

# The Effect of Application of Information Technology on the Organizational Performance Using the EFQM Model (A Case Study of Telecommunication Company of TEHRAN)

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## ABSTRACT

the main goal of this research is to investigate the effect of IT on organizational performance using EFQM model in Tehran Telecommunications Company. Questionnaire was used for data collection. Sample members were selected from employees of Tehran Telecommunications Company. 383 questionnaires were usable. Kolmogrov-Smearnov test was used to verify normality of research variables. SPSS and LISREL software were used to investigate research hypotheses. Results showed that IT has relationship with EFQM model criteria and all hypotheses were verified.

**KEYWORDS** Organizational Performance, Information Technology

## INTRODUCTION

In the past few decades, IT and telecommunications speed was so high that many organizations and companies must invest in IT and revise IT strategies in order to continue activities. IT has provided wide facilities for organizations so that they are able to develop their activities and it has opened up new dimensions in competition and development (Tajfar, 2012, 11). Furthermore, as we stepped into the third millennium, leadership and organizational management became an important issue for managers. Old working procedures seem not to be beneficial in the present conditions. Competition has become completely borderless. New business methods make use of concepts like out-sourcing and re-engineering. In such conditions, the past trend is no longer suitable for future prediction (Sarrafizadeh, 2011, 1).

One of the newest concepts which have received a lot of attention in the recent years is business models planning and national quality prizes. Organizations and companies are evaluated based upon such prizes and improvement and promotion will be facilitated through establishment of a competitive atmosphere (Jolodari Mamghani, 2006, 1).

It seems necessary to use models which are capable of evaluation of the present status of organizations and recognition of strengths and improvable regions and able to facilitate strategic planning. Important models include "Deming" prize in Japan in 1951, "Baldrige" prize in America in 1978 and European Foundation for quality management in 1988 which is known as EFQM model. In this model, 9 fields are considered. 5 fields are related to approaches which form capabilities and competencies needed for an organization. Therefore, they are known as empowerment agents. The other four fields investigate results of application of approaches and are called results. (Safari and Azar, 2004, 3, 4, 5).

In the present era, effective management depends on quality management and IT application. Many studies have been conducted to investigate quality management and use of IT but the role of IT in improvement of organizational performance using EFQM model has not been clarified. Therefore, the main question in this research is whether the application of IT to an organization improves organizational performance (EFQM model components)? And in what status are the components?

## RESEARCH LITERATURE

IT: in its common meaning, technology refers to a set of hardware and equipment (Scarborough & Corbett, 1992,3). Many researchers believe that technology does not purely refer to hardware used in works, but they believe that it also includes employees' knowledge and skills and even it embraces the characteristics of objects on which some kind of work is done (Scott, 1992, 272). IT can be defined as relationships among hardware, software, network and applications of this equipment. IT not only helps with exact and proper processes but also it brings new wealth in different fields of organizational activities (Zuboff, 1988). This is the difference aspect between IT and other technologies. IT not only refers to data processing capabilities of computers but also it refers to human skills and managerial abilities. Therefore, IT does not simply refer to

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computers and other relating equipment but it refers to capabilities and measures in work doing process (Flores et al, 1988).

**Hardware:** physical and mechanical parts which are tangible and observable like monitor, keyboard, sound card ... (Bahan, 2002, 19).

**Software:** software includes specialized and general software needed by users and also software in fields like official affairs, finance, filing, educational and research fields. Specialized and general software include educational CDs on users' work or education. Such software is usually found in educational and working environments and libraries, computer sites and IT centers. Such software should be suitable for education, administrative affairs, filing, finance, and librarianship. They should also provide users with suitable statistical reports and enough education (Behan, 2002, 19).

**Network:** after emergence of internet networks, application of internal networks (intranet) which connect organizational calculation equipment is also being developed. Development of internal network concept and standardization of software and hardware in supporting networks helps many organizations with conduction of their internal communications through internal network. Moreover, combination of internal network with internet forms a network which is called external network (extranet). This network provides a powerful system for inter-organizational communications and cooperation (Sarrafzadeh, 2010, 52).

