGY and LANGUAGE and LEARNING
2	MODELS and TECHNOLOGY and EDUCATION
	Activities and (TECHNOLOGY CENTERS)

TABLE 20

Selected Data on Technology

Topic	Notes	Ref. #
-Transfer of High Technology	-Continuing Education	1
-Transfer Adv. Manufacturing Technology from Univ. to Industry	-Role of University Engineering Professors	3
-Technology Transfer	-Role of CIM	4
-Quality Education	-Role Sharing Experience of Peers	5
-Quality Learning	-Decentralized Training -In-Situ Learning	6
-Engineering Education	-Role of Professors in Recruitment	7
-Education in Manufacturing Systems	-New Curriculum -Computer Hardware	8
-Computing Security Technology	-Graduate Course	9
-Structural Engineering	-Thinking of Performance	10
-Management Technology in European Graduate Business Schools	-Teaching Skills	11

C H A P T E R 9

SELECTED ACTIVITIES OF TECHNOLOGY TRANSFER CENTERS

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Almost every funding agent has his own objective in establishing a technology transfer center. Specific fields are stressed. All needed technology transfer devices and tools for such selected fields, are always ready for the users of such centers. Most of the scientific organizations have engineering centers which care for various engineering activities.

9.1 Engineering Centers:

Most of the technological activities related to any engineering field are served in such large research and technology transfer centers. Electrical, mechanical and other engineering disciplines have various contribution to any new technology for effective transfer and future development. Other fields which benefit from technology transfer are the agricultural fields.

9.2 Agriculture and Agrotechnology Centers:

Agriculture technology is one of the oldest professions which is still growing. Land and underwater agrotechnology have potential interest for future food plans. Agromachinery and processes are typical fields of potential interest for those centers devoted to agriculture development programs. the educational part also benefits from such high technology centers.

9.3 Educational Schools:

Several special schools are located in such technological

centers. The objective of such schools are almost pre-set to benefit from the available resources in such centers. The equipment, tools and devices together with human resources and world expertise, present a unique opportunity for learning and fast achievement using available resources at minimum cost of time and budget. Various industries benefit from such arrangements.

9.4 Industry and Technology Transfer Centers:

The industries of national interest usually have full government and public support for establishing their own unique technology transfer centers oriented to the future development of such industry. Countries which have specific interest in single or few industries e.g. electronic industry in Japan, and other Western and advanced countries, should have their unique technology transfer centers for various aspects of such fast growing industry. The employers of such centers should belong to such countries as is well known in most of the technology centers in various countries. However, international expert access should always be available through international cooperative teams of researchers and visitors and similar exchange programs. Such strategic industries include food and drugs.

9.5 Food and Drug Technological Centers:

Among the most strategic industries in all nations, are food and drugs which satisfies the nations need in safety and health. Several specific technology transfer centers for either production or quality assurance for the benefit of the society

and community benefits. Public opinion satisfaction need the well planned strategic industries in the future.

9.6 Strategic Studies Centers:

In all nations, strategic centers care for such studies that have great concern for future development of the society. Economic and political topics are always the hot issues for almost all countries. Politicians usually concentrate on strategic planning to get their support. Reality might support them if quality technology centers are involved in the process. Table 21 shows selected information and activities related to the technology transfer centers including training, education, and applied fields. Agriculture and food products [8], food technology [9], greenhouses [10], and other activities are of major concern of various technology transfer centers in various countries.

CONCLUSIONS:

Several high quality technology transfer centers are now in action for satisfaction of various pre-set objectives to serve various fields in engineering, agriculture, food and drugs. Strategic planning centers are of most importance for future benefit and growth of such technology transfer centers.

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TABLE 21

SELECTED ACTIVITIES IN TECHNOLOGY TRANSFER

Topic	Notes	Ref. #
-Japan, Singapore Institute of Software Technology	-Cooperative Education Japan - Developing Countries	1
-Wood Harvesting Technology	-Australia	2
-Irrigation and Drainage Technology Transfer	-South America -USA -Developing Countries	3 4 5
-Greenhouse Technology	-Spain	6
-Mechanical Engineering Technology	-Purdue Univ. USA	7

CHAPTER 10

ROLE OF HUMAN FACTORS AND PSYCHOLOGY IN PERFORMANCE & TECHNOLOGY TRANSFER CENTERS

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Excellence technology transfer centers provide quality services to the community and clients. The human factors and ergonomics are of prime interest for optimal transfer of information from such centers for technology to potential users.

10.1 Psychology Aspects:

Administrative and managerial achievements of such centers are directly related to the human satisfaction. The developed system care for not only the human, but also the human-machine (ergonomics). Relaxed people usually learn at faster rates and for sure can develop the system effectively.

Extra credit assignment might lead to improved performance [1]. Table 22 shows the large number of available citations related to language and psychology and technology which might be useful for specific technology advances.

10.2 Learning Techniques:

Technology centers' team benefit from fast learning on-job, or on training in center workshops. the observation and experimental methodology together with other learning techniques are of interest. Technology transfer centers supply the market

and community with needed, trained manpower and experts for market needs.

The role of information specialist and administrator is important for such technology centers performance for users satisfaction [1]. The community culture and traditions are considered by the governing body and policy makers of such technology transfer centers [3]. Improving reporting, individual skills and performance in certain fields and topics of concern, need a well designed program and schedule [4]. Simple and accelerated methods have their own merits if adapted and proved to help in achievement of goals.

10.3 Market Needs Satisfaction:

Community growth is assured by continual supply of the market with what is needed for the technology needs. Skilled laborers and experts in certain areas are better available locally through such technology transfer training centers, rather than using imported laborers and experts. National interest support such local demand of such human resources for industry needs.

