



Recognition and selection of optimal method for transferring technology in Tehran gas organization

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Abstract

The goal of the study is to recognize effective factors in evaluating and selecting technology transferring method in order to understand the current situation of Tehran gas organization according to influence of technology's components on transferring technology. This study encompasses field research method and correlation. According to the subject, goals of research consist of recognizing the dimensions of effective technology transferring and the components which affect them, presenting logical technique which is compatible with environmental conditions of gas organization in order to evaluate and select optimal method for transferring technology, and recognizing effective factors on evaluating and selecting optimal method for transferring technology. Since concept of technology has different parts and transferring process include different stages, we evaluated the relation between numerous indicators of transferring technology and components which affect technology transferring. Meanwhile, in this research the information attained by tentative and field researches was analyzed by statistical software, and measurement tools which have perpetuity and validity. Main hypothesis was mentioned "there is a meaningful relation between process of transferring technology and efficacies of it in the organization" and according to it, 5 incidental hypotheses were determined. After collecting information and making a visionary framework, hypothesizes were tested through Kendall rank correlation coefficient (τ) and because P was less than 0.05, hypothesizes were approved. Conclusion attained by studying indicators showed that mentioned factors affect way of transferring. Finally, in addition to estimating, the credit of the model, research results in the field of technology, and subject of research were attained. And suitable fields for future researches are offered herewith.

Keywords: Industry, Technology transfer, Tehran's gas organization, Algorithm.

Introduction

Technology is growing up based on knowledge, researching and developing. Iran because of being under dominion of several tyrants and neglecting the importance of technology, have fallen 20 to 40 years behind developed countries. Technology requires investments in research and instructing labors. Investment rate in developing countries including Iran is lower than developed countries and is about 0.3% (Mohr, 1999).

Thus, delay in converting research ideas into economic products is the reason for extreme difference between developed and developing countries. No doubt, adapting successful and existing experiences of others can minimize such a gap. In other words, there isn't enough labor, time, and asset to experience the way others tried one or two centuries to pass. Transferring technology is the shortest way to reach to results of other countries' advancements in order to solve industrial problems of country like Iran. This can be one way of gaining desired technology at lower costs and labor if such technology transfer is effected suitably (Cohen & Goel, 2004).

Generally, for developing countries effecting technology transfer may not be easy. The reason is that there is no distinct strategy for transfer and developing it. The result is, being dependent and incompetent in industrial issues. A way out for situation is to deal the issue scientifically and systematically and to superintend for implementation. Such an approach would benefit the

receiving country to evolve integrated framework for improving the technology suitably in tune with economic policy and industrial growth (Moor, 1994). The strategy of government includes: evaluating necessities of technology, abilities, specifying policy of technology development, designing guidelines, and planning for making a suitable environment for innovation through investment that can lead to economical or industrial development of the country (Alcorta, 1999).

Thus, adopting serious policies and improving technology transfer procedure with the intention to enhance interior ability by importing foreign and appropriate technologies not only must be in conformity with national condition but also must have the ability of representing international products (Salami & Reavil, 1997).

Significance and necessity of research

Technology transfer is a tool to minimize the investment and risks in improving technology level. In other words, in this method recipient try to recede from implementing expensive and same researches the other's done by utilizing their results and be sure that it's going to be successful because this research was tested before and won't lead in failure and its result will be functional (Bennett *et al.*, 1999; Cohen & Goel, 2004).

Since, nowadays Gas's role is very efficient in different dimensions like financial, economical, social, political, etc, so research and innovation in this industry is very important [NPB Association, Distribution Survey, www.gri.org]. No doubts, everyone concurs with the

importance of technology and its role in growth of industry and economic. One of the most important factors which cause developed countries to have dominance over others is that they profit by advanced technology and they try to extend technology by increasing investments in research and development sections (Cohen & Goel, 2004). In this course, developing countries concluded that the enigma of differences between them and developed countries is because of technology transfer. Thus, transferring technology in developing countries is extremely an unavoidable issue. It has to be done in a way that makes technical knowledge, industrial reflection development, and conditions to obtain dynamic technology to improve too (Moor, 1994).

Since multinational firms in industrial countries profit by more technology, technology transfer is the most important and more complex decision for developing countries to make. However, if it has done in scientific and correct way, it will be a factor to solve recession and improve standards (Alcorta, 1999).