**Performance:** this concept is important because it can be evaluated or managed by means of definition of performance. Holton and Bitz pointed out that: performance is a multi-dimensional structure and its evaluation differs based upon factors types. In general, organizational performance is defined as an organization's ability to use resources effectively and produce steady outputs considering the beneficiaries' targets (Mohebbi Moghaddam, 2008, 2, 3).

**Leadership:** in an excellent organization, leaders define and determine mission, goals, values and overall organizational vision. They design organizational values and systems which are necessary for steady success and put them into action. Leaders are firm in their intentions. Such leaders change organizational overall direction if necessary and encourage their employees to follow them (Mohebbi Moghaddam, 2008, 32).

**Strategy and policies:** excellent organizations consider market and the part of market they are working inside through a strategy which is concentrated on beneficiaries' benefits. Such organizations use market information, performance reports and beneficiaries' needs as inputs in order to formulate strategy. In an excellent organization, directions, plans, goals and processes are formed and flowed in order to implement strategies (Mohhebi Moghaddam, 2008, 34).

**staff (human resource):** excellent organizations manage, improve and develop all potential powers of their employees in individual, team and organizational levels. They spread justice and equity and involve their employees in organizational affairs administration and therefore empower them. Such organizations care about their employees, establish contact with them and empower them. Such organizations inspire motivation and commitment in their employees in order to help them with using their knowledge and skills for organizational benefits (Mohebbi Moghaddam, 2008, 35).

**Partnerships and resources:** manage their extra-organizational partnerships with their suppliers, and plan for their internal resources (financial resources, hardware and software) in order to support strategies and implement processes effectively. They balance their present and future needs of organization, society and environment (Mohebbi Moghaddam, 2008, 37).

**Processes:** excellent organizations design, improve and manage their processes in order to attract complete satisfaction of customers and create added value for them and other beneficiaries (Mohebbi Moghaddam, 2008, 38).

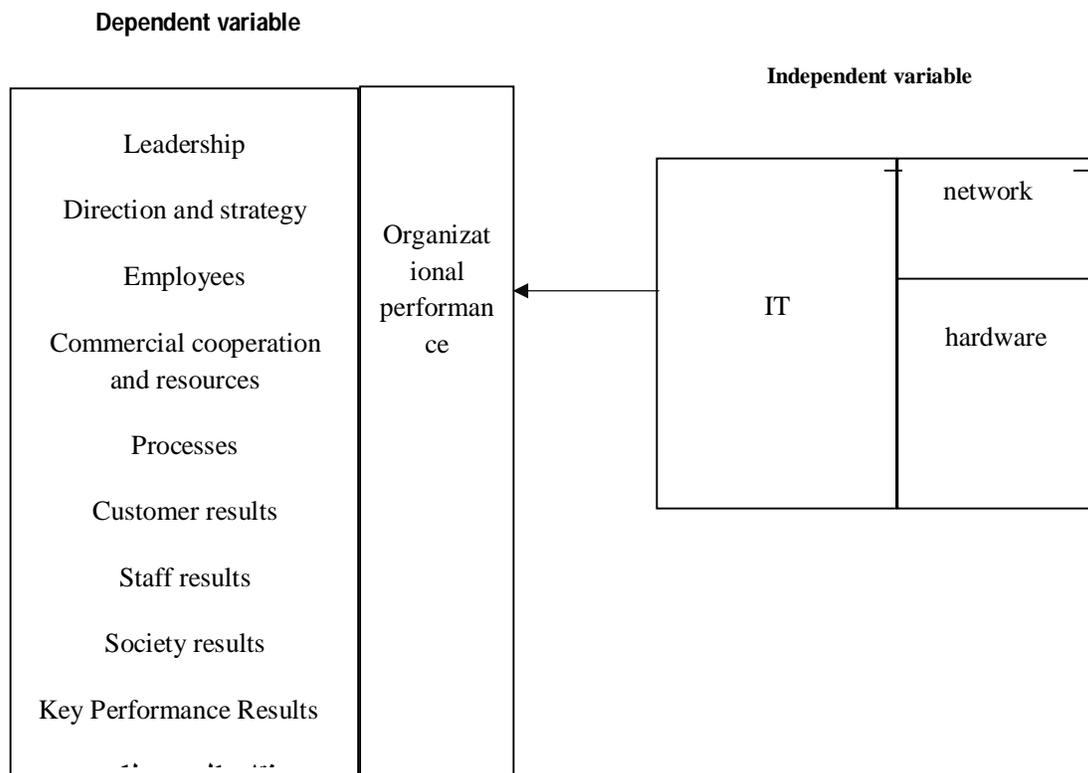
**Customers' results:** excellent organizations measure the results related to customers and indices of measuring their satisfaction with service and products quality continuously and comprehensively (Mohebbi Moghaddam, 2008, 39).

