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ASSESSING EFFECTIVENESS OF COMMUNICATION CHANNELS FOR IMPROVING ORGANIZATIONAL COMMUNICATION (CASE STUDY: GAS COMPANY OF MAZANDARAN, IRAN)

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ABSTRACT

The present study was carried out to assess effectiveness of communication channels in Gas Company of Mazandaran (Iran). Statistical population includes all employees of Gas Company of Mazandaran including 449 persons and the sample includes 329 employees of this company. Based on library studies, effectiveness of communication channels was evaluated in terms of written communication, hierarchy, social presence, participation, customer-orientation, communication facilities, and computer-based communication. Before data analysis and hypothesis test, data normality was verified by Kolmogorov-Smirnov test; one-tailed t-test and Wilcoxon test were used for normal and abnormal data; respectively. Moreover, Friedman test was used to determine which communication channel in Gas Company of Mazandaran has the highest effectiveness. Results indicated that effectiveness of written communication, hierarchy, social presence, computer-based communication and participation is higher than average value; and that of customer-orientation and communication facilities is average.

Keywords: *Communication, Communication Channels, Effectiveness*

INTRODUCTION

An issue affecting efficiency of organizational communication system is the role of communication channels and their effects on communication system and hence, employees' job satisfaction (Hamilton, 1996). Presence of effective and accurate communication within the organization has been always considered as an important component of management success. It is well documented that without an accurate communication inside the organization, workflow is interrupted. Without an effective communication system, coordination, planning, organizing, control and other managerial duties are not realized and indeed the organization can't be managed (Alvani, 2009). In fact, communication is the way of information exchange. Regarding growing importance of information in various product and service organizations, the importance of communication is revealed. Bawlas and Bart (1951) stated that "it is not surprising to say that effectiveness of organization in terms of achieving its goal is closely related to effectiveness of its communication system. Success of every organization depends on coordination and attempts of all employees, managers should rely on quality, magnitude and volume of information toward decision making and concluding (Tseng *et al.*, 2005). Communication plays vital role in all social behaviors of human beings. Socially, people can't communicate to each other unless via common symbols (Linell, 1999). Therefore, the cause of many individual, organizational and social problems can be sought in lack of effective communication, the role of communicational system or communication misinterpretations, thus it can be said that effective communication is important for managers due to following reasons:

- a) Communication is a process by which planning, organizing, leadership and direction and control of management are performed.
- b) Communication is an activity adopted by managers to coordinate and proportionate their time (Seyyed, 2007).

Thus the present study was conducted to assess effectiveness of communication channels in Gas Company of Mazandaran seeking the following goals:

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- 1- Assessing effectiveness of communication channels in Gas Company of Mazandaran
- 2- Identifying communication channels in Gas Company of Mazandaran that are of high effectiveness
- 3- Proposing approaches for improving communication channels with low effectiveness

Literature Review

According to Farhangi (2004), organizational communication- although a new course in the field of human science- is growing fast and has gained attention of scholars of behavioral and organizational science, so that it has analyzed many organizational problems and solved them. Some scholars of organizational communication studying inefficiency of the organizations as management advisors believe that many organizational problems rise from inappropriate communication context and ignoring subtle issues in organizational communication; if the managers were aware of these issues, they could have performed their duties more effectively. Katz and Kahn (1978) stated that communication constitutes spirit and basis of social system of organization via exchanging the information and conveying the message. Hovland *et al.*, (1953) maintained that communication is a process in which an individual (transmitter) delivers some derivers (typically vocal) to alter behavior of the other party (obeying). According to Weaver (1949), communication includes all methods by which an individual can affect the mind of the other one. Effective organizational communication is composed of formal and informal communication channels. Formal communication channel reflects formal structure of an organization and is closely related to organizational hierarchy. Many big organizations implement very formal bureaucratic or traditional communication channels; these organizations make their employees to use these channels for establishing organizational communication (Catchings, 2004). Considering organizational communication and employees' relations goes back to 1927 when Retlisberger and Dickson conducted studies in the field of work relationships between boss and subordinate in Western Electric factories. Later other authors such as Reding (1972), Goldhiber *et al.*, (1978), Joblin (1985) and Kelly (1982) carried out some investigations in this field and proposed valuable theories. These studies were mainly concentrated on the way of organizational communication, employees' satisfaction and organizational performance. Some scholars including Herun (1942) and PIgures (1949) studied organizational communication in broad sense and investigate the relationship between supervisor and sub-ordinate as a shared process. Katz and Kahn (1986) and Bulding (1975) emphasized the necessity for further study on organizational communication and Jublin (1982) objected of ignoring this issue. Carl (1978) stated that "undoubtedly inappropriate communication system can promote the probability of conflict and struggle among the employees". Moorhed and Griffin (2001) emphasized the importance of communication for creating the framework necessary for employees' participation in information, the most important of which is information related to organizational goals and inspires in the person the direction sought by the organization. On the other hand, communication directs the employees to do their duties. Communication and its exchange are required for assessing solutions, operating the decisions and controlling and evaluating the results (Moorhed and Griffin, 2001).