On this basis and in order to achieve above mentioned goals, technology transfer in different industries specially oil and gas was prevalent in Iran since long time ago. But unfortunately because of complexity, pertaining to a specialty, lack of manager who knows the different processes, absence of assessment and technology transfer centers, lack of budget for research and development, and no close relationship between universities and scientific centers with industry in order to make conformity and improve importing technology, indeed there was no appropriate technology transfer since then just ended up purchasing some technologic products. Actually it has not caused industrial growth in Iran (Salami & Reavil, 1997).

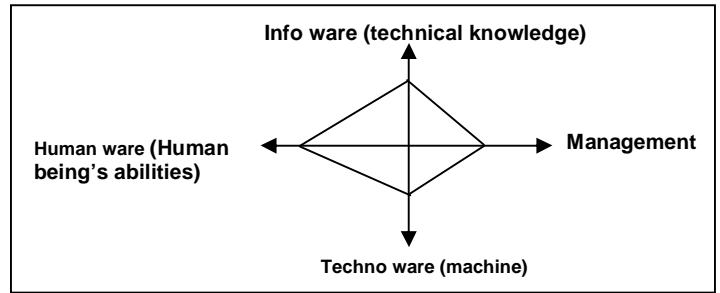
Thematic literature

The two ways of developing technology are: 1) to develop innate technology by innate resources, and 2) through technology transfer. Sometimes the combination of both is used. Making decision about technology transfer or innate development depends on various factors viz. capability level of recipient, technology complexity, and necessity of quick access to required technology (Devol, 1999). Based on rapid improvement of technology, countries and firms couldn't obtain every required technology. Selecting a suitable procedure to transfer could lead in being successful and indigenous (Mohr, 1999).

Constituents and component parts of technology

Technology as determinant factor of production, including raw materials to products and services, comprises four components: techno ware, human ware, info ware, and organ ware (Khalil & Tarek, 2000) (Fig.1). *Techno ware:* consists of set of tools, machines, equipments, installations, and physical facilities. It is the center of converting inputs into outputs.

Fig. 1. Four components' relationship and their mutual influence (Khalil, 2000)



Human ware: the part of technology which is manifested in human beings and is introduced as necessary abilities for production. This part consists of individuals, ingenuity, experiments, skills, knowledge, innovation, expertise, creativity, and motivation of human beings.

Info ware: is related to information known as sustentative technology in documents and was created by human beings in order to use it in techno ware. Info ware is consists of set of information in different formats like: documents, data, information, statistics, maps, booklets, books, and publications.

Organ ware: an organization in which technology is being used as required framework for production activities called organ ware. It consists of set of organization systems, management, networking, marketing associated with transfer, exploitation, and technology development. Organ ware has the duty of coordinating and controlling the other three components of technology.

By these 4 components, natural resources and intermediate goods are converted to produce consumer, capital and intermediate goods. Without these components no conversion happens. Description of this is possible by a mathematical formula algorithm. When quantitative role of components were obtained, unitary value of them which shows their total duty must be estimated in order to get a general indicator. To do this it's recommended to use exponential function like Cobb. Douglas Production Function named Technology Contribution Coefficient (TCC): (Niosi & Godon, 1999) $TCC = TBt^1.HBh^2.IBi^3.Obo^4$. In this formula T, H, I, and O are related to the prominence of technology components: techno ware, human ware, info ware, and organ ware. Power of B is related to each component's role on TCC. And this function shows that without these components no conversion happens.

Definitions and concept of technology transfer

As per industrial treaty manual, technology is transferred through transferring resultants of it as documents, instructions, and teaching experts. On the whole, technology transfer is a process of moving technology from source country to other places in order to use it (Vieira *et al.*, 2002). It includes 1) Techno ware. 2) Human ware. 3) Info ware. 4) Organ ware.

Technology transfer's concept is to minimize investment and the risks for recipient when it wants to



develop it. A complete transfer is a regular process or chain of targeted activities which technology components are replaced in places other than its source. Making technology is exploited in teaching, developing, improving, and economical functions (United Nation Environment Program, 2003).

But there is a point of view which believes that this method is just a blindly imitation of developed countries and never leads in innate growth. This problem derives from lack of plan and strategy in technology transfer, so its positive reasons have been forgotten and restricted to minimizing risks and investment and profiting by others' experiences in order to develop technology, blindly imitate them, and purchase expensive hardware. Complete chain of technology transfer can be considered as: 1.Election, 2.Acquisition, 3.Exploitation, 4.Localization & 5.Creativity (Bennett *et al.*, 1999).

