Int. J. Nonlinear Anal. Appl. In Press, 1–17
ISSN: 2008-6822 (electronic)
http://dx.doi.org/10.22075/ijnaa.2023.32203.4782

Identification and leveling of factors influencing the performance of organizational performance in Iran Telecommunication Company using the FAHP Mikhailov VISM method

Ardeshir Rezaei[a], Mostafa Hajiaghaei Keshteli[a,*], Saber Mola Alizadeh Zavardeh[a], Belgheis Bavarsad[b], Majid Nili Ahmad Abadid[c]

[a]*Department of Industrial Management, Masjed Soleyman Branch, Islamic Azad University, Masjed Soleyman, Iran*

[b]*Department of Industrial Management, Shahid Chamran University of Ahvaz, Ahvaz, Iran*

[c]*Department of Management, Qom University, Qom, Iran*

(Communicated by Mohammad Rasoul Velayati)

Abstract

The purpose of this research is to identify effective factors in the evaluation of organizational performance in Iran Telecommunication Company using the fuzzy hierarchical analysis method of Mikhailov along with interpretive structural modeling. First, by studying the literature and research history, more than 14 general factors affecting the evaluation of organizational performance were identified, which were identified using a questionnaire and based on the opinions of 22 experts, among them 9 factors with a total of about 90% of the opinions that have the most importance in influencing were determined to be considered for leveling. The leveling of these factors in terms of importance was based on the FAHP method and the ISM method. Due to the use of Mikhailov's fuzzy hierarchical analysis method along with interpretive structural modeling to identify and stratify the influencing factors on the evaluation of organizational performance, this research is considered an innovative model for studying the evaluation of organizational performance. According to the findings of the review of the above factors, which was based on ISM, the "public environment" factor has gained the most importance, and this factor, along with the "strategy" factors, as well as "processes and methods" and "interactive environment" as basic factors in The final research model was determined.

Keywords: organizational performance evaluation, telecommunications company, nonlinear equations, FAHP method, ISM
2020 MSC: 65H20, 68V30, 62P30

*Corresponding author
Email addresses: ardeshirrezaei@yahoo.com (Ardeshir Rezaei), mostafahaji@gmail.com (Mostafa Hajiaghaei Keshteli), saber-alizadeh@gmail.com (Saber Mola Alizadeh Zavardeh), bita40@outlook.com (Belgheis Bavarsad), nili2536@gmail.com (Majid Nili Ahmad Abadid)

Received: August 2023 *Accepted:* November 2023

Introduction

Organizations that provide public services as a necessity must improve the internal and external processes of their organization in all areas, and the managers of these organizations are forced to monitor their processes and activities specifically and continuously in order to make optimal use of their capabilities and resources. to plan and manage the future of their organization while benefiting from the obtained results and having the potential capacities. Organizational requirements and, on the other hand, the responsibility towards society's sensitivity and attitude, forces the managers of these organizations to look for effective methods for improvement and promotion by establishing an efficient performance evaluation system in their management dashboard.

The establishment of an optimal model first of all requires the identification and understanding of the environmental factors of the organization and the recognition of the effectiveness of this set of factors. In the dynamic and ever-changing environment of today's world, especially in an organization that is in charge of advanced services such as telecommunications at the country level, it is necessary to use strategies and approaches that fulfill their mission in the face of these changes and achieve the expected results. Therefore, organizations should be able to design a logical model to measure and control their performance according to the conditions and help to achieve their goals by implementing it. With this attitude, evaluating organizational performance is not a goal but a strategic necessity. A necessity that prevents the wastage of resources by reviewing and modifying the organizational processes and systems by identifying the influencing factors and ultimately facilitates the achievement of the ideal goals of the organization.

Although many researches have been done in the country and abroad regarding the design and implementation of organizational performance evaluation, but in the field of identifying obstacles and factors affecting this approach, there have not been enough studies and from this point of view, the present article by taking a step in this The path and application of fuzzy hierarchical analysis is considered innovative. It is necessary to keep in mind that a dynamic organization whose audience is members of the society should identify the effective factors in the efficiency of its performance evaluation system at the same time as having new technologies, in order to be able to consciously identify the obstacles to the inefficiency of this effective approach. and identify a strategy and then be able to take steps to formulate and implement it. For this reason, this research aims at an identitological interpretation of the basic influencing factors in the design of an effective organizational performance evaluation model in Iran's telecommunications company.

Theoretical

Performance control and measurement systems are considered key tools for managers in the realization of organizational strategies and plans, because they help to create a balance between profitability, development and control of performance, expectations, opportunities and competition with others and lead to optimal use. It is one of the potential capacities of the organization. However, in a society-oriented organization whose ultimate goal is to provide public service and satisfy society, even despite its private nature, paying attention to performance evaluation and control systems is highly sensitive, and neglecting this category can have wide consequences in The community level should follow. Of course, it will not be acceptable to accept the fact that in some public organizations there is no comprehensive and systematic approach to design and implementation of performance evaluation systems, or it is viewed superficially as an unwanted task. Definitely, the lack of such a comprehensive and comprehensive system will cause the success or failure of many organizational programs to be evaluated incorrectly. One of the factors of inefficiency of a performance measurement system in a society-oriented organizational system is the impossibility of effective communication with the factors around the organization and receiving appropriate feedback, and in today's world, where vast changes occur continuously in the environment, this lack of communication and adaptation is the beginning of the loss of public trust. And even the decline and death of the organization will be. Because of this desire for change and dynamism that exists in the essence of performance evaluation, the performance measurement and control system is considered one of the most fundamental management approaches in organizations providing public services, including Iran Telecommunication Company, and providing a suitable platform for the inclusive participation of stakeholders. In this process, it is the basis of quality improvement.

In measuring performance from the quality aspect, two points are emphasized:

1. Identifying the criteria by which the performance quality can be judged appropriately.
2. Providing a suitable evaluation model to analyze and evaluate factors affecting performance quality [1].

Experts state the objectives of performance evaluation in the public sector as follows:

a) Rationalize size, cost and tasks

b) Establishment of a more effective system in the field of financial accountability

c) Increasing transparency in the operations of organizations and public institutions

d) Improving skills through updating tasks, procedures and systems

e) Development of a realistic policy based on performance [36].

Normally, the establishment of performance evaluation in organizations, especially public organizations, is accompanied by considerations. When evaluating the performance, the statistics and figures of the organization's performance during a specific period are considered without paying attention to its various dimensions. Even sometimes, a faction with expediency dominates the evaluation process and results so much that they make the strong weak or the weak strong. This type of evaluation is called fake evaluation [50].