Conceptual Framework of the Research

Following criteria were used to assess effectiveness of communication channels. Miller (1997) analyzed communication channels based on classic, human relations, human resource, comprehensive quality management and technology approaches. We assessed effectiveness of communication channels in Gas Company of Mazandaran and assigned the following components for these criteria (dimensions).

- Classic approach (dimension): includes written communication and hierarchy components (Taylor, 1991; Fayul, 1949; Weber, 1920)
- Human relations approach (dimension): includes social presence (Short *et al.*, 1978)
- Human resource approach (dimension): includes participation component (Likert *et al.*, 1967; Ouchi, 1981; Organizational Excellence Model, 2011)
- Comprehensive quality management approach (dimension): includes customer-orientation (Deming, 1982; Organizational Excellence Model, 2011)
- Technology approach (dimension): includes computer-based communication and communication facilities (Hubber, 1990).

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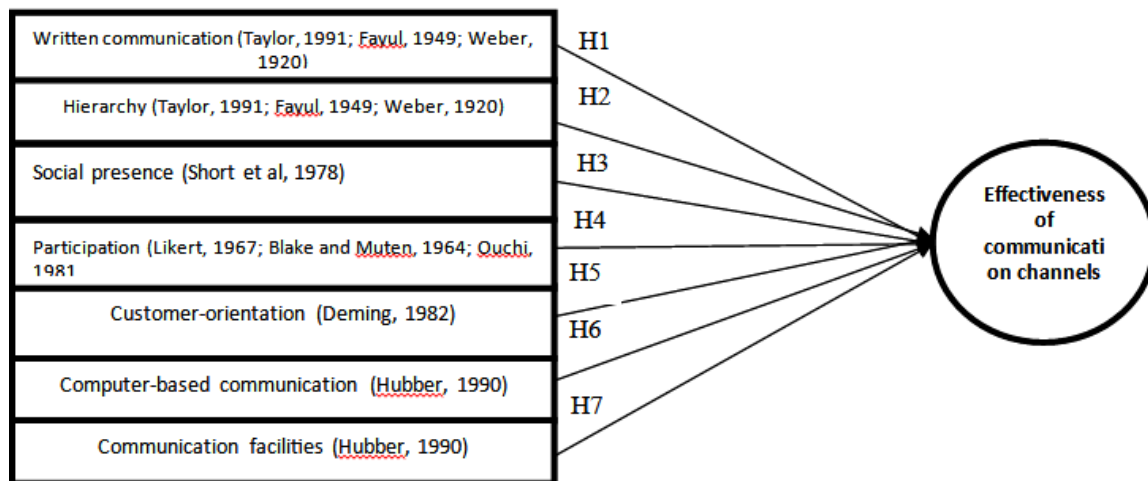


Figure 1: Conceptual model of the research

MATERIALS AND METHODS

Methodology

1- Methodology: regarding its goal this is an applied study and considering data collection method, this is a descriptive survey.

2. Data collection: data were collected by questionnaire. Questionnaire of communication channels was composed of 24 items set as closed-response questions. Validity of questionnaire was evaluated by content validity determined by experts. In this step, items were corrected and revised based on experts' and university professors and it was ensured that the questionnaire assess the properties sought by the author. Questionnaire reliability was determined by Cronbach's alpha using SPSS software, as presented in table 1.

Table 1: Reliability of questions for each component (criterion)

Alpha value	Criterion	Questions	Row
0.82	Written communication	1-2-3-4-5-6-7-8	1
0.86	Hierarchy	9-10	2
0.87	Social presence	11-12	3
0.77	Participation	13-14-15	4
0.84	Customer-orientation	16-17-18-19	5
0.72	Computer-based communication	20-21-22	6
0.65	Communication facilities	23-24	7
0.91	24	Total	8

Statistical population, sampling procedure and size: Statistical population includes all employees of Gas Company of Mazandaran including 449 persons. Stratified sampling method was used in this research.

The sample was adopted from the population including all employees of exploitation department, financial and support department, engineering and project execution department, independent units including planning, general relationship, contracts, guard, HSE, legal and technical inspection. Sample size was determined by Kohan, Morgan and Kerjsi table.