Technology transfer chain

This process consists of several complex dimensions and this complexity makes its modeling seem very important. In addition to transferring, this model should identify problems and obstacles of transferring. According to nature of technology, social and organizational mechanisms effect on the implementation of technology. Hence, there isn't a unique way to transfer technology (United Nation Environment Program, 2003) (Fig.2).

There are factors which arouse the tendency toward modern technology: a).Yield, quality, confidence coefficient, more benefits, b) Evaluating technical goals, and associated techniques. c) Increasing individuals' abilities through technology cooperation has an important role in production, e) Continuum support of modern technology by improving production activities and d) Modernizing equipments, and associated processes permanently in developing countries. There are two categories which are efficient in acquiring new and modern technology (Vieira *et al.*, 2002): a) First category includes: quality, integration, preparations, response time, and labor's skills, b) Second one consists of: capacities, partnerships, developing new and qualified products, and minimizing losses.

When technology transferred to developing countries,

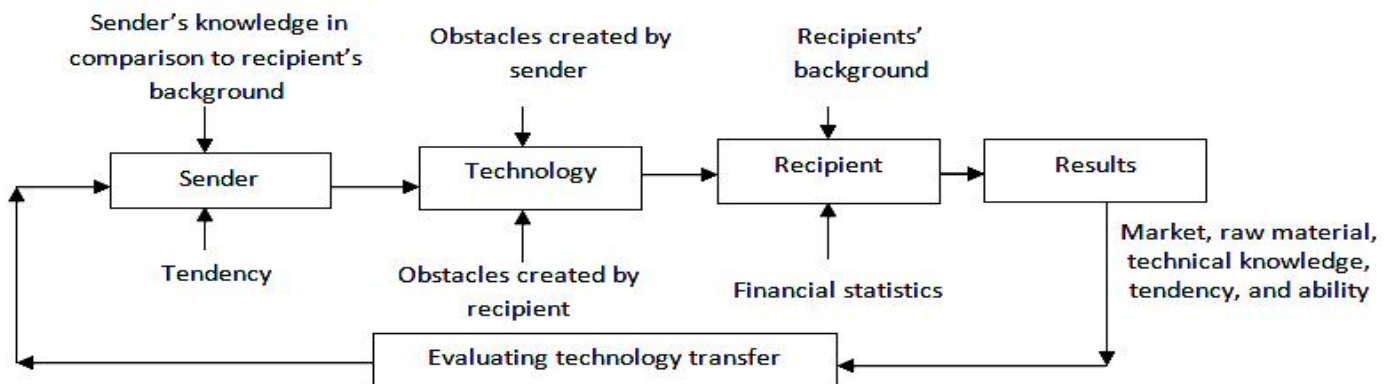
it's necessary to identify applicant's level of technology and the application must be based on scientific ability and according to level of labor's skill in recipient country. In this situation, supplier couldn't implement obsolete technology with low value added in developing countries (Moor, 1994).

One of the prerequisites of developing technology is being aware of current potential of organization in this area, comparing it with ideal situation, identifying the technologic differences, and planning for obviating the existing differences (evaluating technology). Moreover, evaluating technology provides more information which could help managers in decision makings about investments, appropriate methods of developing, or selling technology. So we could conclude that evaluating technology is a very important an unavoidable process which should be done in special situations or in definite time intervals and it must provide required information in the field of technology (Cassiman & Veugelers, 2000). Because of that, role of innovating production process compared to innovating new product is more important. Some experts believe that since production process is just a limited part of technology transfer, so applicants are deprived from innovating process and product (Zhang *et al.*, 2001). Transferring of technology is one of the capabilities of technology and such activities cause new knowledge and satisfy customers afterwards.

Capabilities of technology have 4 levels: 1) Assembling components, 2) Being in conformity with assembling components of products, 3) Redesigning production and 4) Independent design of products. In developing countries, first two levels excel the others; however, it might be possible that redesigning production based on acquisitive technology have the same importance sometimes. Nevertheless, at first we consider technology as a transferred set then in other levels as a complete ability. So in this situation inability applicants will be solved (Moor, 1994).