In a comprehensive research with the aim of investigating the evolution of performance evaluation in recent decades, Neely emphasized the need to update the measurement of performance evaluation indicators. Also, he addressed the ability to predict performance in the system and believes that the manager should, in addition to taking the necessary measures to monitor performance evaluation based on previous events, avoid a cross-sectional view and use the capabilities of the system to activate the performance management system measures for Development and foresight programs are used and with the help of statistical models, he can apply the necessary forecasts for better control [38]. Janet Taylor, by examining Australian public sector service organizations, showed that employees' understanding of the design of a poor performance measurement system, as well as managers' low commitment, can lead to a decrease in the performance of the organization's employees [52]. In a research that evaluated the performance of local government organizations in Ghana, and while pointing out the bottlenecks of performance evaluation, they confirmed the necessity of dynamic measurement systems according to the environmental conditions. Also, this research emphasizes the role of accountability in the performance evaluation system and believes that performance evaluation should have the ability to create added value [4]. In Jordan, in order to provide a road map for public universities, while paying attention to the necessity of implementing this mechanism, the success of its implementation depends on the desire and commitment of managers and employees to participate in the whole process [7]. In another research, the influence of organizational factors on the effectiveness of performance management systems in the public sector was investigated. The findings of this research show that the effectiveness of the performance management system depends on the involvement of senior management. Accordingly, public sector managers must ensure that they are fully committed and engaged in performance management tasks [53].

McGowan believes that in order to increase the productivity of the public sector, it is possible to consider the environmental domain, the organizational domain such as organizational structure, management style work relations and technology along with the individual domain such as incentives and educational development [37]. Since the performance of a large organization is effective on all social, economic and cultural sectors of society, for this reason, such organizations should define suitable performance indicators for themselves in accordance with the surrounding conditions and in the form of strategic plans. It means to create and operationalize methods to measure their progress in the direction of the vision and in achieving the set goals so that they can properly evaluate the efficiency and success in achieving the set goals according to their capacities. But at the same time, one-dimensional attention to environmental factors alone will not be effective, and in order for the performance evaluation system to succeed in achieving its goals, environmental and strategic factors must be taken into consideration along with the organization's structure, processes, functions, and relationships [14].

According to these factors and the complex relationships between them, interpretive structural modeling, which is an effective technique for analyzing the effects of one factor on another factor, can be effective in identifying the relationships between these factors. The investigation of this methodology is based on the order and direction of complex relationships. that there is a system among the factors and in this research, the interpretive structural modeling technique can be used by measuring these complex relationships two by two to identify and stratify and determine the conceptual relationships between the factors.

The distinctive feature of this research, compared to similar foreign and domestic researches, is the use of both qualitative and quantitative methods to identify the concept as well as the leveling of the basic influencing factors in the establishment of organizational performance evaluation. In addition to expressing the concept of organizational performance evaluation, this research presents the dimensions and factors affecting it using the structural-interpretive modeling method.

The questions raised in this research are as follows:

Table 1: Examples of the application of interpretative structural modeling technique in research literature

research fellow	Research topic
Yudatama et al [58]	Using the ISM interpretive structural model to determine the following main factors in the factors: benefits, risk mitigation, opportunities and barriers in the awareness of government governance in information technology.
Chauhana et al [16]	Using ISM and DEMATEL method to analyze the barriers of waste recycling process in India
Singh & Bhanot [48]	A DEMATEL-MMDE-ISM based approach to analyze the barriers to implementing IoT in the manufacturing industry
Sarhan et al [46]	Identifying a framework for implementing construction strategies using the ISM method in the Saudi construction industry
Singh & Gupta [49]	A framework for a sustainable maintenance system: MICMAC approach and ISM fuzzy TOPSIS
Zhang et al [59]	Identifying the influencing factors on decision-making for the development of green procurement using DEMATEL, Fuzzy and ISM methods
Gholami et al [22]	An ISM approach to analyzing barriers to improving academic processes to achieve sustainability in Malaysian higher education

1. What are the effective factors on evaluating organizational performance?
2. What are the most important factors affecting the evaluation of organizational performance in Iran Telecommunication Company?
3. What is the interactive model of factors influencing the evaluation of organizational performance in order to establish this approach?

Research Methodology

Definitions and theoretical concepts of research

Telecommunication Company of Iran

The organization is like a container whose shape, content and capacity should be appropriate to the container, and the container of the public organization originates from its public duties [18]. The scope of activity of an organization providing public services is very wide and diverse and includes information organizations, insurance organizations, water, electricity, gas, education, health, etc. Despite the fact that nearly two decades have passed since it was handed over to the private sector, Iran Telecommunication Company's customers and recipients of its services are members of the society, and for this reason, they face a large volume and variety of audiences and require the prudent use of resources and facilities to fulfill They are their role. As the first and largest telecommunication operator in the country, this company is responsible for providing and supporting telecommunication services as well as data exchange and any activity related to the field of communication and information technology in line with its mission. Article 44 of the Constitution was handed over to the private sector.

Evaluation of organizational performance

Performance evaluation is a process that helps organizational decision-making by selecting indicators, collecting and analyzing data, comparing information and presenting periodic reports [15]. It is a methodical review process that helps organizations achieve the set goals [60]. Performance evaluation in organizations is a process that can be used to evaluate organizations based on their goals and missions and measure their success in achieving goals or their deviation from goals [34]. Effective performance management is a continuous work that, while reviewing performance and exchanging feedback, establishes a direct relationship between the performance of employees and the organization, and strengthens and clarifies the participation of individuals in the affairs of the organization [2].

Evaluation of organizational performance not only as a strategic necessity for organizational improvement, but also in the sense of a systematic effort to know the effectiveness of public services in meeting the needs of the people and the ability of the trustees to fulfill them, and also as a systematic process of measuring and controlling performance based on scientific principles and foundations that It is considered to take place in the form of targeting and control of executive programs.

The evaluation of the performance of a large and comprehensive organization such as Iran Telecommunication Company is a reflection of the efficiency and effectiveness of that organization and a reflection of the correct performance of roles and missions related to the fulfillment of tasks and development programs and the improvement of the level of

enjoyment and satisfaction of people based on effective models. A model that is able to identify, monitor, judge and provide the necessary feedback for the improvement and promotion of the goals, processes, operations, the results of the implementation of programs and its diverse activities.