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Table 2: Population and sample size

Sample number	Relative contribution of employees in the population	Employees number	Department
148	53%	242	Exploiting
66	17.4%	80	Financial and support
63	16.3%	75	Engineering and project execution
52	13.3%	62	Independent units

Data Analysis

For hypothesis tests, one-tailed one sample t-test, one-tailed Wilcoxon test, and path analysis were used.

Table 4: Descriptive evaluation of criteria of communication channels effectiveness

The value	highest	The lowest	Standard deviation	Mean	Dimension
4.75		1.88	0.623	3.42	Written communication
5.00		1.00	1.038	3.30	Hierarchy
5.00		1.00	0.909	3.22	Social presence
5.00		1.00	0.763	3.28	Participation
5.00		1.00	0.818	3.01	Customer-orientation
5.00		1.00	0.961	3.40	Computer-based communication
5.00		1.00	1.022	3.09	Communication facilities
4.50		1.96	0.574	3.28	Total

Before hypothesis test and statistical analyses, data normality should be investigated and then statistical tests are used to test the hypotheses. Data normality was assessed by Kolmogorov-Smirnov test.

Table 5: Evaluating data normality using Kolmogorov-Smirnov

Probability value	Statistic value	Dimension
0.465	0.850	Written communication
0.001	1.933	Hierarchy
0.001	1.996	Social presence
0.059	1.328	Participation
0.010	1.627	Customer-orientation
0.002	1.859	Computer-based communication
0.009	1.650	Communication facilities
0.578	0.780	Total

Hypothesis Test

1- Hypothesis one: written communication is effective as a communication channel in Gas Company of Mazandaran. Regarding normality of “written communication” variable, one-tailed one sample t-test was used.

Null hypothesis (H0): effectiveness of written communication, as a communication channel in Gas Company of Mazandaran, is at average level or lower.

Alternative hypothesis (H1): effectiveness of written communication, as a communication channel in Gas Company of Mazandaran, is higher than average.

According to table6, t-value was calculated as 8.559 and critical t-value of degree of freedom of 160 is 1.65 ($P < 0.05$). Since absolute value of calculated t is higher than critical t and probability (0.000) is lower than significance level (0.05); thus null hypothesis is rejected and effectiveness of written

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communication, as a communication channel in Gas Company of Mazandaran, is higher than average. Moreover, mean score of written communication is 3.42 which is higher than theoretical mean of the test (3); again suggesting that effectiveness of written communication, as a communication channel in Gas Company of Mazandaran, is higher than average.

Table 6: Evaluating effectiveness of written communication in Gas Company of Mazandaran

Significance level	Probability	Critical value	t- Degree of freedom	t value	Estimated mean
0.05	0.000	1.65	160	8.559	3.42

2- Hypothesis two: hierarchy is effective as a communication channel in Gas Company of Mazandaran. Regarding abnormality of “hierarchy” variable, one-tailed Wilcoxon test was used.

Null hypothesis (H0): effectiveness of hierarchy, as a communication channel in Gas Company of Mazandaran, is at average level or lower.

Alternative hypothesis (H1): effectiveness of hierarchy, as a communication channel in Gas Company of Mazandaran, is higher than average.

According to table7, Wilcoxon statistic value was calculated as 6255 and probability (0.000) is lower than significance level (0.05); thus null hypothesis is rejected and effectiveness of hierarchy, as a communication channel in Gas Company of Mazandaran, is higher than average.

Moreover, median score of hierarchy is 3.25 which is higher than theoretical median of the test (3); suggesting that effectiveness of hierarchy, as a communication channel in Gas Company of Mazandaran, is higher than average.

Table 7: Evaluating effectiveness of hierarchy in Gas Company of Mazandaran

Significance level	Probability	Wilcoxon statistic value	Estimated median
0.05	0.000	6255	3.25

3- Hypothesis three: social presence is effective as a communication channel in Gas Company of Mazandaran. Regarding abnormality of “social presence” variable, one-tailed Wilcoxon test was used.

Null hypothesis (H0): effectiveness of social presence, as a communication channel in Gas Company of Mazandaran, is at average level or lower.

Alternative hypothesis (H1): effectiveness of social presence, as a communication channel in Gas Company of Mazandaran, is higher than average.

According to table8, Wilcoxon statistic value was calculated as 5121 and probability (0.000) is lower than significance level (0.05); thus null hypothesis is rejected and it can be inferred that effectiveness of social presence, as a communication channel in Gas Company of Mazandaran, is higher than average level.

Moreover, median score of social presence is 3.25 which is higher than theoretical median of the test (3); suggesting that effectiveness of social presence, as a communication channel in Gas Company of Mazandaran, is higher than average.

