CRITICAL SUCCESS FACTORS (CSFs) ON TECHNOLOGY TRANSFER EFFECTIVENESS IN MANUFACTURING INDUSTRY: A CRITICAL REVIEW

Farizah Binti Mamat @ Mohd Nor
Faculty of Business Management (Management)
University Teknologi Mara Johor, 85000 Johor, Malaysia
Email: fariz676@johor.uitm.edu.my, Tel: 0193139477

Shashazrina Binti Roslan
Faculty of Business Management (Finance)
University Teknologi Mara Johor, 85000 Johor, Malaysia
Email: shash686@johor.uitm.edu.my, Tel: 0196242629

ABSTRACT

This article reviewed the critical success factors (CSFs) on technology transfer effecriveness. The transferring technology process is actually an integration process involving provider and receiver. Technology refers to a new and better way of achieving economics end that contribute to economic development. Contemporary discussion of technology transfer assumes that technology and its advance contribute to change and this change fuels economics growth through productivity increases. The process of transfer happens if technology is used. So, it is application of technology and considered as process by which technology developed for one purpose is used either in a different application or by a new user. The purpose of this article is to highlight a few definition of technology transfer which is practicing in particular sectors including manufacturing. Manufacturing enterprises play an important role to improve the economic environment of a country. The capability of producing high quality products with shorter delivery times and the ability to produce according to diverse customer requirements have become the characteristics required of order-qualifiers for manufacturing industries. In today's competitive global market, manufacturing companies need to be more flexible, adaptive, responsive to changes, proactive and be able to produce a variety of products in a short time at a lower cost. This study will be focused on the effectiveness of technology transfer process. It also reviewed in details about the key factors affecting technology transfer process. This article ended by concluding the top crucial factors that being frequently mentioned in literature as it is important in technology transfer effectiveness in manufacturing industry.

Keywords: Technology transfer, critical successful factors (csfs), manufacturing industries.

INTRODUCTION

Global competitive environments and technological factors are increasingly volatile and evolving rapidly. A major challenge for global firms to become more effective and efficient in technology transfer process is to effectively respond to the rapid changes in the external environment (Massey and Montoya-Weiss, 1997). Technology transfer is one of the most important fields in research and development of new products or new technology service today, making research technology transfer an important topic (Chen et al. 2010) .The technology transfer practices could support organizations to develop and achieve a world leadership position in some technologies which has strength at present to gain economic advantages (Nishimoto, 1995). Technology transfer provides several benefits to organizations. They need to closely manage and monitor the technology transfer process and consequences in order to ensure those benefits are really utilized. Continuing resulting on technology transfer will increase our understanding of some industry values like new products development, new technology transfer, new service procedures and new service business models (Martinezand Jimenez, 2009). Chen et al. (2010) in their research stated that technology transfer has become a competitive weapon in business operational management that could help firms keep cost down, enhance competitiveness and improve operation performance. So that, research on technology transfer trend is the most one of the research issues in *e*-era (economics era).

CSFs have been defined in several ways depending on the purpose for which they were used. Rockart's (1979) defined CSFs as "the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization". While Boynton and Zmud (1984) define critical success factors (CSF) as "those things that must go well to ensure success for an organization". For the purpose of this study, which emphasize on the effectiveness of technology transfer, the definition that proposed by Rocket (1979) is used.

Throughout the industrialized world, technology has become the supreme manifestation of economic welfare. Together with capital, labor and land, technology is inextricably linked with national productivity and the competitive growth enterprise.

Nishimoto (1995) states that the journey towards 2020 has just begun serious challenges will be encountered along the way and Malaysia must be ready at the outset to deal with them boldly with the right mix strategies and action plans. Whilst, in the past, it was expedient and comfortable enough just to exploit resources, the future will be increased by determined by the success of

technological innovations. The strategy therefore should be to build long-term competitiveness based on technology driven quality, investment in skilled manpower and the cultivation of a climate conductive to investment and rapid industrialization.