CONCLUSIONS:

Human factors are behind the success of various technology transfer centers. National interest in self satisfaction for industry with local and national human resources, is needed for a safe and secure society for future development.

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TABLE 22

SELECTED KEYWORDS RELATED TO

TECHNOLOGY AND HUMAN FACTORS

ERIC 1982 - September 1993

No. of Records	Request
21111	TECHNOLOGY
22	TECHNOLOGY and MOTIVATIONS
84	TECHNOLOGY and ACHIEVEMENTS
218	TECHNOLOGY and MONITORING
1349	TECHNOLOGY and CONTROL
117	TECHNOLOGY and ERROR
3724	TECHNOLOGY and REPORT
220	TECHNOLOGY and REPORTING
1155	TECHNOLOGY and WRITING
2331	TECHNOLOGY and BUSINESS
416	TECHNOLOGY and PSYCHOLOGY
89	TECHNOLOGY and (HUMAN FACTORS)
1	TECHNOLOGY and ASSESSEMENT
2056	TECHNOLOGY and ASSESSMENT
3680	TECHNOLOGY and EVALUATION
12199	TECHNOLOGY and REPORTS
100	TECHNOLOGY and VOLUNTEERS
73	TECHNOLOGY and VOLUNTEER
343	TECHNOLOGY and BUDGET
1720	TECHNOLOGY and LANGUAGE
2767	TECHNOLOGY and PROBLEMS
318	TECHNOLOGY and SOLUTIONS
353	TECHNOLOGY and CONFERENCES
230	TECHNOLOGY and FUND

C H A P T E R 1 1

SELECTED INTERNATIONAL TECHNOLOGY TRANSFER CENTERS

M.I. Ismail, SCI & AD INST., Canada

Adla A. Al-Turkait, College of Basic Education, Kuwait

The author (MII) has worked/visited several international high technology centers in various countries for various periods, to satisfy the objective pre-set for scientific and technological achievements. Table 23 shows selected science and technology centers and universities in which the author (MII) was motivated for scientific achievement in various technological fields, using facilities available in such centers. The attendance of international meetings in various countries give an opportunity for various pre-arranged technological visits. Australian conferences together with Canada, USA, and Japan, present major opportunity for most of the world scientists and professors to be familiar with the advance available technology. More details about conferences are available with the authors participation [1].

11.1 Canadian Technology Centers:

Several technology transfer centers funded by taxpayers are located in various locations in Canada. Some of such centers proved their survival, while others did not. The Hydrogen Institute is an example to the later institutes, despite the millions of dollars (over 10) spent on it in the 1980's. The "Ortech" or previously named Ontario Research Foundation's survived for decades. Other institutes are usually attached to

various Canadian Universities in Eastern or Western provinces. The Government fund is distributed amongst the various institutes according to certain rules, depending on the funding policies for acceptance of R & D solicited and non-solicited proposals submitted from such technology involved centers.

11.2 USA Technology Centers:

Almost every state has more than one center devoted to certain specific technology transfer. Most of such centers are partially funded by the government or by the private sector. The philosophies and strategies for making technology centers in the USA are chosen to satisfy the present objectives of such centers. Human factors play an important role for the success of such centers. Comparison between the output of various centers might be made by comparison between the number of referred publications from such centers. The use of various CD-ROM's lead to various results as shown in Tables 24-26.

The U.S. Government document CD-ROM's (Table 24), shows the largest citations in science and technology and NSF (National Science Fund). The number of citations from various countries including Japan as a largest number, are compared. Japan also had a large number of citations after the USA in the Applied Science and Technology CD-ROM data on technology as shown in Table 25. The Educational Resources Information Center (ERIC) CD-ROM data in technology is shown in Table 26. The number of citations from various countries show Canada at the top for technology related publications in educational fields. The

available information from the USA Government Document CD-ROM (GPO), shows information on the scientific cooperation of USA with other countries as shown in Table 27. The number of patents is another index. The annual budget could also be used to give an idea about the size of the technology center. The author's (MII) publications in referred journals and patents are available elsewhere [2-3].

11.3 Japanese Technology Transfer Centers:

As expected, Japan's technology centers are spread accross the country in various islands; the main are located in "Honcho," the largest island. Tokyo, Osaka, Kyoto, Nagoya and Sendai are the main locations for technology and science centers. Most of such centers are attached to the universities. Tokyo Institute of Technology is presently one of the largest institutes devoted to technology, not only in Japan, but worldwide.

11.4 German Technology Centers:

The widely spread Max-Plank-Institutes and other centers devoted for technology advances, are geographically distributed in Germany. DECHEMA presently a large institution for technology not only in Germany, but at the international level for size and achievement. The German system cares too much for the people involved in technology transfer, particularly for those involved in high technology transfer. Quality inudstrial products are the merit of German products.

11.5 French Technology Centers:

The centralized French system for funding technology

transfer centers, assured the geographic distribution of such centers. As an example, high temperature technology and research is distibuted mainly between Limoges (ceramics), and Tolouse (refractories) and Lyon.

11.6 United Kingdom Technology Centers:

Several British centers are devoted to technology transfer. Most of such centers are located in England, UK and most centers are attached to the Universities.

11.7 Kuwait, and Saudi Arabia Technology Transfer Centers:

The technology transfer had the interest of the Gulf countries. King Abdulaziz' science and technology city (KASIT), is a typical example of the huge investment in this respect. Kuwait Institute of Scientific Research (KISR) is another example where facilities for innovation and technology achievement facilities are available.

Several centers for technology and Applied Science are available in the Middle East. Scientific achievements from such centers are usually published in local periodicals. The authors activities and achievements during the last decades in various centers for technology are available in monograph (bibliography) **[4]**.