Table 8: Evaluating effectiveness of social presence in Gas Company of Mazandaran

Significance level	Probability	Wilcoxon statistic value	Estimated median
0.05	0.001	5121	3.25

4- Hypothesis four: participation is effective as a communication channel in Gas Company of Mazandaran. Regarding normality of “participation” variable, one-tailed one sample t-test was used.

Null hypothesis (H0): effectiveness of participation, as a communication channel in Gas Company of Mazandaran, is at average level or lower.

Alternative hypothesis (H1): effectiveness of participation, as a communication channel in Gas Company of Mazandaran, is higher than average.

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According to table9, t-value was calculated as 8.680 and critical t-value of degree of freedom of 160 is 1.65 ($P < 0.05$). Since absolute value of calculated t is higher than critical t and probability (0.000) is lower than significance level (0.05); thus null hypothesis is rejected and it is inferred that effectiveness of participation, as a communication channel in Gas Company of Mazandaran, is higher than average. Moreover, mean score of participation is 3.28 which is higher than theoretical mean of the test (3); meaning that effectiveness of participation, as a communication channel in Gas Company of Mazandaran, is higher than average.

Table 9: Evaluating effectiveness of participation in Gas Company of Mazandaran

Significance level	Probability	Critical value	t- Degree freedom	of t value	Estimated mean
0.05	0.000	1.65	160	4.680	3.28

5- Hypothesis five: customer-orientation is effective as a communication channel in Gas Company of Mazandaran. Regarding abnormality of “customer-orientation” variable, one-tailed Wilcoxon test was used.

Null hypothesis (H_0): effectiveness of customer-orientation, as a communication channel in Gas Company of Mazandaran, is at average level or lower.

Alternative hypothesis (H_1): effectiveness of customer-orientation, as a communication channel in Gas Company of Mazandaran, is higher than average.

According to table 10, Wilcoxon statistic value was calculated as 4785 and since probability (0.335) is higher than significance level (0.05); thus null hypothesis is approved and it can be inferred that effectiveness of customer-orientation, as a communication channel in Gas Company of Mazandaran, is at average level or lower. Moreover, median score of customer-orientation is 3 which is regarded as to be higher than theoretical median of the test (3); suggesting that effectiveness of customer-orientation, as a communication channel in Gas Company of Mazandaran, is at average level.

Table 10: Evaluating effectiveness of customer-orientation in Gas Company of Mazandaran

Significance level	Probability	Wilcoxon statistic value	Estimated median
0.05	0.335	4785	3.00

6- Hypothesis six: computer-based communication is effective as a communication channel in Gas Company of Mazandaran. Regarding abnormality of “computer-based communication” variable, one-tailed Wilcoxon test was used.

Null hypothesis (H_0): effectiveness of computer-based communication, as a communication channel in Gas Company of Mazandaran, is at average level or lower.

Alternative hypothesis (H_1): effectiveness of computer-based communication, as a communication channel in Gas Company of Mazandaran, is higher than average.

According to table 11, Wilcoxon statistic value was calculated as 7857 and since probability (0.000) is lower than significance level (0.05); thus null hypothesis is rejected and it can be inferred that effectiveness of computer-based communication, as a communication channel in Gas Company of Mazandaran, is higher than average.

Moreover, median score of computer-based communication is 3.50 which is higher than theoretical median of the test (3); suggesting that effectiveness of computer-based communication, as a communication channel in Gas Company of Mazandaran, is higher than average.

Table 11: Evaluating effectiveness of computer-based communication in Gas Company of Mazandaran

Significance level	Probability	Wilcoxon statistic value	Estimated median
0.05	0.000	7857	3.50

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7- Hypothesis seven: “communication facilities” is effective as a communication channel in Gas Company of Mazandaran. Regarding abnormality of “communication facilities” variable, one-tailed Wilcoxon test was used.

Null hypothesis (H0): effectiveness of communication facilities, as a communication channel in Gas Company of Mazandaran, is at average level or lower.

Alternative hypothesis (H1): effectiveness of communication facilities, as a communication channel in Gas Company of Mazandaran, is higher than average.

According to table 12, Wilcoxon statistic value was calculated as 5317 and since probability (0.102) is higher than significance level (0.05); thus null hypothesis is approved and it can be inferred that effectiveness of communication facilities, as a communication channel in Gas Company of Mazandaran, is at average level or lower. Moreover, median score of communication facilities is 3 which is regarded as to be higher than theoretical median of the test (3); suggesting that effectiveness of communication facilities, as a communication channel in Gas Company of Mazandaran, is at average level.

Table 12: Evaluating effectiveness of communication facilities in Gas Company of Mazandaran

Significance level	Probability	Wilcoxon statistic value	Estimated median
0.05	0.102	5317	3.00

8- Hypothesis eight: communication channels in Gas Company of Mazandaran are effective. Regarding normality of “communication channels” variable, one-tailed one sample t-test was used.