This paper focuses on the critical successful factors (CSFs) that influencing the effectiveness of technology transfer process.

OVERVIEW OF MALAYSIAN MANUFACTURING INDUSTRY

The growth of any nation or organization is determined by its ability to adopt technological changes demanded by environmental forces prevailing at the time. The issue of technology transfer in Malaysia has been on main agenda in almost all local technological conferences by both the private and public sectors. However, not much has been accomplished and there is not much time left to incorporate technological changes in the light of globalisations. Most Malaysians knows that the key to our country's survival is to capitalize on the potential of advancing technology in order to enhance economic strength.

Zeleny M (1986) in his article, "High Technology Management", defined technology as consisting of three interdependent, co-determinant and equally important components. They are the hardware, the software and the brainware. The hardware is the physical structure and logical layout of the equipment or machinery that is to be used to carry out the required tasks. The software refers to the knowledge of how to use the hardware in order to carry out the required tasks. The barinware refers to the reasons for using the technology in a particular way.

Technology also includes product designs, manufacturing techniques and related managerial systems. It focuses on manufacturing and all related activities with its beginning dating back to the industrial revolution.

Malaysia needs to be competitive in order to be a global player. The major step towards globalization was set by our Prime Minister in the nation's Vision 2020. the achievement of this vision is contingent upon how capable we are in adopting new technology and in managing the continuing changes in the new technology. As Zeleny explained, we must not lack the brainware, which will enable us to perform certain tasks effectively and efficiently.

The Malaysian economy has sustained an enviable growth of an average of 8% in its Gross Domestic Products (GDP) over the last ten years, with 1995 recording at 9.4%. In 1996, the GDP was estimated at US$96.6 billion, which reflected a significant growth of 8.9%. The GDP is expected to increase from RM120.3 billion in 1995 to RM176.6 billion by year 2000.

From a largely agro-based economy, Malaysia has recently emerged as a newly-industrialised economy (NIE). With its strong political stability and the farsightedness of its leaders, the nation is set to achieve the full status of a developed country by year 2020. The significant achievements during the First Industrial Master Plan (1986-1995) in all manufacturing sub-sectors have further inspired the country to plan for greater heights of achievements through its Second Industrial Master Plan (1996-2005).

Under the Malaysia Industrial Development Authority (MIDA) list of industry, there are a number of manufacturing industries which are classified as manufacturing sector. The major manufacturing industries are electronic industry, automobile industry, textile industry, wood based industry, steel industry and petrochemical industry. Among these industries, the electronic industry is the major manufacturing sector (Malaysia Trade Union Congress, 2006). Because manufacturing lines are also very capital intensive, requiring large monetary investments in equipment, long production runs are necessary to amortize the initial investments, and still produce the expensive products for which the lines are created (Katz, Rebentisch, Allen, 1996).

A technology transfer into Malaysia involves four key issues that need to be addressed : the role of the government in policy matters, the investors required to invest in the technology transfer the employee ability to receive this transfer, and the education system to prepare to meet the demands of technology transfer (Malaysian Institute of Management, 2001).

Against the backdrop, some observations seemed to cast some doubt on the seriousness of the Malaysian's quest of achieving Vision 2020. For example, in 1983, a Malaysian Industrial Development Authority study reported that most of the foreign-owned facilities located here were little more than appendages that concentrated on processes that required cheap labour. The same investors' mindset may still prevail.

In 1991 Bank Negara reported that direct foreign investments (DFI) have been important catalyst in the growth and development of Malaysia's industrial base. Concentrating primarily in the export-oriented manufacturing sector, it is widely acknowledged that DFI have contributed significantly to output, employment and total export earnings. For the growth and development of Malaysia's industrial base, the key issues are technology transfer, ongoing research, and development and competitive advantage (Malaysian Institute of Management, 2001).

Generally, investors will only transfer to the host country their start-up or static technology at the adoption phase. This basic technology s transferred if necessary to start up their production process, such as the assembling function, where no advance skills are required. The major operations such as new product development and R&D are still controlled by the parent companies outside Malaysia.