CONCLUSIONS:

Technology transfer centers are available in every country. The efficiency of such centers could be monitored by the output of such centers from referred publications in journals, conferences and patents. Excellence centers are among those who

supply the market with its need from consultation, as well as developed technologies for community interest.

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TABLE 23

SELECTED INTERNATIONAL SCIENCE
AND TECHNOLOGY CENTERS
WITH WHICH THE AUTHOR (MII)
ACHIEVED R & D AND REFERRED PUBLICATIONS

Country	Location of the Center(s)	
CANADA:	Waterloo	(Univ. Waterloo)
	Toronto	(Univ. Toronto)
	Mississauga	(DuraCell Inc.) (Can Reactor, Inc.), (AME Systems), (Chemtape Company), (Muslim WASTA), (SCI & AD Inst), Young Researchers
	Rexdale	(HSA Reactors)
	Montreal	(Polytechnique)
	Quebec	(Laval Univ.)
EGYPT	Alexandria	(Alex. Univ.)
FRANCE	Limoges	(Univ. Limoges)
GERMANY	Stuttgart	(Max-Plank Inst.), (Stuttgart Univ.)
	Frankfurt/min.	(DECHEMA)
JAPAN	Sapporo	(Hokkaido Univ.)
	Nagoyu	(Nagoya Inst. Technology)
	Osaka	(Osaka Univ.)
KUWAIT	Kuwait	(Kuwait Univ.) (PAAET)
LIBYA	Tubrak	(High Petroleum Inst.)
SAUDI ARABIA	Jeddah	(King Abdulaziz Univ.) (SCI & AD Inst.)
UNITED KINGDOM	Capenhurst	(The Electricity Council Research Center)
U.S.A.	Cambridge, MA	(Mass. Inst. Technology)
	Dayton, OH	(Dayton Univ.)
	Farmingdale,NY	(SUNY)

TABLE 24
Selected data on Science and Technology from Various Countries

GPD on SilverPlatter (1976 - 8/93)

No. of Records	Request
7	SCIENCE and TECHNOLOGY and AFRICA
4	SCIENCE and TECHNOLOGY and UNESCO
103	SCIENCE and TECHNOLOGY and NSF
46	SCIENCE and TECHNOLOGY and CALIFORNIA
6	SCIENCE and TECHNOLOGY and MICHIGAN
5	SCIENCE and TECHNOLOGY and TEXAS
5	SCIENCE and TECHNOLOGY and (LONG ISLAND)
26	SCIENCE and TECHNOLOGY and (NEW YORK)
4	SCIENCE and TECHNOLOGY and CANADA
2	SCIENCE and TECHNOLOGY and FRANCE
48	SCIENCE and TECHNOLOGY and JAPAN
5	SCIENCE and TECHNOLOGY and GERMANY
3	SCIENCE and TECHNOLOGY and (GREAT BRITAIN)
1	SCIENCE and TECHNOLOGY and (SAUDI ARABIA)
1	SCIENCE and TECHNOLOGY and GULF
1	SCIENCE and TECHNOLOGY and KUWAIT
5	SCIENCE and TECHNOLOGY and EGYPT
2	SCIENCE and TECHNOLOGY and ISRAEL

TABLE 25
Selected Data on Technology

Applied Science & Technology (CD-ROM) Data Coverage: 10/83 thru 10/28/93

Entries	Subject
6	TECHNOLOGY/BIBLIOGRAPHY
1	TECHNOLOGY/BRAZIL
1	TECHNOLOGY/CANADA
1	TECHNOLOGY/CHINA
1	TECHNOLOGY/COLORADO
10	TECHNOLOGY/DEVELOPING COUNTRIES
4	TECHNOLOGY/EASTERN EUROPE
19	TECHNOLOGY/ECONOMIC ASPECTS
1	TECHNOLOGY/EUROPE
4	TECHNOLOGY/FRANCE
1	TECHNOLOGY/GEORGIA
2	TECHNOLOGY/GERMANY
34	TECHNOLOGY/GREAT BRITAIN
7	TECHNOLOGY/HISTORY
1	TECHNOLOGY/HUNGARY
2	TECHNOLOGY/INDIA
1	TECHNOLOGY/INDONESIA
209	TECHNOLOGY/INTERNATIONAL ASPECTS
2	TECHNOLOGY/ISRAEL
2	TECHNOLOGY/ITALY
44	TECHNOLOGY/JAPAN
5	TECHNOLOGY/KOREA (SOUTH)
1	TECHNOLOGY/MASSACHUSETTS
1	TECHNOLOGY/NEW JERSEY
8	TECHNOLOGY/PACIFIC REGION
1	TECHNOLOGY/PATENTS
2	TECHNOLOGY/RUSSIA (REPUBLIC)
1	TECHNOLOGY/SAUDI ARABIA
2	TECHNOLOGY/SCOTLAND
1	TECHNOLOGY/SINGAPORE
89	TECHNOLOGY/SOCIAL ASPECTS
1	TECHNOLOGY/SOUTHEAST ASIA
12	TECHNOLOGY/SOVIET UNION
1	TECHNOLOGY/SPAIN
26	TECHNOLOGY/STUDY AND TEACHING
1	TECHNOLOGY/SWEDEN
1	TECHNOLOGY/TEXAS
1	TECHNOLOGY/THAILAND
1	TECHNOLOGY/TURKEY
156	TECHNOLOGY/UNITED STATES
1	TECHNOLOGY/VIETNAM

TABLE 26

SELECTED PUBLICATIONS ON TECHNOLOGY
FROM VARIOUS COUNTRIES
Ref. ERIC 1982 - September 1993)