Null hypothesis (H0): effectiveness of communication channels in Gas Company of Mazandaran is at average level or lower.

Alternative hypothesis (H1): effectiveness of communication channels in Gas Company of Mazandaran, is higher than average.

According to table 13, t-value was calculated as 6.194 and critical t-value of degree of freedom of 160 is 1.65 ($P < 0.05$). Since absolute value of calculated t is higher than critical t and probability (0.000) is lower than significance level (0.05); thus null hypothesis is rejected and it is inferred that effectiveness of communication channels in Gas Company of Mazandaran is higher than average. Moreover, mean score of communication channels is 3.28 which is higher than theoretical mean of the test (3); meaning that effectiveness of communication channels in Gas Company of Mazandaran is higher than average.

Table 13: Evaluating effectiveness of communication channels in Gas Company of Mazandaran

Significance level	Probability	Critical value	t- Degree of freedom	of t value	Estimated mean
0.05	0.000	1.65	160	6.194	3.28

Then, it was tried to find out which communication channels has higher effectiveness. This was accomplished by Friedman test.

Null hypothesis: there is no prioritization in effectiveness of communication channels.

Alternative hypothesis: there is prioritization in effectiveness of communication channels.

Table 14: Comparing effectiveness of communication channels

Probability	Critical chi square	Degree of freedom	Calculated chi square	Number
0.000	12.591	6	43.848	161

According to table 14, calculated chi square (43.848) is higher than critical chi square (12.591) with degree of freedom of 6 ($p < 0.05$), and probability value (0.000) is lower than significance level (0.05). Thus null hypothesis is rejected and it can be aid that there is prioritization in effectiveness of communication channels.

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Table 15: Prioritization of communication channels based on effectiveness rate in Gas Company of Mazandaran

Average rate	Communication channels	Priority
4.43	Written communication	1
4.40	Computer-based communication	2
4.30	Hierarchy	3
4.07	Participation	4
3.98	Social presence	5
3.59	Communication facilities	6
3.24	Customer-orientation	7

Structural Equation Model (SEM)

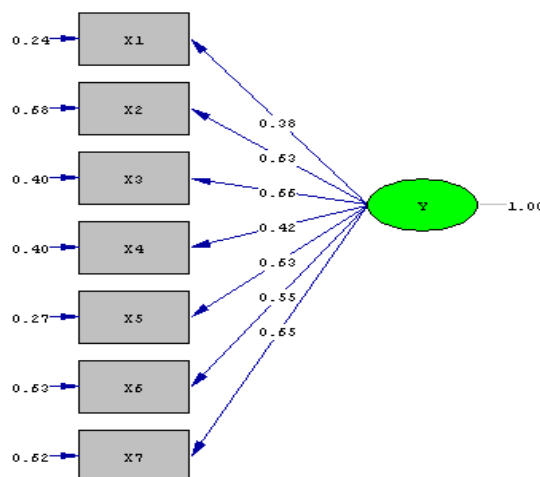
Path analysis of the research variables was performed using LISREL software. At first, a general path analysis was conducted and then, the following questions were investigated among the dimensions.

Standard beta coefficients of communication channels

Standard beta coefficient	Dimension	Row
0.38	Written communication	1
0.63	Hierarchy	2
0.66	Social presence	3
0.42	Participation	4
0.63	Customer-orientation	5
0.55	Computer-based communication	6
0.65	Communication facilities	7

Coefficients of determination of communication channels

Coefficient of determination	Dimension	Row
0.38	Written communication	1
0.37	Hierarchy	2
0.52	Social presence	3
0.31	Participation	4
0.60	Customer-orientation	5
0.32	Computer-based communication	6
0.40	Communication facilities	7



Chi-Square=34.58, df=14, P-value=0.00170, RMSEA=0.096

Graph 1: Estimation of standard beta coefficients of the model

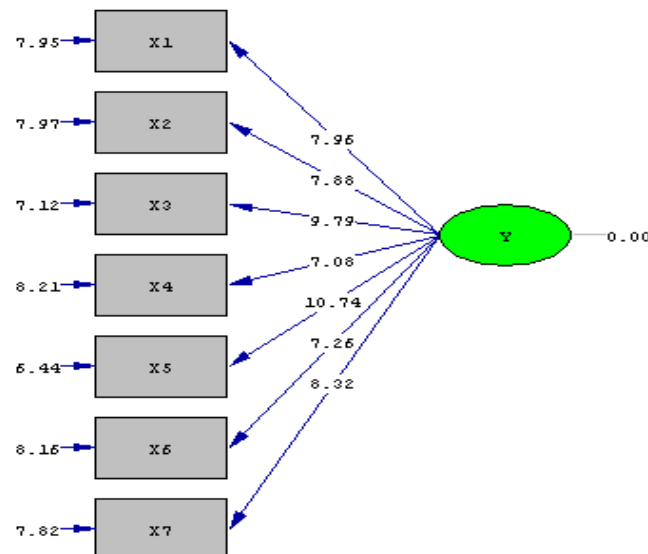
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The values presented on the arrows are estimated standard beta coefficients and the values presented in outer part of the figure represent calculation errors of beta coefficients. Some indices of model fitness are expressed as legend in the lower part of the figure.