Absence of skill is harmful when the market is bullish. While automation can meet the customers' needs and make quality to improve, this situation may not come along. Appropriate progression of automation depends on

Fig.2. Technology transfer chain



level of knowledge. If there is no knowledge, costs will increase, and the process will disrupt. Selecting appropriate technology is a challenge in second level which must be in conformity with local condition of applicant in order to acquire (Mohr, 1999).

Most of technologies need modifying and organizing according to strategy. Applicants' requirements must be considered in respect of conformity with contents of functions and in order to supervise the technology of new products through substantial innovations (Niosi J & Godon B, 1999). The problem appears when supplier is in higher level and applicant without considering its ability applies. In this situation, dependency of applicant on supplier's knowledge will increase. In this level management's perception is more efficient (Alcorta, 1999).

Technical and financial evaluation of technology is based on better quality, lower costs, flexibility, and production. Technology transferred based on values, compatibility, characteristics of technology, and trading products and has several stages (Salami & Reavil, 1997).

Social economy, political systems, and cultural context are important in framework of planning technology transfer (Iranian Ministry of Industrial conference, 1994). Questions which must be answered are as following: 1) which technology must be transferred? 2) Which national resources must be set aside for special kind of technology? 3) Where is the source of technology transfer? 4) What is going to happen to successfully transferred technology? and 5) why technology is needed?

Technology transfer process and its stages

Stages of technology transfer are as follows (Mohr, 1999) which are represented here in Fig.3:

1- *Recognition and evaluation stage:* In this stage, different technologies all around the world recognized and surveyed. Then supplier countries' conditions evaluated.

2- *Selecting stage:* In this stage, state of opportunities is very important. Some of technical methods are particular, so if there is need to transfer them, there will be only one choice. In selecting technology, internal issues of country which is recipient

must be surveyed such as number of unemployed, existence of trained labor, natural resources, and exchange income.

3- *Acquisition stage:* This stage consists of signing a treaty, receiving documents, and forecasting the boundary of activities of both recipient and supplier. Also in implementation stage, it consists of training, human beings' skills, and general management issues.

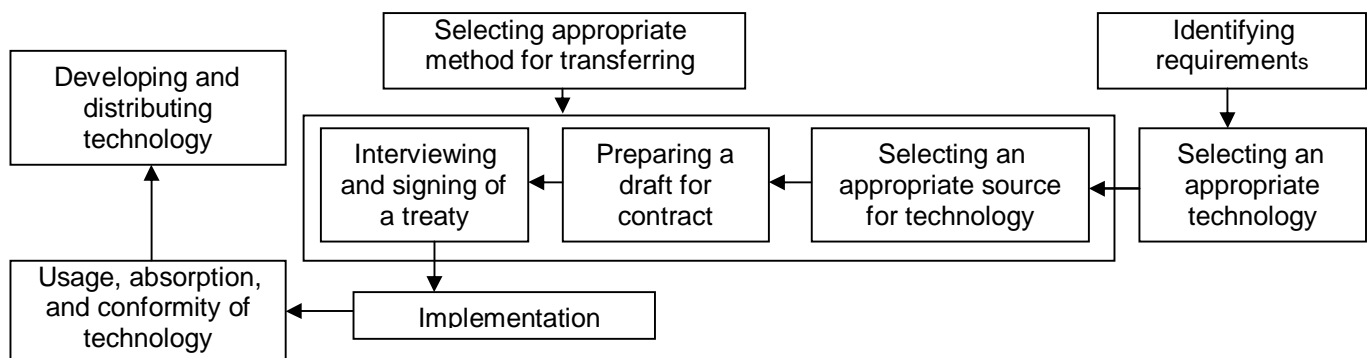
4- *Conformity, understanding, and usage of technology*
Conformity of technology: This stage consists of making technology to fit in special conditions and considering issues like social-economical state, investment, content of production, raw materials, skills' level, infrastructural installation, machines, etc is very important (Mohr, 1999). This stage may be simultaneous with acquisition stage. Using imported technology without considering above mentioned issues is impossible; otherwise, regular chain of technology will be disjointed and other stages never happened (Cohen & Goel, 2004).

Understanding technology: It means complete understanding of transferring process and technical designing of equipments including perceiving the knowledge of acquired technology, complete awareness of designing methods, production methods, surveying methods, quality control, and installing and launching production lines. On the other side it also includes learning manufacturing methods, maintenance, and managerial systems (Mohr, 1999). This process starts by surveying designing principles, installation, and launching machineries and ends with expanding technology throughout the society. In a way that imported technology is the part of common skill and knowledge of that country (Cohen & Goel, 2004).