**Staff results:** excellent organization measure the results related to employees and their job satisfaction indices (Mohebbi Moghaddam, 2008, 39).

**Society results:** excellent organizations measure the results related to society continuously and comprehensively (Mohebbi Moghaddam, 2008, 40).

**Key Performance results:** excellent organizations measure the results related to long-term strategy and goals continuously and comprehensively (Mohebbi Moghaddam, 2008, 41).

**Research conceptual model**



Reference: Mohebhi Moghaddam, 2008, 28

**Research hypotheses**

IT affects OP in Tehran Telecommunications Company using EFQM.

**Subsidiary hypotheses:**

- Application of IT affects leadership dimension in Tehran Telecommunications Company.
- Application of IT affects policies and strategy dimension in Tehran Telecommunications Company.
- Application of IT affects employees dimension in Tehran Telecommunications Company.
- Application of IT affects companies and resources dimension in Tehran Telecommunications Company.
- Application of IT affects processes dimension in Tehran Telecommunications Company.
- Application of IT affects customers' results improvement dimension in Tehran Telecommunications Company.
- Application of IT affects staff results improvement dimension in Tehran Telecommunications Company.
- Application of IT affects society results improvement dimension in Tehran Telecommunications Company.
- Application of IT affects key performance results improvement dimension in Tehran Telecommunications Company.

**MATERIALS AND METHODS**

**Questionnaire**

In the present research, two questionnaires were used to collect data:

- a) EFQM Self-evaluation questionnaire

The questions of the questionnaire were extracted from a book titled "EFQM, techniques and executive approaches (Mohebhi Moghaddam, 2008)". This questionnaire has 50 questions of the same weight and each of the 50 questions has the same effect in organization's point. In this method, 4 choices A, B, C and D were considered for each of the questions and respondents should choose the best answer considering the following concepts:

A=completely yielded the expected result  
 B=has had considerable and satisfactory advancement  
 C= partial advancement  
 D=started

b) IT level measurement questionnaire

This questionnaire included 24 questions and shows the level of IT application in an organization. This questionnaire considers IT indices and experts' opinions. Questions of this questionnaire have been designed based upon 5-point Likert scale (very low (1), low(2), average(3), much (4), very much (5)). Before using the questionnaire, 40 questionnaires were distributed among sample members in order to conduct pretest and measure reliability. All research variables had a Chronbach's alpha equal to 0.7 and we conclude that the questionnaire does have required reliability.

### The sample

Sample members were selected from employees of Tehran Telecommunications Company. Population volume was 5000 and according to Morgan table, sample size was calculated to be 357. 383 questionnaires were distributed in order to have a more exact evaluation.

In the following table, respondents' demographic information has been provided.

Table 1. Respondents' frequency distribution

variable	Dimensions	frequency	Frequency percentage
position	Clerk	205	53.3
	Expert	100	26.1
	Department chairman	38	9.9
	Vice president	28	7.3
	High-rank manager	12	1.3
Gender	Female	116	69.7
	Male	267	30.3
Experience	Below 10 years	44	11.5
	10-20 years	208	54.3
	20-30 years	131	34.2
education	Diploma	18	4.7
	Associate's degree	81	21.1
	Bachelor degree	207	54
	Master degree	77	20.1

### Data analysis and hypotheses test

In this research, Kolmogrov-Smearnov test was used to investigate the normality of research variables. Considering the fact that significance level of this test was more than 0.50 for all variables, we can conclude that distribution of all variables does not significantly differ from normal distribution. Therefore, we can conclude that variables distribution is normal. Finally, LISREL and SPSS were used to examine research hypotheses.