Table 16: t-test values corresponding to components of communication channels

t-values of beta coefficients	Dimension	Row
7.96	Written communication	1
7.88	Hierarchy	2
9.79	Social presence	3
7.08	Participation	4
10.74	Customer-orientation	5
7.26	Computer-based communication	6
8.32	Communication facilities	7

The values presented in table 16 try to show if the beta coefficients are significant or not. This was investigated using t-test and the values in the table indicate that all the tests were significant.



Chi-Square=34.58, df=14, P-value=0.00170, RMSEA=0.096

Graph 2: Estimation of t-test coefficients of the model

The values expressed on the arrows are calculated t values and the numbers presented in outer part of the figure indicate t-values of calculation errors.

Table 17: Estimation of model indices

Value	Indices
34.58	Chi square statistic
14	Degree of freedom
2.47	Chi square to degree of freedom ratio
0.0017	P-value
0.096	The Root Mean Square Error of Approximation (RMSEA)
0.96	comparative fit index (CFI)
0.91	Relative fit index (RFI)
0.94	Goodness of fitness index (GFI)

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As can be seen from table 17, chi square value is estimated as 34.58 and degree of freedom is 14; thus the ratio between chi square and degree of freedom is 2.47. Since this index is lower than 3; thus the fitness of the model is good. Moreover, probability value (0.0017) is lower than 0.05. RMSEA index was calculated as 0.096 which is lower than 0.1; showing that model fitness is at average level. Comparative fit index (CFI), relative fit index (RFI) and goodness of fitness index (GFI) were 0.96, 0.91, and 0.94; respectively. In general, it can be said that the model is well fitted. Then, path analysis among the questions in various dimensions of communication channels was performed.

Table 18: Coefficients of determination of the questions for each component of communication channels

Questi on8	Questi on7	Questi on6	Questi on5	Questi on4	Questi on3	Questi on2	Questi on1	Dimension	Row
0.22	0.35	0.30	0.25	0.38	0.39	0.30	0.21	Written communication	1
						0.70	0.56	Hierarchy	2
						0.50	0.79	Social presence	3
					0.22	0.57	0.53	Participation	4
				0.70	0.76	0.70	0.52	Customer-orientation	5
					0.72	0.50	0.44	Computer-based communication	6
						0.52	0.63	Communication facilities	7

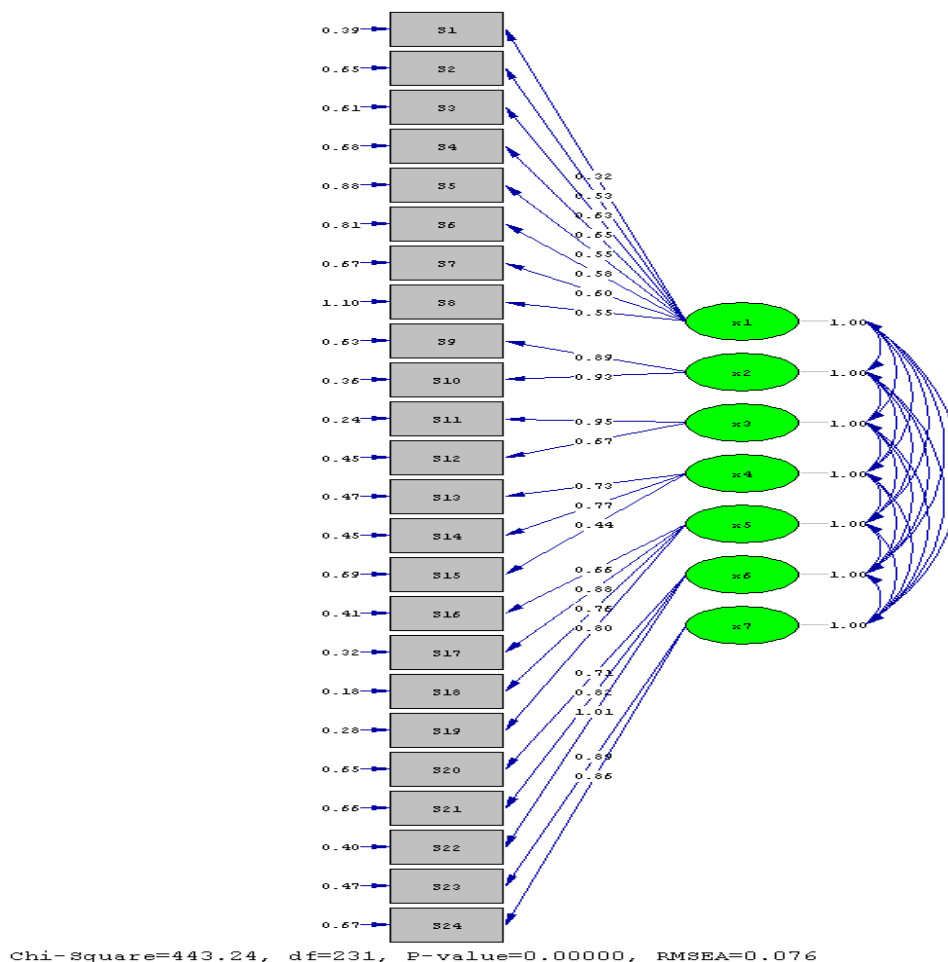
Coefficient of determination (R^2) of each question in each communication channel is presented in table 18.