Investors are reluctant to transfer their dynamic or rooting technology to the host country primarily because of the cost of the new technology. New or dynamic technology incorporates the higher end of operations, maintenance and repair, and R&D activities, which are currently lacking in Malaysia.

However, not all investors are interested in low-cost operations and not investing in technology. Some large multinational organizations operating in Malaysia since the 1970s have transferred dynamic technology and have even set up in-house R&D units for constant improvements.

We should revisit successful companies around Asia. Japan is a leader in technology. Japanese firms have consistently increased their own R&D efforts to use, improve, develop and perfect imported technology.

It is clear that technology has to be bought from industrialized nations. A classic example is our national car. Having acquired technology from Japan in 1983, we have been just maintaining it. It was not until the late 1990s and with our Prime Minister driving the need for technology transfer that we started to develop our very own R&D team in the automobile industry.

The major manufacturing players in Malaysia are the Americans, the Europeans and the Japanese. Scoichi Yamashita, editor of Transfer of Japanese Technology and Management to the Asean Countries, said that the local government, economists, and journalist are under the impression that the withdrawal of foreign staff from a foreign-owned subsidiary signals accomplishment of the technology transfer process. The American and the European companies operating in Malaysia have their technical expatriates withdrawn as soon as operation commences, while the Japanese technical expatriates and become technical advisors.

It is unclear about what Malaysians do with the new manufacturing information. Instead of complaining that there is no transfer of technology, local companies could address the issue of technology transfer by investing in R&D. The view is strong shared by our Education Minister in the 2001 media report, in which he raised concern for the lack of R&D in our country, especially in our universities. He wants to see research and development with commercially viable outcomes. These could be in unexpected fields or in the improvement of existing ones.

Finally, the presence of a digital divide has now made technology transfer a bit more difficult for those who have not embraced information and communication technology. Technology generally requires the user to be computer literate. In Malaysia and the K-Economy, Dr.Shahrin Sabibubbin reported the Human Resources Minister, Datuk Dr Fong Chan Onn, as saying in a press conference in February 2001 that only 10% of Malaysians were computer liberate and that Malaysia needs to achieve the 50% computer literacy rate to be on par with South Korea, Singapore, Hong Kong and Taiwan.

These countries are our potential competitors and if we are not able to stand tall alongside them, we may be at the losing end. With the Asean Free Trade Area the World Trade Organization at our doorstep, we need to wake up to the call to realize what technology transfer means and the need to be seriously involved in ongoing research and development.

TECHNOLOGY

What is technology? "Technology refers to new and better way of achieving economics end that contribute to economic development" (Steward and Nihei, 1987). Defining technology is paramount because it helps to identify phenomena related to technology transfer. Since the 1960s, many scholars have tries to understand the real meaning of technology using different underlying philosophies (Choi et al. 2002, Skolimowski, 1966). According to Choi (2002), the definitions or meanings of technology these authors proposed were unique, according to their context, philosophy, economy, or other variables. Most contemporary discussion of technology transfer assumes that technology and its advance contribute to change and that this change fuels economics growth through productivity increases (Gee, 1981). Technologies were typically real assets that could be uniquely identified as to function and purpose. (Flannery and Dietrich, 2000) Technology can be defined as all the knowledge, products, processes, tools, methods, and systems employed in the creation of goods or in providing services (Khalil, 2000).

TECHNOLOGY TRANSFER PROCESS

Technology is information that is put into use in order to accomplish some task (Eveland, 1986). Transfer is the movement of technology via some communication channel from one individual or organization to another. Technology transfer comes in many flavors and involves different parties depending on various factors, including the maturity of the technology, receiver's expectations, and commitment from receiver. According to (Larsson et al. 2006), they defined technology suited for transfer to be in the form of competence, methods, tools, prototypes and ready-made products.