No.	Records	Request
#1	863	TECHNOLOGY TRANSFER
	39	#1 and CANADA
	21111	TECHNOLOGY
	669	TECHNOLOGY and CANADA
	19	TECHNOLOGY and EGYPT
	354	TECHNOLOGY and FRANCE
	270	TECHNOLOGY and GERMANY
	351	TECHNOLOGY and BRITAIN
	62	TECHNOLOGY and UK
	593	TECHNOLOGY and ENGLAND
	274	TECHNOLOGY and JAPAN
	6	TECHNOLOGY and KUWAIT
	4	TECHNOLOGY and LIBYA
	7	TECHNOLOGY and (SAUDI ARABIA)
	8	TECHNOLOGY and SAUDI
	37	TECHNOLOGY and USA
	765	TECHNOLOGY and NY
	903	TECHNOLOGY and (NEW YORK)
	0	TECHNOLOGY and MASS.
	289	TECHNOLOGY and MA
	690	TECHNOLOGY and CA
	309	TECHNOLOGY and FL
	139	TECHNOLOGY and ILL
	265	TECHNOLOGY and DE
#45	657	TECHNOLOGY and CENTER and ACTIVITIES
	9	#45 and CANADA
	2	#45 and BRITAIN
	3	#45 and ENGLAND
	1	#45 and EGYPT
	4	#45 and FRANCE
	5	#45 and GERMANY
	5	#45 and JAPAN
	2	#45 and (SAUDI ARABIA)
	2	#45 and USA
	22	#45 and CA
	23	#45 and MA
	11	#45 and FL
	35	#45 and NY
	16	#45 and ILL
	9	#45 and KANSAS
	60	#45 and OHIO
	9	#45 and OH
	5	#45 and DE

TABLE 27

SELECTED TECHNOLOGICAL AND
SCIENTIFIC COOPERATION WITH USA
(REF. U.S. GOVERNMENT DOCUMENTS CD-ROM)

Country	-Notes	Ref.#
EGYPT, ISRAEL	-Plans, Oct. 31, 1980	5
EGYPT	-Agreement, March 29, 1977	6
EGYPT and MIDDLE EAST OPEC NATIONS	-Technology Transfer -1976	7
EGYPT	-October 29, 1983 -Standardization Conf.	8
EGYPT	-Scientific Cooperation Science and Technology Jan. 11, 1981	9
ISRAEL	-1978 -Science & Research Grants -International Cooperation	10
KUWAIT	-1983 -Scientific and Technological Cooperation	11
MEXICO	-1988 -Meteorological Database	12
SAUDI ARABIA	-1976 -Technological Cooperation in Science and Technology	13

C H A P T E R 1 2

CONVENTIONAL PROBLEMS AND SOLUTIONS OF TECHNOLOGY TRANSFER CENTERS

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Adla A. Al-Turkait, College of Basic Education, Kuwait

Judith R. Levine, SUNY Engineering Technologies,

Technology transfer centers face several problems particularly in the start period or when exposed to special or extreme conditions. The human related problem might present the most important type of problems.

12.1 Human Related Problems

The most serious problem facing such high technology centers, is the choice of the highly qualified personnel and scientists. Motivations are used to attract experts. Stat and service persons could be found in shorter time compared to the time needed for replacing a Ph.D. holder or expert. The placement agencies in North America and other countries might help in this respect. The well equipped technology transfer centers might attract experts who are interested in R & D.

12.2 Equipment Related Problems:

Basic tools, devices and machines are needed in almost all technology transfer centers. The maintenance of such advance tools and devices present a serious problem in a large numbers of centers. In-house workshops might be of potential interest for presenting solutions to various conventional problems.

12.3 Materials Performance and Technical Problems:

Prediction of materials failure under the conventional service conditions of such materials, particularly devices of constructional materials, is of prime interest for safety groups working for such technology transfer centers. Materials exposed to extreme conditions, particularly when such materials are under galvanic conditions, causes severe economic loss to the technology of interest.

12.4 Economic Related Problems:

Technology transfer budgets present the most important problem, particularly for centers which have limited resources. Most of technology transfer centers have no problems for the employee salaries. However, research and development (R & D) cost present the higher burden and might affect the centers' performance.

12.5 Managerial Problems:

Technology centers can survive with their strong political ties and good relations with the leader party in the country. In fact, almost all the technology transfer centers had politicians working for their plans and strategies. Budget might be related to such useful relations. The electronic information services present the optimal source for literature related to all the problems and solutions **[1-3]**.

Although every technology center has its own problems, some of such problems are general for various centers. Table 28 shows selected problems from the literature. Information, quality

control, and software development are typical problems.

Table 29 presents selected available data in U.S. Government document CD-ROM which might be of interest to certain technology centers.

CONCLUSIONS:

The human related problems present the most important managerial problems. The materials and devices present the other technical problems which should find solutions for the assurance of the success of technology transfer centers.