Usage of technology: The process of exploiting technology in order to produce goods, preparing services, obtaining production methods, activities, and actions done before exploiting called usage of technology (Mohr, 1999). In this stage activities like designing, structuring, installing, launchings, and establishing systems, and managerial organizations are going to be done (Cohen & Goel, 2004).

5- *Development and distribution stage*
Developing technology

Fig.3. Technology transfer process according to references (Salami & Reavil LRP, 1997)





If all above mentioned stages have done correctly, we could say that technology transferred. But it does not finish (Mohr, 1999). Last stage in transferring technology is development and universalization of acquired technology and innovating based on that (Mohr, 1999). In fact by using new skills, existing technology will be improved and developed in this stage, and then importer itself will be converted into producer (Cohen & Goel, 2004).

Distributing technology

Intention of distributing is to universalize the acquired technology and new ones in field of training, understanding, usage, and development (Mohr, 1999).

Theoretical framework of research and its methodology

Theoretical framework of research is a conceptual pattern based on theoretic relationship between several factors of research which are recognized as important. This framework is a logical, descriptive, and trained network consists of relationships between variables which are identified when one intended to interview, observe, and survey the research background.

After identifying variables, we must edit the relationship between variables in order to raise and test the associated theory. Therefore, theoretical framework of research was represented in Fig.4.

Since the goal of research is related to technology transfer in Tehran's Gas Organization, type of research if functional. We used descriptive-analytical method and comparative studying. By using instructions and guidance of professors and interviewing with some experts, we designed a questionnaire and they justified its theoretical validness (Sohrabi & Tahmores, 2003).

In order to achieve our goals, we used correlation method of research. Because it was decided to represent a comprehensive picture of above mentioned instances and analyze important factors of transferring in Gas industry by a descriptive background and square researches. Therefore, we tried to control undesirable variables more and more, and survey various independent variables and then by comparative surveys, give some recommendations (Richard *et al.*, 1997).

According to researcher's interests in identifying

relationship between variables (dependent and independent) and answering following questions: is there any relationship between them, If there is, how related they are, is the relation or correlation between them straight or upside down, so correlation method (Kendall relationship test poll) with SPSS software was used. Researcher wanted to search about relationship between variables by information he/she has or is going to acquire in order to answering above mentioned questions by statistical calculations (Richard *et al.*, 1997).

A Kendall rank correlation coefficient (τ) is an indicator of correlation for those findings which we use Spearman correlation coefficient (γ_s) for them. It means that findings related to two X and Y variables are ordinal measures, in a way that we could be able to rank the score of each testable on X and Y. In this way τ is a measure for showing the rate of correlation between two groups of scores which are related to those two variables. So like γ_s , τ is measurable too. One advantage of τ to γ_s is that we could universalize τ to Correlation coefficient contribution (Sidney Siegel & John Castellan, 1988).

Related formula is:

$$\tau = \frac{S}{\sqrt{\frac{1}{2}N(N-1) - T_x} \sqrt{\frac{1}{2}N(N-1) - T_y}}$$

Purposes of research

Purposes of research consist of: Recognizing dimensions of effective transferring technology and efficient components; Proposing logical methods which are proportional to local conditions of national Gas organization in order to evaluate and select desirable method of technology transfer; Identifying and surveying effective factors in evaluating and selecting desirable method of technology transfer.

Research hypotheses

Research hypotheses consist of:

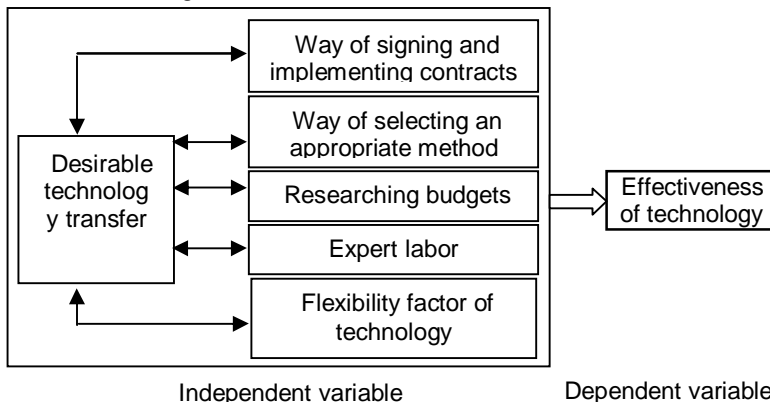
The main hypothesis: There is a meaningful relation between technology transfer process and effectiveness of it in Tehran's Gas Organization.