A technological innovation is an idea, practice or object that is perceived as new by an individual or some other unit (Rogers, 1995). Therefore, technology transfer is the application of information (a technological innovation) into use (Gibson and Rogers, 1994). The technology transfer process usually involves moving a technological innovation from an R&D organization to a receptor organization (such as private company). A technological innovation is fully transferred when it is commercialized into a product that is sold in the marketplace. So, technology transfer is a special type of communication process.

Technology transfer has been defined in many ways by various authors. However, most of the definitions are focused to the same ideas which is regarding to the movement of the technology from one location to another. The summary of these definition are shown in table 1 below:

Table 1: Definition of technology transfer

YEAR	AUTHOR	DEFINITION
1983	*McCardel*	Technology transfer is "the process of communicating research results to potential users"
1990	*Souder,Nashar, and Padmanabhan,*	The transferring technology process is actually an integration process involving provider and receiver. Technology transfer is not a unidirectional process, but a dialogue between varieties of actors at the sender/receiver site(s) at any point in time.
1993	*Padmanabhan and Souder*	"Technology transfer is the managed process of successfully conveying a technology from some point of origin to its routine application among users"
1995	*Spann,Adams and Souder*	"Technology transfer has been generally defined as the managed process of conveying a technology from one party to its adoption by another".
2000	*Robert Krull*	Technology transfer is a process by which existing technology is transferred or transformed to fulfill the user's needs. Technology transfer is the process by which research and other new technologies are transferred into useful processes, products, and programs. Another way of saying the same thing is: technology transfer is the process by which a better way of doing something is put into use as quickly as possible
2004	*Hill*	Technology transfer as a process through which resources are transferred in the development of products and services between the organizations.
2010	*Chen et al.*	Technology transfer is the process of sharing of skills, knowledge, technologies, methods, and samples of manufacturing, and facilities among governments, and other institutions to ensure that scientific and technological developments are accessible to a wider range of users who can then further develop and exploit the technology into new products, processes, application, materials or services.

For the purpose of this study some definition to the technology transfer process is need to be highlighted. The summary of the technology transfer process definitions are shown below in table 2.

Table 2: Technology transfer process

YEAR	AUTHOR	PROCESS
1976	*Behram, Wallander, Thunmen, Stock and Tatikonda.*	Identified → namely→ pre-negotiation stage→ negotiation stage→ technology transfer start-up→ long-term development stage
1987	*Enos and Park*	planning→ negotiation between suppliers of → technology and recipients→ plant and equipment design→ procurement and construction→ installation and start-up→ production and improvement→ subsequent annovation
1987	*Noling and Gilreath*	discovery→evaluation→adaptation→implementation
1992	*Risdon*	Technology innovation → technology confirmation → targeting technology consumers→ technology marketing→ technology application→ technology evaluation
2002	*Kelly and Wiseall*	strategy→ commission→ research→ evaluation → application
2004	*Hill*	identify→ assessment → strategy development → protection→ implementation

2005	*Goktepe*	identification of needs→ choice of technology→ assessment of conditions of transfer→ evaluation→ adjustment to local conditions→ agreement→ replication→ implementation

While, technology transfer processes can be complex and intertwined certain stages can be identified. These may include assessment of conditions of transfer, agreement and implementation. From the previous processes technology transfer selected, there are 3 main processes involves in the technology transfer process which are: planning/strategy, negotiation and implementation.

Technology transfer is usually iterative, involving multiple transfer steps, and considered as successful only if the result is in a positive change. Teaching a new skill or method may not really qualify as technology transfer unless, and until, it results in change (Nishimoto, 1995). Therefore the challenge is to insist on having successful technology transfer, rather than simply exchanging information between two parties.

According to the Rouach (2003) the goals of effective technology transfer can be described as; to develop technology that fits the strategic needs of the client, to ensure that the quality and costs of the technology meet the need of the client, to implement technology in a timely manner, to ensure that the technology is widely and routinely used.

Furthermore, Bhatia (1998) state that the basic conclusion of technology transfers is a communication process. Whatever, facilitates communications between persons will facilitate technology transfer. Technology transfer should not be a once for all singular process, but becomes iterative arrangement that begins with an understanding of the business units markets, opportunities, and customer needs.