Table 19: Standard beta coefficients of the questions for each component of communication channels

Questi on8	Questi on7	Questi on6	Questi on5	Questi on4	Questi on3	Questi on2	Questi on1	Dimension	Row
0.55	0.60	0.58	0.55	0.65	0.63	0.53	0.32	Written communication	1
						0.93	0.89	Hierarchy	2
						0.67	0.95	Social presence	3
					0.44	0.77	0.73	Participation	4
				0.80	0.76	0.88	0.66	Customer-orientation	5
					1.01	0.82	0.71	Computer-based communication	6
						0.86	0.89	Communication facilities	7

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The values of beta coefficient are presented in table 19.



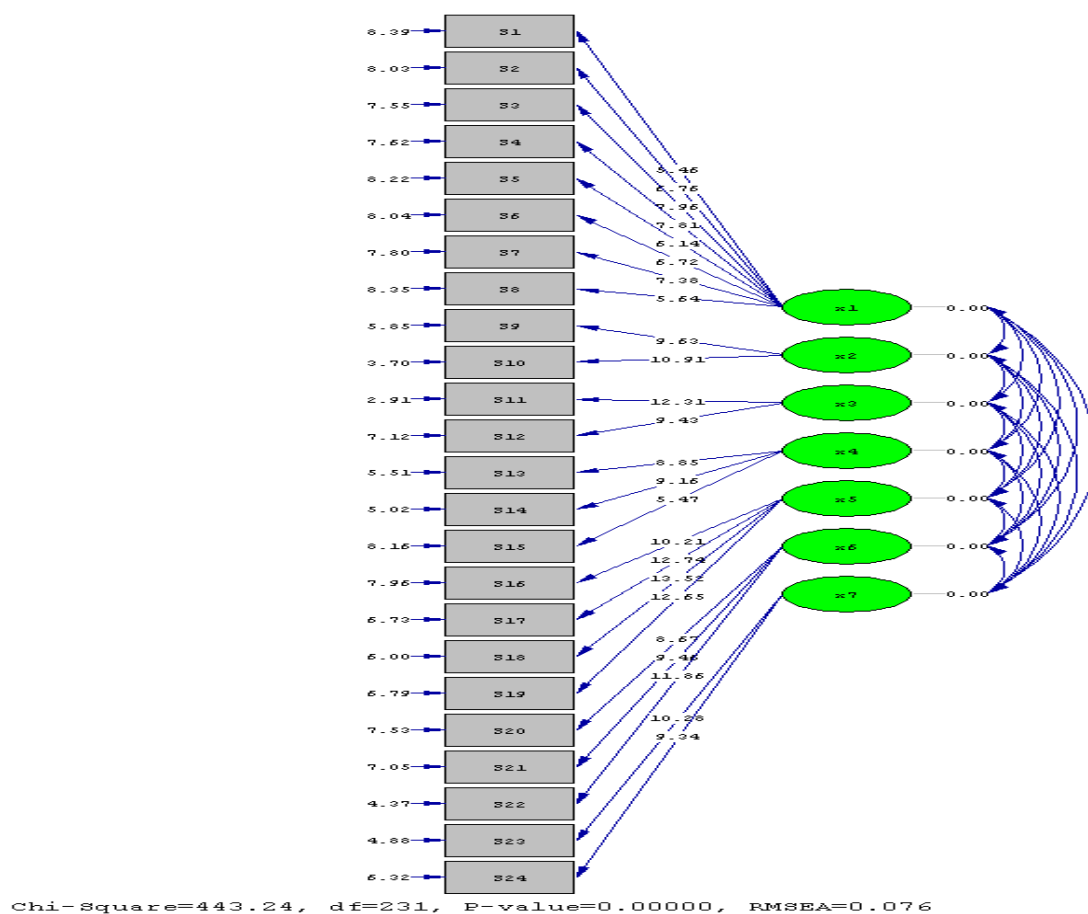
Graph 3: Estimation of standard beta coefficients of the model