Assumptions in particular: 1) The way of signing contracts and implementing them has a very important role in effectiveness of technology transfer, 2) The way of selecting an appropriate method for transferring technology has a very important role in effectiveness of technology transfer, 3) Researching budgets have a very important role in effectiveness of technology transfer, 4) Having expert labors has a very important role in effectiveness of technology transfer, 5) Flexibility factor of technology has a very important role in effectiveness of technology transfer.

Researching variables

Variables of this research (as you saw in Fig.4) are: Dependent variable which will be surveyed in this research is the effectiveness of technology

Fig. 4. Theoretical framework of research



transfer. Variable which affect this variable named independent is: desirable technology transfer which itself has components: The way of signing contracts and implementing them, the way of selecting an appropriate method for transferring technology, researching budgets, Having expert labors, and Flexibility factor of technology.

Territory of research

Thematic territory: this research is about effective factors in evaluating and selecting desirable method for transferring technology in Tehran's Gas. And its theme is categorized under technology management issues.

Place territory: this research is done in Tehran's Gas Organization. This organization's main mission is supplying Gas demand in Tehran.

Statistical Samples

In this research Statistical samples are some professors which are also researchers in Gas organization and some people who are aware of Gas Organization's situation and total number of them is 140 (N = 140). Because of time limitations and dispersals, only 80 questionnaires were distributed which among them 60 questionnaires were analyzed so N = 60.

Methods of data collection

In this research, there are two main methods for gathering information. For information which are related to theoretical issues we used library to study and for information which are related to statistical data we used questionnaires. However, sometimes during the research, researcher forced to use other methods like observing so closely, surveying documents, and verbal interview with people, but main method is using questionnaire.

Questionnaire Validity

In order to acquire appropriate and accurate data, measuring variables must be valid enough. By validity we mean that measuring tool should measure the required characteristic accurately not another one. Thus one of the most important goals in making any tests or questionnaires is to have high validity (Richard *et al.*, 1997). According to professors and experts who confirmed the validity of present questionnaire and that it was in harmony with theoretical issues, they used it in their research. Also it's necessary to explain that this questionnaire was distributed among 12 experts of Gas organization and after opinion sampling, some questions were deleted or adjusted, then final questionnaire was edited after all these stages. Therefore we could be sure about validity of questions.

Questionnaire reliability

Reliability means stability of research findings. It means that when a measuring tool measured a characteristic, under same circumstances same results obtained. In fact new measurement must be

just like the previous one.

Measuring reliability of questionnaire

There are three main methods for estimating the perpetuity: a) Retesting, b) Same weight test technique, c) Dividing measuring tool into two parts.

In this research we used retesting method in order to estimate the perpetuity of questionnaire. Retesting means that we use one measuring tool in two different times for group and calculate scores of them (correlation degree). In his method, mistake is everything which makes people to get different scores in different measurements (Richard *et al.*, 1997).

Cronbach's alpha coefficient method

Another way to calculate perpetuity is using Alpha formula of Cronbach's alpha coefficient which was used in this research just for reassurance. It's the method for calculating internal conformity of tools like questionnaires or tests to measure different characteristics. In order to calculate Alpha coefficient, at first we should calculate the variance of each question of questionnaire and total variance must be calculated. Then by using following formula alpha coefficient will be calculated (Sidney Siegel & John Castellan, 1988).

$$r_{\alpha} = \frac{j}{j - 1} \times \left[\frac{1 - \sum S_j^2}{S^2} \right]$$

Which

j = number of subsets of questionnaire or test's questions

Sj = the variance of jth subset

S = total variance

According to 27 transmitted questionnaires and 20 of them returned, alpha coefficient calculated 0/812 which showed the perpetuity of questionnaire.

Hypotheses testing

As we said, along with ignoring theories by SPSS software we used Kendall's method in order to approve. In fact, kendall coefficient is used whenever our measurement is matrix and number of applicants is more than 20. In this situation we should use correlation coefficient or kendall. In order to more understanding here is some explanations: 1) Whenever p is less than 0.05, theory is approved. 2) Whenever there is a star in first line of a table, it means that security level of it is 0.95. 3) Whenever there are two stars in first line of a table, it

means that security level of test is 0.99.