However, Stock and Tatikonda (2000) the effectiveness of the technology transfer process by defined it as the degree to which the utilization of the transferred technology fulfills the recipient firm's intended functional objectives within cost and time targets.

Pursell (2000) suggests that are appropriateness of a technology influences the transfer of an innovation. Appropriate technologies are inexpensive, easily maintained, suitable, and compatible with one's need for creativity, and relatively easy to learn to use. Appropriate technologies are those that match the needs and wants of the receiving individual or group.

According to Chen (2011), researchers have developed methods to evaluate the effectiveness of the whole process in which knowledge is transmitted from the provider to the recipient. Teece (1976) stood from the viewpoint of cost and assumed that the effect of technology transfer may be judged by the cost involved. Staikarn (1981) considered from the perspective of effectiveness that the constructs of a successful technology transfer include practical utilization of technology, complete absorption of transferred knowledge, expansion of technology to relevant fields, and ability to modify the technology as per required by specific demand or objective. Mansfield (1982) suggested that the success of technology should be composed of three aspects; practical utilization of the technology, achievement of economic effectiveness, and competence of product development. Leonard-Barton & Sinha (1993) applied satisfaction of technology recipient to assess the effectiveness of technology transfer in electrical industry, factor analysis concluded three constructs; impacts on efficiency, smoothness in the process of transfer, and execution of goals. Davenport & Prusak (1998) proposed that effectiveness of technology transfer should be evaluated by speed of technology transfer, and depth of technology transfer.

CRITICAL SUCCESS FACTORS ON TECHNOLOGY TRANSFER PROCESS

According to (Larssonet al. 2006), when technology is to be transferred it is possible to take different approaches or strategies on how to achieve the transfer. To success on technology transfer, the technology transfer partner must have a strategy.

In order to investigate the CSFs for effectiveness technology transfer process it is important to recognize the technology transfer model. As developed by University of Leicester and Rolls-Royce (Kelly and Wiseall, 2002) The model stressed on a distinction is made between the delivery of research 'outputs' and the eventual 'outcomes' that have a real impact on the company's business. In between, process of capability is occurred acquisition that involves embedding within the company all of the required human and physical attributes needed so that a new technology is ready to be applied. Experiences within the company have concluded that capability acquisition has two important dimensions; 'acceptance' and 'assimilation'. On the other hand, Bozeman (1996) has identified the following variables in his technology transfer model, which are technology characteristics, structured variables for technology characteristics, project characteristics, and structured variables for project characteristics and implemented. The propose model by Bozeman (200) also includes five broad dimensions determine effectiveness characteristics of technology transfer agent, characteristics of the transfer media, characteristics of the transfer object, the demand environment, the characteristics of the transfer recipient.

Analysis indicates that critical success factors include: the type of application, importance of the system to business strategy and an early, key, successful development (Millett, 1996) Dearing (1993) states that technology transfer is "the communication of information which is put to use" Similarly, McCardel (1983) notes that technology transfer is "the process of communicating research results to potential users", since Perkins (1993) mentioned that technology transfer us "The process of adapting technology from its origins to the marketplace must involve technical communicators. They must be at the center of the transfer process". The key to technology transfer is the effective communication between the technologists, who understand the technology, and the clients in the operating divisions, and also understand on how to convert technology into competitive

advantage. The early establishment and use of teams of clients and technologists is critical to promoting effective communications. Follow-up must be regarded as an integral part of the technology transfer process. The essential element embedded in the entire technology transfer process is effective communication (Rouach, 2003). There are 40 technology transfer experts all agreed that the key to effective technology transfer is effective communication between those who have developed the technology and those who can use the technology in operations.

Boulter and Bendell (2002) state that the interface between the parties involved in technology transfer need to be managed well. Even when the communication between a source and receiver is good, the technical people remain dedicated to the technical objectives of a project, a long term stability of management objectives is a must for successful technology transfer to be consummate (Bhatia, 2003).