Fuzzy hierarchical analysis method of Mikhailov

Analysis Hierarchy Method (AHP) is one of the multi-criteria decision-making techniques, the most important of which is the ability to transform the hierarchical structure of a complex multi-criteria problem into an extended structure for a better understanding of the decision-making problem. Considering that this process is not able to properly reflect the human relativist way of thinking in the form of fixed numbers and the respondent should declare a range in his judgments rather than express his opinion definitely in the form of a fixed number, the necessity The formation and scope of application of FAHP fuzzy hierarchical analysis has increased [12].

1. Analytical Hierarchy Process

Saaty [45] developed a strong and helpful tool for managing qualitative and quantitative multi-criteria elements involving in decision-making behavior. This model is called Analytical Hierarchy Process (AHP) and is based on a hierarchical structure. This procedure occupied an assortment of options in the decision and capable to apply sensitivity analysis on the subsequent criteria and benchmarks. In addition, it makes judgments and calculations easy because of paired comparisons. Moreover, it demonstrates the compatibility and incompatibility decisions which is the recompense of multi criteria decision making [32]. Analytical Hierarchy Process is one of the most inclusive system is considered to make decisions with multiple criteria because this method gives to formulate the problem as a hierarchical and believe a mixture of quantitative and qualitative criteria as well. The first step is to create a hierarchy of the problem. The second step is to give a nominal value to each level of the hierarchy and create a matrix of pairwise comparison judgment [30].

2. Steps to Conduct AHP

At the first stage, the issue and goal of decision making brought hierarchically into the scene of the related decision elements. Decision making elements are decision indicators and decision choices. The group established a hierarchy according to Figure 2 which should reflect the understudy problem.

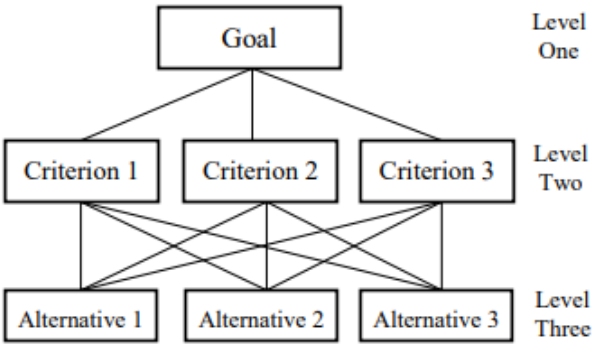

Figure 1: Sample Hierarchical Tree

In second step and in order to conduct pair comparison, a questionnaire should be designed and distributed among the respondents (can be managers, experts, users and etc.) to collect their opinion. It is noteworthy that each decision maker entered their desired amount for each member and then individual judgments (of each respondents) have been converted into group judgments (for each one of the pair comparison) using their geometrical average. The scale ranges from one to nine where one implies that the two elements are the same or are equally important. On the other hand, number nine implies that one element is extremely more important than the other one in a pairwise matrix. The pairwise scale and the importance value attributed to each number are illustrated in the Table 2, 3 shows the sample of the questionnaire.

The data analyze procedure involves the following steps. First the pairwise comparison matrix which is called matrix A is extracted from the data collected from the interviews. The principal right eigenvector of the matrix A is computed as 'w'.

If $a_{ik} \cdot a_{kj} = a^{ij}$ is not confirmed for all k, j, and i the Eigenvector method is selected. If the matrix is incompatible and in case of incomplete consistency, pair comparisons matrix cannot be used normalizing column to get W_i. For a

Table 2: Relative scale for paired comparison

Intensity of importance		Description
Equal importance	1	Both activities equally contribute to the objective.
Moderate importance	3	Weak or slight importance over another – Experience and judgment slightly favor one activity over another
Strong importance	5	Greater or more essential importance when compared with another – Experience and judgment strongly favor one activity over another.
Very strong importance	7	Very high or demonstrated importance – An activity is favored very strongly over another; its dominance is demonstrated in practice.
Extreme importance	9	Extremely high importance – The evidence favors one activity over another with the highest level of certainty

Source: Adapted from Saaty [45]

Table 3: Sample AHP Questionnaire How important are the following security criteria in comparison

Factor	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Factor
Factor	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Reliability
Privacy	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Validation
Privacy	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Verification
Privacy	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Integrity
Privacy	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Confidentiality
Privacy	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Availability

positive and reversed matrix, Eigenvector technique can be used which in it:

$$e^T = (1, 1, \cdots, 1)$$

$$W = \lim_{k \to \infty} \frac{A^k \cdot e}{e^T \cdot A^k \cdot e}$$

To reach a convergence among the set of answers in to successive repetition of this process, calculation should be repeated several times in order to take a decision when facing an incompatible matrix. Then, the following formula is applied to transform the raw data into meaningful absolute values and normalized weight $w = (w_1, w_2, w_3, \ldots, w_n)$:

$$A_w = \lambda_{\max} w$$

$$\lambda_{\max} = \frac{\sum a_j w_j - n}{w_1}$$

$$A = a_{ij} \text{with} a_{ij} = \frac{1}{a_{ij}}$$

A: pair wise comparison
w: normalized weight vector
$\lambda_{\max}$: maximum eigen value of matrix A
a_{ij}: numerical comparison between the values i and j

In the next step, in order to validate the results of the AHP, the consistency ratio (CR) is calculated using the formula, $CR = CI/RI$ in which the consistency index (CI) is, in turn, measured through the following formula:

$$CI = \frac{\lambda_{\max} - n}{n - 1}$$

The value of RI is related to the dimension of the matrix and will be extracted from Table 4. It should be noted that consistency ratio lower than 0.10 verifies that the results of comparison are acceptable.

Considering that this method is also an expertise-oriented technique and the sample size should be less than 10 people, therefore, in this section, the opinions of the same 12 people selected from the previous stage are again used. Its calculations using Expert choose software, during three stages of pairwise comparisons, normalization, weighting and final ranking, calculation of compatibility rate in judgments, calculation of vectors of local priorities and finally determination of final priorities, market share development criteria based on strategies Entering international markets were prioritized.

Table 4: The value of Random Consistency Index, Source

dimention	RI
1	0
2	0
3	0.5799
4	0.8921
5	1.1159
6	1.2358
7	1.3322
8	1.3952
9	1.4537
10	1.4889

Fuzzy logic, unlike Aristotelian two-valued logic (true or false, black or white, zero and one), is an infinite spectrum of gray between black and white. A multi-valued logic and a new technique that replaces the methods that require complex and advanced mathematics to design and model a system by using linguistic values and expert knowledge. AHP method is considered a desirable method for choosing the best option considering multiple criteria due to its similarity to human analytical thinking process. However, the classification of criteria and the use of fuzzy data instead of deterministic data make the results much closer to reality [51]. The Mikhailov method provides a more efficient approach than the analysis hierarchy technique in the fuzzy environment. Mikhailov offers two linear and non-linear methods to calculate weights. The linear method has complex and time-consuming calculations, and he suggests a non-linear programming method to check the consistency of fuzzy judgment.