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TABLE 28

SELECTED PROBLEMS AND SOLUTIONS
RELATED TO TECHNOLOGY TRANSFER

Topic	Notes	Ref. #
-Information Transfer -Technology Transfer	-South Pacific -Education Needs	4
-International Educational Exchange	-Engineering Education	5
-Software Development Critical Thinking	-Programmed Tutoring Problem Solving	6
-Management Development -Quality-Working Life Technology Transfer	-Vocational Education -Quality Control	7
-Industrial Plants	-Boilers	8
-U.S. Government	-University Labs	9
-Electromagnetic Boundary Value Problems	-Numerical Solutions	10
-Infra-Red Technology	-Determining of Cloud Top Height	11

TABLE 29

Selected Data on Technology

(Ref. GPD on SilverPlatter (1976 - 8/93)

No. of Records	Keywords
0	EDUCATIONAL TECHNOLOGY CENTERS
194	EDUCATIONAL TECHNOLOGY
0	TECHNOLOGY COURSES
3	TECHNOLOGY CURRICULUM
4	TECHNOLOGY and LANGUAGE and LEARNING
2	MODELS and TECHNOLOGY and EDUCATION
0	ACTIVITIES and (TECHNOLOGY CENTERS)
2	ERGONOMICS and TECHNOLOGY
27	PSYCHOLOGY and TECHNOLOGY
0	(MARKET NEEDS) and TECHNOLOGY
31	MARKET and TECHNOLOGY
68	LEARNING and TECHNOLOGY
2	TECHNOLOGY and PROBLEMS and SOLUTIONS

CHAPTER 13

EVALUATION SYSTEMS FOR TECHNOLOGY TRANSFER CENTERS

M.I. Ismail, SCI & AD INST., Canada

Adla A. Al-Turkait, College of Basic Education, Kuwait

Technology transfer centers are evaluated with varius systems depending on the objective of such evaluation. The In-Situ techniques are of prime interest.

13.1 In-Situ Evaluation Techniques:

Self evaluation of center manpower and their performance could be made In-Situ. Usually every center has his own annual report, which are usually written to the satisfaction of the funding agent as well as the public for the benefit of the community.

13.2 International Recognition:

Most of technology transfer centers are interested in international recognition. Some of such wealth centers with manpower (scientists), publish about their achievements while others with huge budgets make several conferences and invite various experts from advanced countries to give seminars and lectures. Referred publications [1-3] still are the most respected evaluation of the performance of such quality technology transfer centers.

13.3 Refereed Publications, Journals, Patents, & Conferences:

Some centers publish their own periodicals and monographs. The referred publication assures the quality of published data. Journal publications and patents are preferred. Concise scientific monographs are also acceptable.

13.4 Monographs

Referred specific monographs are published with International standard book numbers (ISBN) are of potential interest for evaluation of various centers' activities. Such monographs might be devoted to specific industry and advances in related technology.

13.5 Industrial Achievements of Technology Transfer Centers:

The role of technology transfer centers in the various achievements in specific industry, is of potential interest for the evaluation of such centers as aid for industrial developments.

The CD-ROM's and online electronic information retrieval are shown in Table 30. There is a large number of articles in the U.S. Government Documents file (GPD) on evaluation and technology compared to other functions related to technology as shown in Table 30. specific data is shown in Table 31.

CONCLUSIONS:

Technology transfer centers are periodically evaluated for excellence in performance. In-Situ techniques as well as outsiders' views are used for qualification of the performance of such centers. Referred publications present an international measure for center output.

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TABLE 30

Selected Data on Technology

Ref. GPD on SilverPlatter (1976 - 8/93)

No. of Records	Keywords
0	ACTIVITIES and (TECHNOLOGY CENTERS)
2	ERGONOMICS and TECHNOLOGY
27	PSYCHOLOGY and TECHNOLOGY
0	(MARKET NEEDS) and TECHNOLOGY
31	MARKET and TECHNOLOGY
68	LEARNING and TECHNOLOGY
2	TECHNOLOGY and PROBLEMS and SOLUTIONS
788	EVALUATION and TECHNOLOGY
3	EVALUATION and TECHNOLOGY and CENTERS
152	MONITORING and TECHNOLOGY
0	MONITORING and (TECHNOLOGY CENTERS)
164	FUTURE and TECHNOLOGY
0	FUTURE and (TECHNOLOGY CENTERS)

TABLE 31

Selected Keywords Related to Technology

Topic	Notes
-Technology Transfer Cooperative Programs	-Models
-Stimulation of Research and Services	-Public Services
-Computer and Technology Oriented Programs	-Bilingual Computer
-Evaluation of Engineering Control	-Spray Painting

C H A P T E R 1 4

MONITORING AND CONTROL OF TECHNOLOGY TRANSFER CENTER ACTIVITIES

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M. Issapour, SUNY Farmingdale NY

Several techniques are used for monitoring and control of technology transfer centers' activities. the written materials are of prime interest. Table 32 shows the available citations from CD-ROM (U.S. Government Documents). Information and industry manufacturing and research and technology show the largest number compared to other items shown in Table 32. It is understood that using various words, results in different numbers of citations. Keywords should be selected carefully to satisfy the program objectives. The retrieved information might be of potential interest. Table 33 presents details about selected topics, e.g. quality control and new technology training. Wide range of technologies from robotic to toxic chemicals could benefit from such retrieved data for further development of their existing technology.

14.1 Published Data from the Center:

Most of technology transfer centers have several publications in local, as well as in international journals and other books and monographs. The more publications, the more important is the center. Some technology transfer centers only serve and have no interest in research or publication. Others

are well known for their published educational publications. Electronic information services give more data [1-2].

14.2 Services for Clients:

The larger the number of served clients by the technology center, the more important are such involved centers. Most of the elients need their work to be treated confidentially. The finding might be patented and the royalty could be split between the center and the client or according to their pre-set agreement.

14.3 Patented Devices, Processes and Materials:

Most of technology transfer centers are interested in patents and new processes and materials. Commercializing of patents is the priority of most of the technology transfer centers. Excellence centers are those who are able to commercialize available patents to the benefit of the community and for the market satisfaction.

CONCLUSIONS:

Monitoring of technology transfer activities could be achieved by evaluating the output of such technology centers. The quality and quantity of written reports and the number and quality of service to the benefit of the community and potential clients, are the real measure of monitoring of excellence of such technology centers.