In addition, a certain level of trust among partners and the best use of human resources between companies are ingredients for success in technology transfer. Technology transfer is a process that requires management attention and support to be effective (Rouach, 2003). There are also other dimensions for effective technology transfer process which include sociotechnical (e.g., transfer personnel satisfaction), external (e.g., market success), and strategic (e.g., development of a long term organizational competencies) outcomes. Organizations should balance emphasis on project operational outcomes with other objectives as necessary given the specific transfer context. Exclusive focus on operational outcomes is not always appropriate (Stock and Tatikonda, 2000). It seems reasonable that the degree and type of success in technology transfer might relate to the motive for pursing the mission (Bozeman, 1991). The contingent perspective is clear: a given level of information processing requirement should be appropriately matched to a given level of information processing capacity (or vice versa) in order to achieve effective task outcomes (Stock and Tatikonda, 2000).

Toregas et.al (2004) also has stressed several variables in their technology transfer model, which emphasized on leadership commitment, service to customers, staffing with talented people, and the use of external capabilities to augment staff are the four essential elements for successful technology transfer. Meanwhile, Shama (1992) in his research point out six variables to measure technology transfer effectiveness from a research university: (1) the number of invention disclosures received, (2) the number of U.S. patents filed, (3) the number of licenses/options executed, (4) the number of licenses/options yielding income, (5) the number of start-up companies, and (6) the gross licensing income received. Our six item scale reflects certain of the four dimensions of technology transfer strategies utilized by federal R&D laboratories.

Based on Watanabe (1992) his studied define that there were several key factors for successful transfer which are;

- a project manager who has strong enthusiasm and clearly sees the benefits and

  Excitement the new product will bring to society be appointed.

- Demonstration of creativity is crucial and should be encourage in identifying the new market with new technology.

- Engineering resources should be concentrated on selected key fields including basic works in order to incorporate sophisticated technologies into high yield production lines.

- Key R&D personnel should be transferred with the production and marketing because truly innovative products require new culture in which to incubate.

- Respect for highly skilled people should always be emphasized while skills should be channeled into focused programs which can be observed and improved by the group.

The factor of influencing the effectiveness of technology transfer not only the tangible factor but it can be identified through intangible factors. Smilor and Gibson (1991) stressed that the ways that would improve the technology transfer process by share success stories of technology transfer among program areas, which could awareness regarding to the importance of technology transfer by involving shareholder marketing and product planning personnel.

Currently, the biggest international trend in the transfer of technology is that companies are gradually moving towards strategic alliances such as partnering, joint ventures, merges and acquisitions. Alliances may be most useful at the cutting edge of the learning agenda, to access and internalize technologies and know-how that are embedded, largely tacit, uncodified, and thus difficult to access via contractual approaches that do not involve a close collaboration between the partners.

A study by Yves and Gary points out that, in planning for or assessing individual skill-based alliances, it is important to focus on a few critical issues:

- How will the alliance create value? It is necessary to consider the extent of co-specialization between the technologies and skills of the partners that, on the one hand, will create value from each partner's competences and, on the other, engender risk of intrusion of one another's technology.

- What is the strategic compatibility between the partners? It is essential to assess the potential compatibility between partners' priorities, and the resilience of the alliances to external factors.
- How compatible are the partners' or organizations and cultures?
- How can the process of collaboration be made to converge? This might mean matching the sequence of mutual commitments demanded from each partner with the level of under-standing and trust achieved together.
- How effective is the design of the alliances?
- How balanced are the contributions and benefits over time?
- How strong are the expectations of future benefits?

Rouach (2003) in his studied define "building a network of partners is the key elements in technology transfer". One essential element embedded in the entire technology transfer process is effective communication. In addition, a certain level of trust among partners and the best use of human resources between companies are ingredients for success in technology transfer.

Hill (2004) stressed that the credibility of a technology proposition appears to depend upon five requirements:

- A global, growing market
- The potential of the technology to disrupt the market
- A strong management team
- Strong intellectual property rights
- A clear business model through which revenue and profit generated.