Interpretive Structural Modeling (ISM)

The interpretive structural modeling method is an interactive learning process, and in this technique, a set of various and unrelated factors are structured in the form of a comprehensive and systematic model. In this method, it is used to design the pattern of complex relationships between the elements of a system. The ISM technique is an interpretation due to the fact that this is the result of a collective judgment and specifies which factors and how they are related to each other and is structural, because a structure provides a general set of relationships between different factors and finally this The method is a type of modeling, because it presents the specific relationships identified between the factors as well as the general structure obtained in the form of a model [19].

Nonlinear Structural Equation Model

The traditional linear structural equation model is typically made up of two parts: the measurement model describing the relationships between the observed and latent variables and the structural model describing the relationships between the latent variables. Given a vector of p observed variables Z; for the ith individual in a sample of size n and a vector of q latent variables f_i, the linear structural equation model system can be written:

$$Z_i = \mu + \Lambda f_i + \epsilon_i \tag{0.1}$$

$$b_0 + B_0 f_i = \delta_{0i}, \tag{0.2}$$

where in the measurement model, the matrices $\mu(p \times 1)$ and $\Lambda(p \times q)$ contain fixed or unknown scalars describing the linear relation between the observations Z; and the common latent factors f_i, and represents the $(p \times 1)$ vector of random measurement error independent of f_i such that $E(\varepsilon_i) = 0$ and $Var(\epsilon_i) = \Psi$ with fixed and unknown scalars in; and in the structural model, the matrices $b_0(d \times 1)$ and $B_0(d \times q)$ contain fixed or unknown scalars defining d different additive linear simultaneous structural equations relating the factors to one another plus the $(d \times 1)$ vector of random equation error doi, where $E(\delta_{0i}) = 0$ and $Var(\delta_{0i}) = A_0$ with fixed and unknown scalars in A_0.

The simultaneous linear structural model as written in (0.2) is very general. For many practical research questions which can be addressed by simultaneous structural models, it is useful to model specific variables in terms of the rest of the variables, i.e., it is useful to consider some of the latent variables as endogenous and others as exogenous, where endogenous variables are those that are functions of other endogenous and exogenous variables. Let $f_i = (\eta_i', \xi_i')$ where η_i are the d endogenous latent variables and ξ_i are the $q - d$ exogenous latent variables. Then a commonly used form for the structural model (0.2) becomes:

$$\eta_i = b + B\eta_i + \Gamma\xi_i + \delta_i, \tag{0.3}$$

where it is assumed the equation errors δ_i have $E(\delta_i) = 0$, $Var(\delta_i) = \Delta$ and are independent of the ξ_i as well as independent of ϵ_i in (0.1), and the matrices $b(d \times 1)$, $B(d \times d)$, $y(d \times (q-d))$, and $A(d \times d)$ are fixed or unknown scalars. The structural model (0.3) is said to be in implicit form, implicit because it has endogenous variables on both sides of the equations, i.e., it is not "solved" for the endogenous variables. It is assumed that the diagonal of B is zero so that no element of η_i is a function of itself. A sufficient condition for solving is that $(I - B)$ is invertible, then can be solved for the endogenous variables and written as

$$\eta_i = b^\star + \Gamma^\star \xi_i + \delta_i^\star \tag{0.4}$$

where $b = (I-B)^{-1}b$, $Y^\star = (I-B)^{-1}y$, and $Var(\delta_i^\star) = (I-B)^{-1}\delta(IB)^{-1}$.

The structural model (0.4) is said to be in reduced form as the η_i now appears only on the left-hand side of the equation. It is important to note the assumption that the equation errors δ_i were additive and independent of the In the implicit form results in the equation errors ξ_i in the reduced form (0.4) also being additive and independent of the η_i.

Given p, q and d, additional restrictions must be placed on μ, A, Y, b_0, B_0, and Δ_0 in (0.1)-(0.2) in order to make all the unknown parameters identifiable. The assumption that (0.2) can be written in reduced form (0.4) is the typical restriction placed on the structural model. Additionally, a common restriction placed on the measurement model (0.1) is the errors-in-variables parameterization where q of the observed variables are each fired to be equal to one of the q different latent variables plus measurement error. For a thorough discussion of identifiability in linear structural equation models see, e.g., Bollen (1989). Finally, it should be noted that there is no inherent distributional assumptions needed for ej, do, nor fl at this point of model specification although distributional assumptions may be added eventually to perform estimation.

A mixture SEMs for a $p \times 1$ random vectory y_i is defined as follows:

$$f(y_i) = \sum_{k=1}^{K} \pi_k f_k(y_i|\mu_k \Sigma_k), \qquad i = 1, \cdots, n \tag{0.5}$$

where K is the number of components which can be unknown, π_k's are component probabilities which are nonnegative and sum to 1.0, $f_k(y_i|\mu_k\Sigma_k)$ is a multivariate normal density function with an unknown mean vector μ_k and a covariance matrix Σ_k. Conditional on the kth component, suppose that y satisfies the following measurement model:

$$y = \mu_k + \Lambda_k \omega_k + \epsilon_k \tag{0.6}$$

is an $p \times 1$ Intercept vector, Y_k is a $p \times q$ factor loading matrix, ω_k is a $q \times 1$ random vector of latent variables, and ϵ_k is a $p \times 1$ random vector of error measurements with distribution $N(0, \Psi_k)$ which is independent of ω_k, and Ψ_k is a diagonal matrix. Let ω_k be partitioned into $(\eta_n^T, \xi_k^T)^T$ where is a $q1 \times 1$ vector, ξ_k is a $q2 \times 1$ vector, and $q1 + q2 = q$. The structural equation is defined as

$$\eta_k = B_k \eta_k + \Gamma_k \xi_k + \delta_k \tag{0.7}$$

where B_k and Y_k are $q1 \times q1$ and $q1 \times q2$ matrices of unknown parameters; and random vectors $\xi_k \lambda_k$ are independently distributed. as $N(0, \phi_k)$ and $N(0, \phi_{\lambda k})$ respectively; and ϕ_k is a diagonal matrix.