Table 20: t-values of the questions for each component of communication channels

Questi on8	Questi on7	Questi on6	Questi on5	Questi on4	Questi on3	Questi on2	Questi on1	Dimension	Row
5.64	7.38	6.72	6.14	7.81	7.96	6.76	5.46	Written communication	1
						10.91	9.63	Hierarchy	2
						9.43	12.31	Social presence	3
					5.47	9.16	8.85	Participation	4
				12.65	13.52	12.74	10.21	Customer-orientation	5
					11.86	9.46	8.67	Computer-based communication	6
						9.34	10.58	Communication facilities	7

The values in table 20 indicate if beta coefficients are significant or not. This was investigated using t-test ($p < 0.05$) and the results of the table show that all the tests were significant.

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Graph 4: Estimation of t-test coefficients of the model

The values written on the arrows are calculated t values and the values written in outer part of the figure show t-value of calculation errors.

Table 21: Estimation of model indices

Value	Indices
443.24	Chi square statistic
231	Degree of freedom
1.918	Chi square to degree of freedom ratio
0.000	P-value
0.076	The Root Mean Square Error of Approximation (RMSEA)
0.94	comparative fit index (CFI)
0.86	Relative fit index (RFI)
0.81	Goodness of fitness index (GFI)

As can be seen from table 21, chi square value is estimated as 443.24 and degree of freedom is 231; thus the ratio between chi square and degree of freedom is 1.918. Since this index is lower than 3; thus the fitness of the model is good.

Moreover, probability value (0.000) is lower than 0.05. RMSEA index was calculated as 0.076 which is lower than 0.8; showing that model fitness is good. Comparative fit index (CFI), relative fit index (RFI) and goodness of fitness index (GFI) were 0.94, 0.86, and 0.81; respectively. In general, it can be said that the model of path analysis is well fitted.

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RESULTS AND DISCUSSION

Results

1- Results of sub-hypothesis 1: average value of written communication was calculated as 3.42, which is higher than theoretical mean value of the test (3). This finding shows that effectiveness of written communication, as a communication channel in Gas Company of Mazandaran, is higher than average.

2- Results of sub-hypothesis 2: average value of hierarchy was calculated as 3.25, which is higher than theoretical mean value of the test (3). This finding shows that effectiveness of hierarchy, as a communication channel in Gas Company of Mazandaran, is higher than average.

3- Results of sub-hypothesis 3: average value of social presence was calculated as 3.25, which is higher than theoretical mean value of the test (3). This finding shows that effectiveness of social presence, as a communication channel in Gas Company of Mazandaran, is higher than average.

4- Results of sub-hypothesis 4: average value of participation was calculated as 3.28, which is higher than theoretical mean value of the test (3). This finding shows that effectiveness of participation, as a communication channel in Gas Company of Mazandaran, is higher than average.

5- Results of sub-hypothesis 5: average value of customer-orientation was equal to theoretical mean value of the test (3). This finding shows that effectiveness of customer-orientation, as a communication channel in Gas Company of Mazandaran, is at average level.

6- Results of sub-hypothesis 6: average value of computer-based communication was calculated as 3.50, which is higher than theoretical mean value of the test (3). This finding shows that effectiveness of computer-based communication, as a communication channel in Gas Company of Mazandaran, is higher than average.

7- Results of sub-hypothesis 7: average value of communication facilities was equal to theoretical mean value of the test (3). This finding shows that effectiveness of communication facilities, as a communication channel in Gas Company of Mazandaran, is average.

8- Results of the main hypothesis: average value of communication channels was calculated as 3.28, which is higher than theoretical mean value of the test (3). This finding shows that effectiveness of communication channels in Gas Company of Mazandaran is higher than average.

9- Results of Friedman test: Friedman test was performed to determine which communication channel in Gas Company of Mazandaran has higher effectiveness. Results of this test indicated that there is prioritization among the communication channels; so that some channels such as written communication, computer-based communication, hierarchy and participation have the highest priority. In the other words, these channels have the higher effectiveness in Gas Company of Mazandaran.

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