The main hypothesis

There is a meaningful relation between technology transfer process and its effectiveness in Tehran's Gas organization (Table 1).

Table 1. Correlation The main hypothesis

			ATHRA	F1
Kendall's tau_b	ATHRA	Correlation Coefficient	1.000	.619**]
		Sig. [2-tailed]	.	.000
		N	60	60
	F1	Correlation Coefficient	.619**]	1.000
		Sig. [2-tailed]	.000	.
		N	60	60

**Correlation is significant at the .01 level [2-tailed].

First incidental theory: The way of signing contracts and implementing them has a very important role in effectiveness of technology transfer (Table 2).

Table 2. Correlation First incidental theory

			ATHRA	F2
Kendall's tau_b	ATHRA	Correlation Coefficient	1.000	.668[**]
		Sig. [2-tailed]	.	.000
		N	60	60
	F2	Correlation Coefficient	.668[**]	1.000
		Sig. [2-tailed]	.000	.
		N	60	60

** Correlation is significant at the .01 level [2-tailed]

Second incidental theory: The way of selecting an appropriate method for transferring technology has a very important role in effectiveness of technology transfer (Table 3).

Table 3. Correlation Second incidental theory

			ATHRA	F3
Kendall's tau_b	ATHRA	Correlation Coefficient	1.000	.590[**]
		Sig. [2-tailed]	.	.000
		N	60	60
	F3	Correlation Coefficient	.590[**]	1.000
		Sig. [2-tailed]	.000	.
		N	60	60

** Correlation is significant at the .01 level [2-tailed].

Third incidental theory: Researching budgets have a very important role in effectiveness of technology transfer (Table.4).

Table 4. Correlation Third incidental theory

			ATHRA	F4
Kendall's tau_b	ATHRA	Correlation Coefficient	1.000	.615[**]
		Sig. [2-tailed]	.	.000
		N	60	60
	F4	Correlation Coefficient	.615[**]	1.000
		Sig. [2-tailed]	.000	.
		N	60	60

Correlation is significant at the .01 level [2-tailed].

Forth incidental theory: Having expert labors has a very important role in effectiveness of technology transfer (Table 5).

Fifth incidental theory: Flexibility factor of technology has a very important role in effectiveness of technology transfer (Table 6).

According to above mentioned theories, we could conclude that experts approved all designed theories. Here in following table, we represented testing of incident theories (Table 7).

Table 5. Correlation Forth incidental theory

			ATHRA	F5
Kendall's tau_b	ATHRA	Correlation Coefficient	1.000	.546[**]
		Sig. [2-tailed]	.	.000
		N	60	60
	F5	Correlation Coefficient	.546[**]	1.000
		Sig. [2-tailed]	.000	.
		N	60	60

** Correlation is significant at the .01 level [2-tailed].

Table 6. Correlation Fifth incidental theory

			ATHRA	FA
Kendall's tau_b	ATHRA	Correlation Coefficient	1.000	.496[**]
		Sig. [2-tailed]	.	.000
		N	60	60
	FA	Correlation Coefficient	.496[**]	1.000
		Sig. [2-tailed]	.000	.
		N	60	60

** Correlation is significant at the .01 level [2-tailed].

Interpretation of results

Statistical accuracy, delicacy and velocity were achieved by computer based programs and SPSS program was used to test the theories.

We observed a meaningful relationship between selected independent variable and dependent one (effectiveness of technology transfer process). Moreover, by considering level of mistake ($\alpha=0/01$), there isn't any meaningful difference between results of theories. Hence, we conclude that the sample society is a homogeneous society.

Conclusions and recommendations

Technology must be created but time consuming and very expensive and hence the option for technology transfers. Factors such as conformity, effectiveness, universalization, and development of technical knowledge, play key role in technology transfer.

Imported technology is one of the important factors of producing goods, presenting services, and exploiting natural resources in order for export and internal use. Nowadays technology and its developments could have more competitive advantages against current ones.