Table 2: model fitting indices

Index title	Acceptable domain	Value	result
$\chi^2/df$ <sup>1</sup>	$\leq 3 \chi^2/df$	87.2	Model verified
RMSEA <sup>2</sup>	RMSEA<0.09	0.000	Model verified
GFI <sup>3</sup>	GFI>0.9	0.9	Model verified
AGFI	AGFI>0.85	0.85	Model verified
CFI <sup>4</sup>	CFI>0.90	0.95	Model verified
IFI <sup>5</sup>	IFI>0.90	0.95	Model verified
NNFI <sup>6</sup>	NNFI>0.90	0.94	Model verified
RFI <sup>7</sup>	RFI>0.90	0.93	Model verified

LISREL calculated a Good Fit Index (ratio of squares explained by model to total sum of squares of estimated matrix in population). This index is similar to correlation coefficient in favorability. Both criteria range from zero to 1, although they might be negative theoretically (of course this must not happen, because this

<sup>1</sup>Chi square divided to degree of freedom

<sup>2</sup>Root mean square error of approximation

<sup>3</sup>Goodness of fit index

<sup>4</sup>Comperation fit index

<sup>5</sup>Incremental fit index

<sup>6</sup>Non-Normed Fit Index

<sup>7</sup>Relative Fit Index

indicates absence of definite fit of the model with data). as GFI and AGFI approaches 1, model has a good fit with the observed data.

RMSEA is root mean square error of approximation. This criterion has been defined as difference value for each degree of freedom. RMSEA value, which is actually the very deviation test of each degree of freedom, is less than 0.50 for models which have a good fit. Values up to 0.80 indicate reasonable error for approximation in population. Models whose RMSEAs are 1.0 or higher have weak fitting. Other indices have been stated along with complete name:

NFI=(normal fit index)

NNFI=(non-normed fit index)

CFI= (comparative Fit index)

RMSEA=root mean square error of approximation

One-variable regression test was used to investigate research hypotheses and the results have been summarized in the following table:

Table 3. Research hypotheses test

row		Observed F	p-value	Beta	R <sup>2</sup>
1	Regression of IT on leadership	72.172	0.000	0.399	0.159
2	Regression of IT on policies and strategies	67.76	0.000	0.389	0.151
3	Regression of IT on staff component	73.418	0.000	0.402	0.162
4	Regression of IT on partnerships and resources	68.96	0.000	0.391	0.153
5	Regression of IT on processes component	73.094	0.000	0.401	0.161
6	Regression of IT on staff results component	65.935	0.000	0.384	0.148
7	Regression of IT on customers' results component	70.575	0.000	0.395	0.156
8	Regression of IT on society results component	76.001	0.000	0.408	0.166
9	Regression of IT on key performance results	69.495	0.000	0.393	0.154

In the first row, the observed F value is equal to 172.72 and research question is verified in significance level 0.000 with 95% of certainty. Therefore, relationship between the two variables is verified because p-Value is less than 0.50. in other words, IT influences on leadership. Beta coefficient is equal to 0.399 and shows that increase in IT cause an increase in leadership. Results showed that 9.15 of the dependent variable variance (leadership) is predicted by the independent variable (IT).

In the second row, the observed F value is equal to 76.67 and research question is verified in significance level 0.000 with 95% of certainty. Therefore, relationship between the two variables is verified because p-Value is less than 0.50. in other words, IT influences on strategy and policies. Beta coefficient is equal to 0.389 and shows that increase in IT cause an increase in strategy and policies. Results showed that 15.1 of the dependent variable variance (strategy and policies) are predicted by the independent variable (IT).

In the third row, the observed F value is equal to 73.418 and research question is verified in significance level 0.000 with 95% of certainty. Therefore, relationship between the two variables is verified because p-Value is less than 0.50. in other words, IT influences on employees. Beta coefficient is equal to 0.402 and shows that increase in IT cause an increase in employees. Results showed that 16.2% of the dependent variable variance (employees) is predicted by the independent variable (IT).

In the fourth row, the observed F value is equal to 68.96 and research question is verified in significance level 0.000 with 95% of certainty. Therefore, relationship between the two variables is verified because p-Value is less than 0.50. in other words, IT influences on companies and resources. Beta coefficient is equal to 0.391 and shows that increase in IT cause an increase in companies and resources. Results showed that 15.3% of the dependent variable variance (companies and resources) is predicted by the independent variable (IT).