CONCLUSION

From the above discussion on different factors of influenced technology transfer effectiveness, it is clear that the factors affected technology transfer process provides several benefits to their environment. What the parties on environment need to do is to closely manage and monitor the process and consequences of technology transfer. According to Yazdani et al. (2011), recognizing the factors on technology transfer is high important. Indeed, situations have been changed compared to the past that the old business and manufacturing methods ar not responding to current needs anymore. Overall, it can therefore be concluded that, there are many factors affected the technology transfer effectiveness and different sectors may differ in their ways of handling their implementation process. This would further strengthen the claim on the generalized set of success factors.

Finally, the effectiveness of technology transfer takes a long time to succeed. Additional research is suggested to be done longitudinally in order to assess the impact of factors over time. Other type of studies can also be the use of qualitative studies (as opposed to quantitative data gathered though questionnaires, etc.) where data collected through observation or interviews. This type of study can obtain a good grasp of the phenomena of interest (Sekaran, 2004). Case studies is another type of research involving in-depth, contextual analysis of similar situations in other organizations, where the nature and definition of the problem happens to be the same as experienced in the current situation (Sekaran, 2004).

REFERENCES

Bhatia, S. Appropriate technology transfer: A must for improving global competitiveness, *IEEE Transaction*, 525-528.

Boulter, L., Bendell, T. (2002). Managing the technology transfer process, *IEEE Transaction*, 643-648.

Bozeman, B. (2000). Technology transfer and policy public policy: A review of research and theory, *Elsevier research policy* 29(2000), 627-655.

Cuttler, R.S. (1989). A comparison of Japanese and U.S. high- technology transfer practices, *IEEE Transactions of engineering management* 36(1), 17-23.

Dietrich, G., Flannery, Wm.T. (2000). Technology transfer in a complex environment: exploring key relationships, *IEEE Transaction*, 528-533.

Enos, J.L. 1989. Transfer of technology. *Asian economic economic literature march 1989* 3(1), 2-36.

Gibson, D.V., Gibson, T.H. (1995). Inter-organizational technology transfer: the case of the NSF science and technology centers, *Proceedings of the 28th annual Hawaii international conference on system sciences-1995, Austin,* 661-670.

Grant, E.B. Fitness for transfer: improving the international transfer of manufacturing capability, 916-919.

Grieve, R.H. (2004). Appropriate technology in a globalizing world, *International journal of technology management and sustainable development* 3(3), 173-186.

Kelly, J.C., Wiseall, S.S. (2002). Effective technology transfer in Rolls-royce – the practical assessment of business benefits, *IEEE Transactions*, 860-865.

Lin, Chinho., Tan, Bertam., Chang, Shofang. (2002). The critical factors for technology absorptive capacity, *Emerald industrial management and data systems* 102(6), 300-308.

Metz, B., Davidson, R.O, Martens, J.W., Rooijen, S.N.M., McGlory, L.V.W. (2000). *Methodological Technological Issues in Technology Transfer*, The Press Syndicate Of The University Of Cambridge, United Kingdom.

Nishiyama, T., Ikeda, K., Niwa, T. (2000). Technology ransfer macro-process a practical guide for the effectiveness introduction of technology, *ACM*, 577-586.

Noling, J.W., Gilreath, P. (1998). Technology transfer of methyl bromide alternative for soilborne pest management, *Annual international research conference on methyl bromide alternatives and emissions reductions*, 1-3.

Perkins, J.M. (1993). Social perspective on technology transfer, *IEEE Transactions on professional communication* 36(4), 185-189.

Risdon, P. (1992). Understanding the technology transfer process, *Wallacaville animal research centre*, 1-6.

Rouach, D. (2003). Technology transfer and management, *Special feature: new technology transfer practices*, 21-27.

Sekaran, U. (2003). *Research Method for Business,* 4th Edition, John Wiley & Sons, Singapore.

Zhoa, Liming., Reisman, A. 1992. Toward meta research on technology transfer, *IEEE Transactions on engineering management* 39(1), 13-21.