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TABLE 32
Selected Data on Manufacturing
GPD on SilverPlatter (1976 - 8/93)

No. Records	Request
1	MANUFACTURING and PATENTS
185	MANUFACTURING and RESEARCH
142	MANUFACTURING and TECHNOLOGY
26	MANUFACTURING and SCIENCE
2	MANUFACTURING and INNOVATION
216	MANUFACTURING and INFORMATION
0	MANUFACTURING and COMMUNICATION
7	MANUFACTURING and COMMUNICATIONS
0	MANUFACTURING and OPERATIONSW
10	MANUFACTURING and OPERATIONS
0	MANUFACTURING and SKILLS
29	MANUFACTURING and PRODUCTIVITY
4	MANUFACTURING and EXPORT
1	MANUFACTURING and IMPORT
4	MANUFACTURING and TAXATION
0	(ENVIRONMENTAL POLLUTION) and MANUFACTURING
43	POLLUTION and MANUFACTURING
31	SAFETY and MANUFACTURING
0	BENEFIT and MANUFACTURING
185	MANUFACTURING and RESEARCH
5	MANUFACTURING and (QUALITY CONTROL)
59	MANUFACTURING and QUALITY
0	MANUFACTURING and MEETINGS
0	MANUFACTURING and CONFERENCES
6	MANUFACTURING and CENTERS
0	MANUFACTURING and ERGONOMICS
0	MANUFACTURING and PSYCHOLOGY
5	MANUFACTURING and JOBS
3	MANUFACTURING and MARKET
3	MANUFACTURING and TRAINING
5	MANUFACTURING and ROBOTS
0	MANUFACTURING and CIM
17	MANUFACTURING and COMPUTERS
10	MANUFACTURING and (COMPUTER INTEGRATED)
1	MANUFACTURING and TECHNICIANS
6	MANUFACTURING and ENGINEERS
44	MANUFACTURING and MATERIALS
47	MANUFACTURING and TESTING
13	MANUFACTURING and EVALUATION
3	MANUFACTURING and CONSUMER
0	MANUFACTURING and SATISFACTION
0	MANUFACTURING and CHEATING
1	MANUFACTURING and SPECIFICATIONS
112	MANUFACTURING and STANDARDS
152	MONITORING and TECHNOLOGY
164	FUTURE and TECHNOLOGY

TABLE 33

SELECTED DATA ON: MONITORING LITERATURE PROGRESS

Topic	Notes	Ref. #
-Industrial Application	-Robots Interfaces	3
-Machinery and Tools	-Periodicals	4
-Robot, Automation	-Education, Workplace	5
-Industry Assessment	-Automation Equipment	6
-Office of Technology Assessment	-Machinery	7
-Robotic Technology	-Industrial, Research	8
-Robotic Government Policy	-Robots	9
-Materials in Library of Congress	-Robots Bibliography	10
-Robot Hierarchical Control System	-Industrial Robots	11
-Solid Waste Crisis (Long Island)	-Toxic Chemicals	12
-Water Quality (Long Island)	-Water Quality Management	13
-Ground Water Resource (Long Island)	-Development	14
-Coal Conversion (Long Island)	-Electric Utilities	15
-Spoil Dumping	-Environmental Aspects	16
-New Technology Training	-Linking Agent, Technology Transfer	17

CHAPTER 15

FUTURE DEVELOPMENTS

M.I. Ismail, SCI & AD INST., Canada

Adla A. Al-Turkait, College of Basic Education, Kuwait

Most of the existing centers devoted for technology transfer have their plans for development and growth to meet the growing need of the society and community. Effective communications using the available developed telecommunication services is of potential interest [1].

Science and technology progress is based on assurance of optimal use of available resources including human resources and techniques [2-3]. Future developments are assured utilizing international and volunteer effors for optimal achievement [4]. The electronic information is the future as well as the best current means for following up and having the best available information concerning any technology of interest. Experts in technology and information assure maximum benefit from such available huge amounts of world publications in any field related to achieving excellency in technology fields [5-7].

15.1 Teleservices:

The currently available telecommunications with all the expected development in the future, might be considered for future development of such technology centers for economic reasons. Cooperative programs will be more adapted for the same reasons. More details are available [4-8].

15.2 Cooperative Programs:

International cooperative programs will dominate for economic and political reasons. Those who have to achieve progress at optimal cost, might consider sharing their available resources with others on mutual interest basis [4-8]. Distance learning and language should be used for the benefit of all parties involved in technology transfer [2]. Exchange of faculty visits or multi-purpose visits could be used for its short and long term return to the technology center objectives satisfaction. The continued growth of such centers is assured by the availability of funded and other resources.

15.3 Fund Generating Systems:

Development in funding systems is needed for survival and development for such technology involved centers. Several techniques are currently used depending on the availability of qualified volunteer and other experts who are interested in future progress of such technology centers. Donations and tax shelter systems are still used and are expected to continue in the future to support such high technology centers particularly those centers which depend on the private sector for funding.

Table 34 shows selected literature of interest for possible future development of technology centers. International cooperative efforts are of potential interest for wide technology fields. The role of development nations in the future development of technology centers is to be considered for their effect on world market and economics. Job creation mechanisms

are of potential interest for politicians and excellence technology transfer centers who are interested in serving their community through their output of useful technology for the people in the geographic area of the center. The educational system benefit assures the future progress of such technology centers depending on national experts and international experts (visitors) and cooperative efforts. Advances in telecommunications accelerates the progress and the development of any technology in any part of the globe.

CONCLUSIONS:

Future developments of technology transfer centers is related to integrated efforts from those involved in such centers in addition to strategic plans from specialists in the community and politicians. The role of International cooperation is of prime interest in this respect.