In the fifth row, the observed F value is equal to 73.490 and research question is verified in significance level 0.000 with 95% of certainty. Therefore, relationship between the two variables is verified because p-Value is less than 0.50. in other words, IT influences on processes. Beta coefficient is equal to 0.401 and shows that increase in IT cause an increase in processes. Results showed that 16.1% of the dependent variable variance (processes) is predicted by the independent variable (IT).

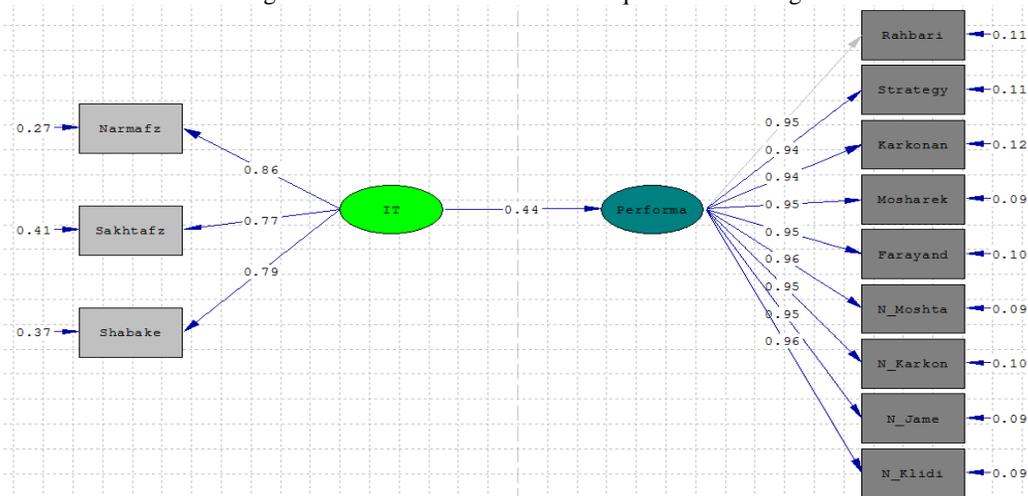
In the sixth row, the observed F value is equal to 65.539 and research question is verified in significance level 0.000 with 95% of certainty. Therefore, relationship between the two variables is verified because p-Value is less than 0.50. in other words, IT influences on staff results. Beta coefficient is equal to 0.384 and shows that increase in IT cause an increase in staff results. Results showed that 14.8% of the dependent variable variance (employees' variance) is predicted by the independent variable (IT).

In the seventh row, the observed F value is equal to 70.575 and research question is verified in significance level 0.000 with 95% of certainty. Therefore, relationship between the two variables is verified because p-Value is less than 0.50. in other words, IT influences on customers' results. Beta coefficient is equal to 0.395 and shows that increase in IT cause an increase in employees. Results showed that 15.6% of the dependent variable variance (customers' results) is predicted by the independent variable (IT).

In the eighth row, the observed F value is equal to 76.100 and research question is verified in significance level 0.000 with 95% of certainty. Therefore, relationship between the two variables is verified because p-Value is less than 0.50. in other words, IT influences on society results. Beta coefficient is equal to 0.408 and shows that increase in IT cause an increase in society results. Results showed that 16.6% of the dependent variable variance (society results) is predicted by the independent variable (IT).

In the ninth row, the observed F value is equal to 69.594 and research question is verified in significance level 0.000 with 95% of certainty. Therefore, relationship between the two variables is verified because p-Value is less than 0.50. in other words, IT influences on key results of performance. Beta coefficient is equal to 0.393 and shows that increase in IT cause an increase in key results of performance. Results showed that 15.4% of the dependent variable variance (key results of performance) is predicted by the independent variable (IT).

Figure 1. Research model structural equations modeling



Other variables of the final model have been presented in table 4.