We assume that $B_{0k}(q1 - B)$ is nonsingular and (I_{ql} Is Independent of any elements in $B_{k^\star}$. One specific form of B_k that satisfles this assumption is the lower or upper triangular matrix.

As the mixture model defined in (0.5) is invariant with respect to permutation of labels $k = 1, \cdots, K$, adoption of an unique labeling for identifiability is important. Roeder and Wasserman (1997), and Zhu and Lee (2001) proposed to impose the ordering $\mu_{1,1} < \cdots < \mu_{K,1}$, for eliminating the label switching (jumping between the various labeling subspace), where $\mu_{k,1}$ is the first element of the mean vector μ_k. This method works fine if $\mu_{1,1}, \cdots \mu_{K,1}$ are well separated. However, if $\mu_{1,1}$, $\mu_{K,1}$ are close to each other, it may not be able to eliminate the label switching, and may Introduce incorrect results. Hence, it is necessary to find a sensible identifiability constraint. In this chapter, the random permutation sampler developed by Frühwirth-Schnatter (2001) will be applied for finding the suitable Identifiability constraints. See the following sections for more details.

Moreover, for each $k = 1, \cdots, K$, structural parameters in the covariance matrix Σ_k corresponding to the model defined by (0.6) and (0.7) are not identified. A common method in structural equation modeling for identifying the model Is to fix appropriate elements in A_k, B_k, and/or Y_k at preassigned values. The positions of the preassigned values of the fixed elements in these matrices of regression coefficients can be chosen on a problem-by-problem basts, as long as each σ_k is identified. In practice, most manifest variables are usually clear indicators of their corresponding

latent variables. This give rather clear prior information to specify the zero values to appropriate elements in these parameter matrices. See the illustrative example in Section **??** for a more concrete example. For clear discussion of the proposed method, we let $\prod = (\prod_1, \cdots, \prod_K)$, and O be the vector which contains all unknown parameters in the covariance matrices that defines an identified model.

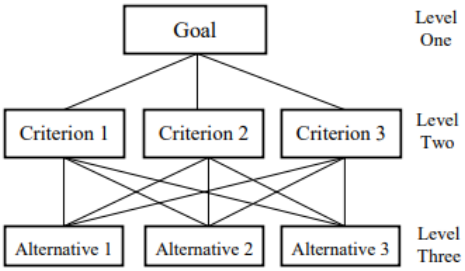

Figure 2: Theoretical Model of the Study

In this research, the statistical indicators include number, mean, standard deviation, minimum, maximum, skewness and kurtosis. In addition, in order to show the distribution of variables, frequency tables and bar charts are used.

Research methodology

The research is of applied type and in terms of descriptive method, it was carried out as a survey. In this research, based on interviews and research literature, the basic factors of organizational performance evaluation were identified, and then, in order to determine the effective factors, the research statistics community, which included the experts of Iran Telecommunication Company, were selected. This research was a field study and two questionnaires were used to explain the studied model, and all the questionnaires were collected after completion. In both questionnaires, with the opinion of 22 experts, and in the form of a pairwise comparison, the factors obtained from the research literature review and interviews were evaluated, and the validity of these two questionnaires were monitored and confirmed through content validity. In order to provide a suitable answer and to resolve the ambiguities, the current research plan is specified in Figure 3.

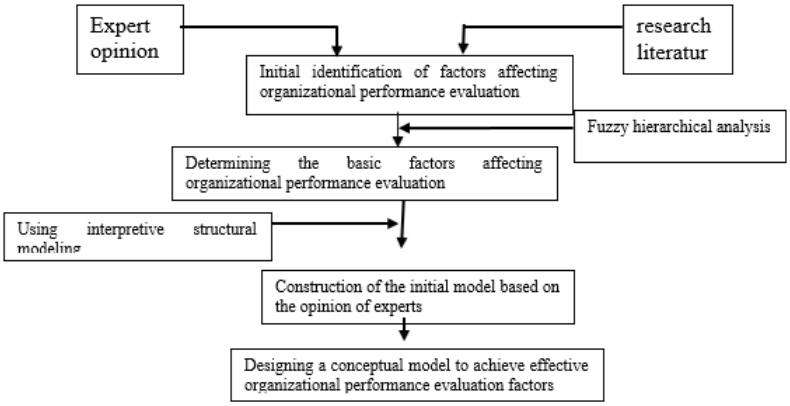

Figure 3: Research design framework

Research findings

The implementation steps of this research and the findings are as follows:

Identification of effective factors:

At this stage, in order to identify the essential components effective in the evaluation of the organizational performance of Iran Telecommunications Company, by summarizing the research literature and conducted interviews, the major

factors were identified both at the macro and strategic level, at the structural level, and at the process and executive level, which In the following, due to the dispersion of these factors, after taking advantage of the interviews and experts' opinions in explaining the theoretical concepts, applications and identifying the factors affecting the evaluation of organizational performance, these components were reduced to 14 final factors, which are presented in Table No. 5.

Table 5: Identified basic factors effective on the evaluation of organizational performance based on background and experts' opinion

Row	Agents	Sources and research done
1	management style	Armestrang & Baron [10] Phan et al [42] Victor [56]
2	Organizational incentives and support	Almohtaseb [7] Jardioui [25] Asiaei [11]
3	Organizational Structure	Tung [54] Azorin[13] Kearney& Hisrich & Roche [28]
4	Strategies	Eckerson [17] Akhtar & Mittal [3] Ha [23]
5	Human resource management system	Noe [40] Foot & Hook [20] Kwarteng & Aveh [31]
6	Evaluation processes and methods	Alkhaldi & Abdallah [6] Neely [38] Posavac & Carey [43]
7	Organizational Culture	King [29] Schein [47] Taylor [52]
8	Information system	(Rommny& Steinbart [44] Ahenkan [6] Teerooven-gadum [53]
9	Organizational training and awareness	Armestrang [9] Lin & Kuo [33] Alberto [5]
10	Corporate Communications	Al-Surmi [5] Papke-Shields & Monaj [41]
11	General environment (political, social, cultural, economic, technology, etc.)	Van De Walle [55] Vogel [57] Mc Gowan [37]
12	Funds	Ghalayni [21] Kaplan & Norton [27]
13	Attitude of managers	Al-Surmi [8] McAdam [35] Tung [54]
14	interactive environment (clients, suppliers, unions, competitors, etc.)	Neely [39] Kaplan & Norton [26] Ho & Chan [24]

At this stage, the Mikhailov method was used, which is more valid than other common methods. In his technique, Mikhailov suggests two linear and non-linear methods to calculate the weights and rank of factors at the same time. Due to the complexity and time-consuming nature of the linear method, a non-linear method was used in this research to check the consistency of the fuzzy judgment matrix while calculating the weights. Due to the non-linearity of this model, software such as Gams or Lingo should be used. As in this research, Lingo software version 15 was used. Considering that out of 14 general factors, 9 factors alone included about 90% of the weight of the factors, they were identified as the most important final factors affecting the evaluation of organizational performance in Iran Telecommunication Company.