Thus, technology and its developments cause some opportunities and threats which are external factors and out of organization's control. So survival of organizations depends on the fact that opportunities must be identified and exploited, and then external factors' side effects which caused by potential threats have to be minimized. To do that technology has to be considered as two way road: one side for purposes and motivation of supplier, technologic developments, and their ability to transfer the



Table 7. Represented testing of incident theories

Result or $0.01 = \alpha$	description	Type of theory
Approved	There is a meaningful relation between technology transfer process and its effectiveness in Tehran's Gas organization.	Ohm
Approved	The way of selecting an appropriate method for transferring technology has a very important role in effectiveness of technology transfer.	First incident
Approved	The way of selecting an appropriate method for transferring technology has a very important role in effectiveness of technology transfer.	Second incident
Approved	Researching budgets have a very important role in effectiveness of technology transfer.	Third incident
Approved	Having expert labors has a very important role in effectiveness of technology transfer.	Forth incident
Approved	Flexibility factor of technology has a very important role in effectiveness of technology transfer.	Fifth incident

technology and other side for recipient's facilities based on ability to acquire, understand, and develop.

According to studies and resultants of surveying, following solutions were proposed in order to decrease existent differences by using technology's components in process of transferring technology and technology development: 1) Identifying and listing of potential technologies of industry according to universal outlook on production and products. 2) Estimating technical and human ability and capacity of investment. 3) Evaluating modern and appropriate technology based on variables like velocity of production, content of functions, costs, flexibility, required space, and technology's lifetime. 4) Evaluating and ranking methods of technology transfer based on variables like velocity of transferring, costs of transferring, conformity, self confident, access to market. 5) Evaluating and ranking technology suppliers based on variables like reputation of supplier, supplier's tendency to cooperate, previous experiences, political situation, its rank compared to opponents. 6) Accurate planning about professional trainings of technology's components like labor, management, and technical knowledge. 7) Research and development department of company should be more active in developing and acquiring technology. 8) Decreasing the distance between current and desirable situation of company in conformity, taking technology, especially development and distribution stages. 9) Balancing software against other components. Because during transferring focus is more on hardware. And this means inappropriate use of asset as uncommon element in production. 10) Focusing on using components in technology transfer framework as the framework components are related to other pillars of process.

References

1. Bennett D, Vaidya K and Zhao H (1999) Valuing transferred machine tool technology relating value to product attributes and preferences of acquirers. *Intl.*

J. Operational & Production Management. 19 (5), 491-514.

2. Cassiman and Veugelers (2000) External technology source: Embodied or disembodied technology acquisition. In: Proc. of session Conf. on innovation, appropriate & economic policy, Paris, Jan.
3. Cohen, Goel, (2004) Technology transfer: strategic management in developing countries. Sage Publ. pp: 224-228.
4. Devol RC (1999) American's high-tech economy: growth, development, and risk for metropolitan areas, Report. Miliken Institute, Santa Monica, CA.
5. Iranian Ministry of Industrial conference (1994) Technology transfer process in light of industry.
6. Khalil M. Tarek, (2000) Management of technology. McGraw Hill.
7. Mohr H (1999) Technology assessment in theory and practice, *J. Soc. Philosophy & Technol.*
8. Moor WC (1994) Technology transfer to developing countries: The Oman experience. In: Proc. of the Fourth Intl. Conf. on Management of Technol. Feb. 27 - March 4, Miami, Florida. pp: 406-415.
9. Niosi J and Godon B (1999) Canadian R&D aboard management practice. *Res. Policy.* 28, 215-230.
10. Richard Levin, David I and Rubin S (1997) Statistics for Management. 7th Edition. Publ Prentice Hall.
11. Salami R and Reavil LRP (1997) International technology transfer policies & the industrialization of developing countries. *Technol. Management: Strategies & Appl.* 3, 195-211.
12. Sidney Siegel and John Castellan NJR (1988) Nonparametric statistics for the behavioral sciences. Publ. McGraw-Hill College.
13. Sohrabi, Tahmores (2003) Comprehensive model for designing and explaining the process of technology transfer in the petrochemical industry. Theses Ph.D. degree in industrial management, *Islamic Azad Univ. Sci. & Res.*
14. United Nation Environment Program (2003) Workbook for training in environmental technology assessment for decision-makers. *A Pilot Program, IETC Techn. Publ. Series 5.*
15. Vieira, Deb CR and Zawislak PA (2002) The evolution of the supply capacity of some the auto part companies in the state of Rio Grande do soul. *The 11th Intl. Conf. on Management of Technol.* March 10-14.
16. Zhang G, Vaidya K and Bennet D (2001) from transferred technology to technological capability: a framework for examining the acquisition capability of Chinese enterprise. In: 6th Res. Symp. on Intl. Manufacturing, Sep. pp: 186-195.