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TABLE 34

SELECTED DATA ON: FUTURE DEVELOPMENT ISSUES

Topic	Notes	Ref. #
-Forming the Future with a Unique Partnership	-Metal Industry	9
-Future Concern in Environment	-Engineering Graduate	10
-CIM in Higher Education	-Partnership with IBM	11
-CIM	-Developing Countries	12
-Education for High Technology	-Jobs	13
-Technology Resource Center	-Develcping	14
-High Technology in Rural Setting	-State-of-the-Art	15
-Effects of New Technologies	-Labor Market	16
-Mechanisms for Job Creation	-Job Development	17
-Patenting the Future	-Information Dissemation Marketing	18
-Training for International Development	-Developing Nations	19
-Business Education Practices and Trends	-Cooperative Programs	20
-Technology Transfer and the University	-Teachers Attitudes	21
-Marine Pollution Training	-Int. Cooperation	22
-Laser	-Int. Cooperation	23
-Training Airplanes	-Military Airplanes	24
-Strategies for Int. Cooperation	-NASA, Developing Countries -Potato and Hunger	25 26
-Jet Engine Testing	-Space Research (Russia)	27

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TABLE 34 (con't)

-Int. Space Year	-Int. Cooperation	28
-America Environment Policy	-Int. Cooperation	29
-Technology and Europe Market	-Int. Cooperation	30 31
-Technology: Global Influence	-Int. Cooperation	32

CONCLUSIONS AND RECOMMENDATIONS

Excellence Centers for Technology Transfer (ECTT) are expected to integrate all the available achievements in sciece , technology,social fields. The human factors are of prime interest for assurance of quality outputs of such ECTT. Access to information sources whether in electronic or printed forms is of definite help for such ECTT performance.

The benefit to the community from ECTT could be granteed form creation of new jobs or at least keeping their available jobs. on-job training in ECTT whether on formal bases or by management and adminstration motivations assures the survival of such centers and even assure the future growth.

The quality information from CD-ROM and ON-LINE could be optimaly utilized though international volunteer experts in their field based on motivated cooperative programs

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The reader is advised to consult the CD-ROM for the up-to - date references for his interest. The following are selected monographs which might be of interest to some readers.

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4. M.I.Ismail,Ed, Electrochemical Reactors: Their Science and Technology, Elsevier Pub., Amsterdam, 1989, ISBN-0-444-871-39x.

Other books published by the authors are available at the appendix of this monograph.

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Experience:

- Member of all committees (Schools, Colleges, Public libraries, etc.), for Library developments in Kuwait
- Member of several library association in Arab World, U.K. and USA
- Director of Libraries in Public Authority for Applied Education and Training (PAAET), (1986-1990)
- Head of Department of Librarianship in College of Basic Education (PAAET), (1979 to Date)
- Chief Supervisor of School librarians in Kuwait
- Supervisor for various School librarians in Kuwait
- Member of the Editorial Board for the Kuwaiti Children Encyclopedia by Kuwait Foundation for Advances in Science (KFAS).
- Member in the technical committees of various conferences (Information, Development), some were sponsored by UNESCO office in Kuwait.
- Established Electronic library in Saudi Arabia with available resources (Al-Faisalian Women's Welfare Society, Jeddah)
- Designed and Supervised several training programs for career development of personnel working in Kuwaiti libraries.

Refereed Publication:

A: **Published Books** with ISBN: Author, Co-editor or Co-author of the Book or its Chapter(s).

1. Kuwait Scientific Encyclopedia, Vol. 1, 2, 3, and 4, (1984- date)
2. Information Resources, in "Simplified Techniques: Applied Research, Graduate Studies and Technology Transfer", CRM Publ., Canada, (ISBN-0-921478-18-6), 1989, 534-566.

3. Cooperative Education, ISBN-0-921478-39-9, 1991
4. Electronic Information, ISBN-0-921478-35-6, 1991
5. Educational Systems, ISBN-0-921478-37-2, 1991
6. Libraries and Learning Centers: ISBN-0-921478-41-0, 1991

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21. Career Guidance, ISBN-0-921478-31-3, 1993
22. Dissertations, ISBN-0-921478-16-X, 1993

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5. Information Sources for Corrosion Control in Petroleum and Petrochemical Industries, Accepted The 41st Int. Soc. Electrochem. Polaro Prague 90, 1990.
6. Establishment and Management of Learning Resource Center, the 17th Conf. on Education Media Technology, Kuwait, 1987, 1-46.

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1. Palm-Tree Waste for Greenhouse Applications, Patent Applied for, 1991.

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7. BOOKS and Monographs: Plan, Edit, Author, Publish, Review
8. CAREER and CURRICULUM Development
9. COOPERATIVE HIGHER EDUCATION by Research and Ref. Publ.
10. CIVIL: Defense, Engineering Research

11. CHEMICAL Engineering: Corrosion, Wear, Tribology, Electrochemical
12. DEFENSE, R&D
13. DENTAL, R&D

14. DRUG RELEASE Monitoring
15. ECONOMICS and Management

16. EDUC. and CAREER DEV. and EVALUATION of Performance
17. ENERGY and Materials: DRH, Electrotechnology, High Temperature
18. Education and PERFORMANCE Evaluation
19. EDITOR, Author of International Publications (Journals & Books)
20. ENVIRONMENTAL Pollution and Control, Safety and Health, Oil Spill

21. FOOD and Agriculture, Products and Drugs
22. Human Factors and ERGONOMICS
23. INFORMATION
24. MANAGEMENT and R&D
25. MATERIALS and Energy Systems, Metallurgy, Geology, Geotechnical

26. MEDICAL Eng., Biomedical, Electrophysiological Neuromuscular
27. MECHANICAL Engineering: Stress-strain, Tolerance, Tribology
28. PHARMACEUTICAL Engineering
29. PLANNER, Reviewer, Editor and Author of International Science Publ.
30. PATENTS Processing and Innovations