Table 6: Factors affecting the evaluation of organizational performance based on research literature and experts' opinions

Row	Effective components (factors).	Weight
1	General environment (political, cultural, economic, social, technological, etc.)	0.1173
2	Strategy	0.1138
3	Processes and methods	0.1121
4	Organizational incentives and support	0.1083
5	Organizational training and awareness	0.0994
6	interactive environment (clients, suppliers, unions, laws and regulations, etc.)	0.0978
7	management style	0.0872
8	Organizational Culture	0.0771
9	Organizational Structure	0.0694
10-14	Financial resources 0.0403, organizational participation 0.0251, human resource management 0.0202, organizational communication 0.0174, information system 0.0146	

The steps of using interpretive structural modeling

After the 9 factors were prepared, the initial model adjustment was done heuristically through interpretive structural modeling and based on the opinion of experts. The format of the graphic form should be reflected in order to reduce its complexity.This model is used by creating a systematic relationship among its desired factors and by ranking and determining the level of these factors, it helps managers to better implement the designed model. The tool used in this stage is a questionnaire consisting of the 9 final components, which through pairwise comparisons of the factors, the experts were asked to express the relationships between them in the form of (existence of mutual relationship, existence of one-way relationship, lack of existence of relationship) do The procedure is as follows:

The first step - creating a structural self-interaction matrix: Based on the following four relationships, factors are compared in pairs:
Based on the following four relationships, factors are compared in pairs:
V: the state where the factor of row i affects the factor of column j.
A: The case where the factor of column j affects the factor of row i.
X: the state where row and column factors i and j have a two-way relationship and affect each other.
O A: state where none of them has any effect on the other.

The second step - formation of the primary achievement matrix: It is created based on the self-interactive matrix and with the help of determined relationships:

Table 7: Structural interaction matrix

9	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**Self-interaction matrix**
A	O	A	O	O	A	A	V		**Public environment**
O	O	A	V	O	A	V			**2. Incentives and organizational support**
A	O	O	O	O	O				**3. Strategy**
A	O	V	O	O					**4. Interactive environment**
O	A	V	V						**5. Management style**
O	A	X							**6. Organizational culture**
O	O								**7. Organizational structure**
V									**8. Organizational training and awareness**
									9. Processes and methods

If this relationship is based on the symbol V, its house in the attainment matrix will be 1 and the relative house will be 0. If this relationship is based on the symbol A, its house in the attainment matrix will be 0 and the relative house will be 1. If this relationship is based on If the base of the symbol is O, its house in the achievement matrix will be 0 and the corresponding house will be 0. If this relationship is based on the symbol X, its house in the achievement matrix will be 1 and its relative house will be 1.

The third step-creating the final achievement matrix:

Table 8: Final achievement matrix

The final achievement matrix	Public environment	Incentives and support	Strategy	Interactive environment	management style	Organizational Culture	Organizational Structure	Education and awareness	Processes and methods	Penetration power
Public environment	1	1	1	1*	1*	1	0	1*	1	8
Incentives and support	0	1	0	0	0	0	1	1*	0	3
Strategy	0	1	1	1	1*	0	1*	1	0	6
environmental environment	0	1	0	1	1	1*	1	1*	0	6
management style	0	1	0	0	1	1	1	1*	0	5
Organizational Culture	0	1*	0	0	1	1	1*	0	0	4
Organizational organization	0	1*	0	0	1	1	1	1	0	5
Education and organization	0	1	0	0	0	0	1*	1	0	3
methods and methods	0	1*	0	0	1	1	1*	0	1	5
Degree of dependence	1	9	2	3	7	6	8	7	2	

Keeping in mind the interactive relationship between the elements, it will be necessary to adapt the initial acquisition matrix. For this purpose, the initial matrix should be raised to the power of $K + 1$ to establish a stable state. In this way, some elements of zero become the number 1, which is shown as (1*).

The fourth step - leveling of factors: by specifying the input set (including the set where the rows are 1) and the output set for each element (including the set where the columns are 1) and determining the common set, the leveling of the factors is done. The common set is obtained from the shared factors of these two sets. In this technique,

any factor or factors whose common set is the same as their input set are assigned the first level of priority. After identifying this variable or variables, we remove their rows and columns from the table and the operation We repeat again on other factors until the level of all factors is determined. Finally, the variables whose output and common sets are similar are placed at the highest level of the hierarchy of the interpretive structural model.

According to the results of this research, among the basic components of the evaluation of organizational performance in the Iranian telecommunication company, zone V means the general environment factor and after that zone IV includes the strategy factor, independent factors that have high influence and low dependence And these items are considered the most independent factors of this model. After these two levels, in another level, i.e. level III, there are factors of interactive environment and factors of processes and methods, which have less influence and more dependence than the previous factors. In the lowest levels, i.e. levels II and I, the intensity of these changes has increased. In level II, two factors of management style and organizational culture have been placed, and in the lowest level, i.e. level I, three factors of organizational structure, training and organizational awareness, and incentives. Organizations and support are the most dependent and the least influential.

Table 9: Determining the level of factors

Row	Agents	Input set	Output set	Common collection	level
1	Public environment	1, 2, 4, 7, 8, and 9	8	8	V
2	Incentives and organizational support	1, 2, and 3	1, 2, 3, 4, 5, 6, 7, 8, and 9	1, 2, and 3	I
3	Strategies	1, 2, 3, 4, 7, and 9	8 and 9	9	IV
4	Interactive environment	1, 2, 3, 4, 6	4, 8, and 9	4	III
5	management style	1, 2, 3, 6, and 7	2, 4, 5, 6, 7, 8, and 9	2, 6, and 7	II
6	Organizational Culture	1, 2, 6, and 7	2, 4, 5, 6, 7, and 8	2, 6, and 7	II
7	Organizational Structure	1, 2, 3, 6, and 7	1, 2, 3, 4, 5, 6, 7, 9	1, 2, 3, 6, and 7	I
8	Organizational training and awareness	1, 2, and 3	1, 2, 3, 4, 7, 8, and 9	1, 2, and 3	I
9	Processes and methods	1, 2, 5, 6, and 7	5 and 8	5	III

The fifth step - drawing the interpretive structural model: based on the specified levels of the factors and the relationships between them, the desired final model, i.e. the final achievement matrix of the research model, is drawn. The first level is considered as the most effective level and the last level as the least effective level. It should be noted that considering that in this research, the opinions of 22 experts were used to complete the questionnaire, in order to form the self-interaction matrix, the mode method which is based on the highest frequency in each region is used, and since for the calculation It is not used for the values or order of the data, it can be used for qualitative data.