Table 4. Final model values

Relationships between concepts and indices in the model	Estimation value	Standardized value	Standard error	T value	Predicted variance value (R <sup>2</sup> )	Significance level	Result
1. IT has influence on organizational performance through EFQM model in Tehran Telecommunications company	0.44	0.44	0.350	8.22	0.19	P<0.01	Hypothesis verified

Values of standard estimation of factor loadings which have been calculated through maximum likelihood method have been presented in figure 5-4. These values which are called  $\lambda$  are used in SEM analysis in order to estimate latent variables points and these values must be compared. Furthermore, standard estimation error values indicate error level in raw estimation of factor loadings and smaller values (close to zero) show more exact estimations and smaller certainty interval.

T values which are obtained by means of division of factor loading estimation on standard error show the significance of factor loading significance (significance difference with factor loading with zero). T values in 1.96-3 indicate significance with more than 95% certainty among latent variables. T value is equal to or greater than 3 show significance effects with more than 99% of certainty among latent variables. Therefore, as it can be observed in T table column, the variables influences on each other were verified with more than 99% of certainty. Moreover, significance level columns and complementary results have been presented.

As a result, predicted variance column indicates the explained variance value of relationships among latent variables. Higher values up to one show the greater correspondence of relationships among research variables. It must be mentioned that this value has direct influence on other variables.

**Results obtained from performance evaluation of the organization based on EFQM model**

Table 5. EFQM model criteria point

row	criteria	Received point	Ideal point	Relative point
1	leadership	57	100	57%
2	Strategy and policies	47	80	59%
3	staff	48	90	54%
4	Business partnerships and resources	45	90	50%
5	processes	84	140	60%
6	Customer results	98	200	49%
7	Staff results	42	90	47%
8	Society results	30	60	51%
9	Key performance results	78	150	52%
10	sum	529	1000	53%

As it can be observed in the table above, the criteria received the following values out of total values: leadership criterion received 57 points out of 100 points (57% of total point), strategy and policies received 47 points out of 80 points (59% of total points), employees received 48 points out of 90 points and 54% of total point, resources and business partnerships received 45 points out of 90 points (50% of total points), processes received 84 points out of 140 points (60% of total points), customer's results received 98 points out of 200 points (49% of total points), society results received 30 points out of 60 points (51% of total points), performance key results received 78 points out of 150 points. Totally, Tehran Telecommunications Company received the point 529 after collecting respondents' answers to EFQM questionnaires which equals 53% of total point.

**RESEARCH RESULTS**

The most important result of this research is that IT has relationship with EFQM model criteria. Items which achieved the most point can be regarded as strengths and items which achieved the least point can be regarded as points which can be improved. As it can be seen in table 5-16, "processes" item has the greatest percentage (60%-strengths) and staff results has the smallest percentage (47%-improvable areas). Furthermore, the following items can be referred to as improvable points and strengths according to the results. Tehran Telecommunications Company is therefore advised to apply executive recommendations in order to improve its organizational performance. IT needs should be evaluated before application or purchase of new technologies. Before implementation or development of information systems or technologies, cost-benefit analysis must be conducted. Managers are advised to train (users, system experts, employees and supervisors) in order to familiarize them with new technologies. Continuous improvement is advised to be implemented and case studies should be studied from other countries IT applications in organizations. Managers should have more understanding of EFQM model. Therefore, managers should have more participation and feasible presence in preparation and formulation of long-term strategies and goals. Necessary structure should be designed in order to help accept the model requirements. Goals and values of the company should be directed with all levels of strategy and designing so that employees become familiar with goals and plans of achieving organizational goals. Strategy and goals should be achievable and based upon real and certain information so that the company can have necessary ability to implement changes when necessary.

The company should coordinate employees' and organizational goals with each other using appropriate processes like performance evaluation and training. Delegation of power should be considered and they must be participated in continuous satisfaction. The company should update information related to suppliers, customers, processes, competitors and ... and provide it for individuals. The organization should use audits as a solution to improvement of its systems. The company is advised to gather customers' information to improve organizational performance. Employees' issues like absence, disease, attraction and employees' exit, early retirement, accidents, employees' complaints and ... should be measured and evaluated. Employees' opinions in different fields like work environment, hygiene, safety, job expectations, appraisal and rewarding, training and overall satisfaction should be considered. All activities and processes performances which are directly involved in a product or service production should be measured.

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