31. POLYMERS Engineering Materials and Plastics
32. PSYCHOLOGY
33. PYROTECHNOLOGY and High Temperature Research
34. RESEARCH and Developments (R&D)
35. SAFETY and SECURITY

36. SENSORS for PREDICTION of Failure
37. SOCIAL Research CENTERS
38. SOCIETY and Development
39. SOIL and Ground WATER
40. STRATEGIC STUDIES

41. TECHNOLOGY:
42. TRANSPORTATION: Extreme Conditions, Traffic and Highways
43. WASTE Treatment
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Bk #	Year of Publication	Field / Book Title / ISBN 0-921478-	# Pages,	# Authors,	# Chapters
1)	1977-	Eng. Metallurgy, ISBN-977 246 666-X	280	1	10
2)	1986-	Corrosion Monitoring, ISBN-080 310 4 71-5, One Chapter			
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8)	1991*	Electronic Information - 356	64	2	6
9)	1991*	Educational Systems - 372	78	2	8
10)	1991*	Food Technology - 151	52	1	12
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12)	1992*	Technology Transfer - 453	63	1	4
13)	1992*	Greenhouse Res. Trends - 461	55	2	6
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18)	1992*	Communications & Educ.- 119	57	2	6
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22)	1993*	Information Services - 917	60	2	8
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25) 1993* Geography & Environment	-429	162	2	7
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31) 1993* Kuwait & Mr. Bush	- 844	148	3	8
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45) 1993 Plasma & Laser	275	63	3	11

Contribution to 45 Refereed Social and Applied field Books with ISBN Since 1977 till now 1993
(Over 110 Authors, Chapters & over 6,000 pages)

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1993- Int. J. Technology Advances, ISSN- 1192- 2575
+ 15 Books & one Journal in Applied and / or Social Fields
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3. Born in Egypt, CANADIAN Nationality:

4. Education and TEACHING Experience at University of Alexandria (B.Sc., 63; M.Sc. 67; Ph.D., 1971); Limoges Univ., France (PDF); Hokkaido University, Japan (JSPS) Fellow); Laval Univ., Canada (PDF); Univ. Waterloo, Canada (Visiting Professor); Research Centers: in U.K. (Electricity Council Research Center); Germany (Max-Plank Inst., Stuttgart); High Petroleum Inst. (Tobruk); Mass. Institute Technology.

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a) PRINCIPLES of SOCIAL and APPLIED Research: Fundamentals, Extreme Conditions, Conventional and System Simulation Studies.

b) APPLIED RESEARCH FIELDS IN EDUCATION: Fast and simple techniques for Research Data generation in SOCIAL and APPLIED fields using available resources (electronic information, simple research tools and processes).

c) Member (present or past) of "Canadian Association for Cooperative Education", The Human Factors Society, USA, the Working Group of Chem. Eng. Aspects in the Protection of the Environment, European Federation of Chemical Engineering since 1984; European Inst. for the joining of Materials, American Institute of Chemical Engineering; Association of Professional Engineers of Ontario; The Met. Soc... etc. Founder of the "Muslim Wasta" (World ASSOC. Science and Technology Advances)," SCI & AD INST", and "Higher Education and young Researchers" and other organizations interested in Career Development, Higher Education, in Technology Advances, and other Social and Applied Research in Canada since 1984.

7. Selected ACCOMPLISHMENTS in EDUCATION and Evaluation Systems:

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b) Editor and Author of 44 Books (Refereed publications with ISBN in Canada, USA and Europe since 1988 in various social and applied fields.

c) Editor-in-chief of International Journal of Technology Advances, TecAd, and International Journal Social Sciences and reviewer for several international journals and scientific societies.

d) Consultant to industry, private sector and governmental agencies

e) Visiting professorships: Hokkaido Univ. (Japan), Laval Univ., Univ. of Waterloo, HPI, Max-Planck Inst., etc.
f) Chaired several sessions in international conferences in Materials, Batteries, Electrochemistry.

8. Contribution to EDUCATION & Performance Evaluation Professions.
a) Achievement of New MONITORING & Evaluation Systems: Useful for Education and in Applied and Social Fields useful in transient Heat and Mass Transfer studies, Environmental, Contamination, Biotechnology, Medical, Agriculture and other Engineering and Applied Research in multidisciplinary areas including Social Fields.
b) Patented and commercialized own unique economic R&D Package useful for wide range of applied research.
c) Founder of the Cooperative Higher Education by Research and Refereed Publication system useful for Career Development using the available resources (Electronic Information Simplified Techniques, Questionnaires, M.I. Ismail Patented Research processes and Direct supervision).

9. INTERNATIONAL COOPERATIVE EDUCATION SYSTEM: Managed to have several refereed publications in 56 international journals and 59 international conferences and 42 books and monograph with 145 researchers from 20 nations since 1963 till 1993. (71 Co-authored Refereed Journal Articles from 11 Nations, 104 Co-authored Refereed Conferences Articles from 19 Nations), Total of 145 contributions from 20 Nations.

10. AWARDS; FUND & HONOREE DOCTORAL DEGREE: Awards and fellow ships from various Universities and research centers and funded by various organizations in Japan, North America and Europe
- Nominated for honoree doctoral degree in science by American University professors in USA (1993).

11. Hobbies: Reading, Music, Fishing and Gardening.

12. References (Personal): Available on request.

13. Electronic References: (For Refereed Publications): CD-ROM or ON-LINE Retrieval Systems: DIALOG, Science and Technology Files, Patent files, Compendex, Engineering Index, etc.

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