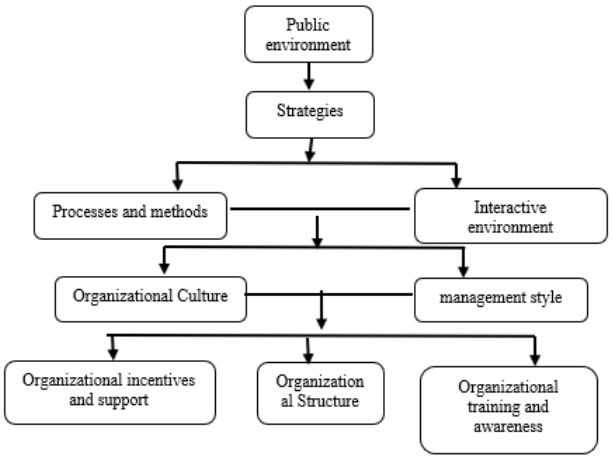

Figure 4: Conceptual model of fundamental factors in evaluating organizational performance

In line with the segmentation of the criteria, in the final matrix, each of the factors should be separated based on the power of penetration and the degree of dependence. Based on the low or high of two indicators of the power of penetration and also the dependence of a two-by-two matrix called the matrix of the effect of multiplication of

applied cross-reference. MICMAC is formed which has four regions, which are: autonomous region, dependent region, connected region and independent region.

Sixth step - Analysis of the power of influence and the degree of dependence (MICMAC analysis): In the ISM model, the interrelationships and influence between the criteria are well shown, which leads to a better understanding of the decision environment by managers. The sum of the rows of the values in the final achievement matrix for each of the elements indicates the level of influence and the sum of the columns indicates the degree of dependence. The power of influence refers to the number of factors that influence the desired factor, and the dependency index refers to the number of factors that influence this factor and lead to its achievement.

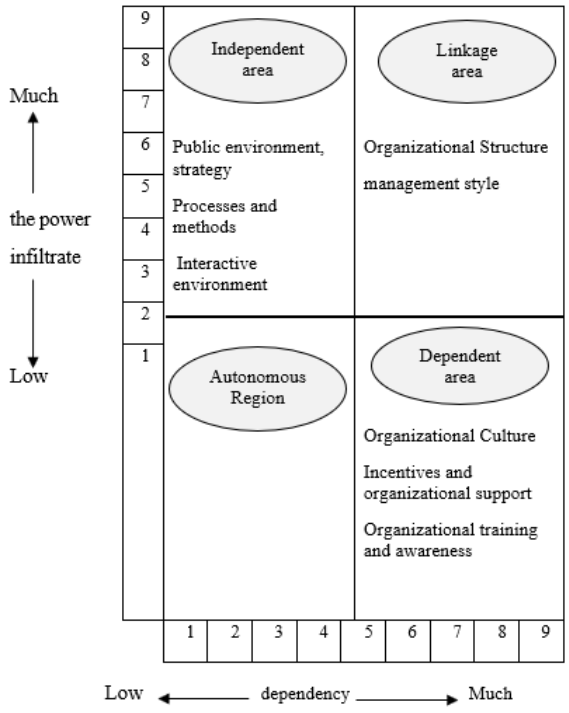

Figure 5: The influence power-dependency diagram

By drawing a two-by-two matrix centered on these two characteristics, four areas can be identified, which include independent, linked, autonomous, and dependent variables. Figure 3 shows this matrix. As mentioned, the power of influence refers to the number of elements that the i-th element affects and the degree of dependence on the number of elements that affect the i-th element.

General environment factors, processes and methods, strategy, interactive environment are located in the independent area. An area that includes criteria with high influence and low dependence. Independent area variables are called key factors, and in this research and among the existing components, the public environment with the greatest effect was recognized as the most fundamental factor in the effective establishment of organizational performance evaluation in Iran Telecommunication Company.

The other area includes dependent criteria that have little influence but high dependence, and in this research, three factors of organizational culture, the factor of organizational training and awareness, and the factor of organizational incentives and support are located in this range. The next area includes related criteria that have relatively high influence and dependence, and any action on these factors has an impact on other factors and at the same time they are affected by other factors. In this research, organizational structure and style Management are two factors that are located in the linked area in this matrix. Finally, the fourth area includes autonomous criteria, that is, factors that neither have a high influence nor are dependent on other factors.

It should be considered that according to the initial findings based on research literature and the opinion of elites, the possession of a more important component from the point of view of experts (Table No. 9) alone should not be the basis and criterion of planning and arrangements. Also, in the next step and contrary to the initial results, by using the method of interpretive structural modeling and drawing the causal model of factors, general environment and strategy, as well as processes and methods and the factor of the interactive environment, respectively, the most

fundamental factor in order to reach the model are considered organizational performance evaluation.

Usually, in the research related to organizational performance evaluation, the design of performance evaluation model and determination of its dimensions and indicators have been discussed, and the relationship of these factors is rarely examined in order to prepare a road map for designing and establishing organizational performance evaluation and guiding managers in order to determine how The beginning of the work to reach this category has been discussed. With such an intention, during this research, with the help of interpretative structural modeling technique, a causal model of the final factors affecting the evaluation of organizational performance has been drawn.

Conclusion

Examining the results related to the identification of factors affecting the evaluation of organizational performance in Iran Telecommunication Company reveals the fact that the organizational management system needs a general review based on the factors affecting organizational evaluations. This neglect or lack of recognition can cause a lot of damage to the bureaucratic structure of organizations providing public services. In a situation where political requirements, social conditions, asymmetric distribution of economic factors in the country, cultural and climate differences, and environmental conditions limit the space for the same evaluation of specialized and operational factors and creates a gap between goals, plans and results, the organization are not evaluated and supported as they should be on the basis of fundamental factors, and in this way, the necessary platform is provided for the ineffectiveness of the existing models of organizational performance evaluation.

The public environment includes all political, cultural, social, economic and technological variables and the like. If we consider the public environment as the body and soul of the society, it can definitely be acknowledged that as long as accountability for the performance and social responsibility of individuals is not institutionalized in the society in accordance with the environmental requirements and the managers of these organizations desire to interact dynamically with the environment and avoid the attitude Do not put the mechanical and daily routine at the top of your plans and goals, any action to establish the organizational performance evaluation model will only waste time and money.

The lack of comprehensiveness of the existing methods and the superficiality of the evaluation processes at the level of these organizations and in most cases the lack of a specific reference to answer for the performance has caused the organizations to adopt inconsistent approaches to performance evaluation and to try for performance deficiencies. themselves, contaminate the relationship between actual and reported performance, or try to keep indicators related to their unfavorable performance away from monitoring by distorting or misinterpreting.

Let's not forget that in organizations whose audience is members of society, the purpose of evaluating organizational performance is to respond to people's needs and improve the quality of life and solve problems from the perspective of citizens, and the social indicators themselves are indicative of general facts in expressing the performance of such organizations. they are going . At the same time, it is necessary to use efficient approaches such as organizational performance evaluation in the management dashboard of organizations providing public services such as telecommunication companies to effectively measure and control performance and increase social accountability and increase transparency.

In conclusion, the organizational performance evaluation system in a comprehensive organization such as Iran Telecommunication Company can be effective when it puts public and national interests and interests and local requirements of each region of the country in the focus of its macro goals and strategic plans with a comprehensive perspective. As long as an organization does not correctly identify the expectations and priorities based on the environmental factors, they will not be able to identify the real demands of the society, and they will not be able to formulate an effective strategic plan and set the priorities and demands of themselves and the target society based on that.

References

[1] H. Aghajani, D. Kiakjuri, and F. Yahya Tabar, *Evaluation of the performance of units of Islamic Azad University of Mazandaran province using data envelopment analysis*, J. Res. Oper. Appl. **10** (2013), no. 14, 111–125.

[2] H. Aguinis, *Enhancing the relevance of organizational behavior by embracing performance management research*, J. Organ. Behav. **29** (2008), no. 1, 139–145.

[3] M. Akhtar and R. K. Mittal, *Implementation issues and their impact on strategic performance management system effectiveness: An empirical study of Indian oil industry*, Measur. Bus. Excell. **19** (2015), no. 2, 71–82.

[4] A. Ahenkan, E. Tenakwah, and J. Bawole, *Performance management implementation challenges in Ghana's local government system*, Int. J. Prod. Perf. Manag. **67** (2018), no. 3, 519–535.

[5] A.C. Alberto, G.M. Victory, and C.P. Eulogio, *Leadership and organizational learning is role on innovation and performance: Lessons from Spain*, Ind. Market. Manag. **36** (2017), no. 3, 349–359.

[6] R. Alkhaldi and A. Abdallah, *Lean management and operational performance in health care: Implications for business performance in private hospitals*, Int. J. Prod. Perform. Manag. **69** (2019), no. 1, 1–21.

[7] A.A. Almohtaseb, M.A.Y. Almahameed, A. Hisham, K. Shaheen, and M.H.J. AlKhattab, *A roadmap for developing, implementing and evaluating performance management systems in Jordan public universities*, J. Appl. Res. Higher Educ. **11** (2019), no. 2, 325–339.

[8] A. Al-Surmi, C. Guangming, and D. Yanqing, *The impact of aligning business, IT, and marketing strategies on firm Performance*, Ind. Market. Manag. **84** (2020), 39–49.

[9] M. Armestrang, *Performance Management: Key Strategies and Practical Guidelines*, 2rd ed, Kogan Page, 2000.

[10] M. Armestrang and A. Baron, *Performance management: The New Realities*, London, CIPD, 2004.

[11] K. Asiaei, R.R. Jusoh, and N. Bontis, *Intellectual capital and performance measurement systems in Iran*, J. Intell. Capital **19** (2018), no. 2, 294–320.

[12] M. Attaei, *Fuzzy multi-criteria decision making*, First Edition, Shahrood University Publications, 2009. [in Persian]

[13] M. Azorin, M. Cortes, and P. Ortega, *Characteristics of organizational structure relating to hybrid competitive strategy: Implications for performance*, J. Bus. Res. **25** (2012), no. 4, 993–1002.

[14] U.S. Bititci, A.S. Carrie, and L.G. McDevitt, *Integrated performance measurement systems: An audit and development guide*, TQM Mag. **9** (1997), no. 1, 46–53.

[15] N. Chai, *Sustainability Performance Evaluation System in Government: A Balanced Scorecard Approach Towards Sustainable Development*, Springer Dordrecht, Heidelberg, London, New York, 2009.

[16] A.A. Chauhana, A. Singhb, and S. Jharkharia, *An interpretive structural modeling (ISM) and decision-making trail and evaluation laboratory (DEMATEL) method approach for the analysis of barriersof waste recycling in India*, J. Air Waste Manag. Aaaoc.**68** (2018), no. 2, 100–110.

[17] W.W. Eckerson, *Performance management strategies*, Bus. Intell. J. **14** (2009), no. 1, 24–27.

[18] A. Faghihi, *Collection of Papers of the Seminar on Administrative Issues of Iran*, Allameh University Publications, 1993.

[19] M. Faisal, D.K. Banwet, and R. Shankar, *Supply chain risk mitigation: Modelling the enablers*, Bus. Process Manag. **12** (2006), no. 4, 535–552.

[20] M. Foot and C. Hook, *Introducting Human Resource Management*, Pearson Education Limited Milan Italy, 1999.

[21] A.M. Ghalayni, J.S. Noble, and T.J. Crowe, *An integrated dynamic performance measurement system for improving manufacturing competitiveness*, Int. J. Prod. Econ. **48** (1997), 207–25.

[22] H. Gholami, M.F. Bachok, M. Zameri, M. Saman, D. Streimikiene, S. Sharif, and N. Zakuan, *An ISM approach for the barrier analysis in implementing green campus operations: Towards higher education sustainability*, Sustainability **12** (2020), no. 1, 363.

[23] V.D. Ha, *Impact of organizational culture on the accounting information system and operational performance of small and medium sized enterprises in Ho Chi Minh City*, J. Asian Finance Econ. Bus. **17** (2020), no. 2, 301–308.

[24] S.K. Ho and Y.L. Chan, *Performance measurement and the implementation of balance scorecards in municipal governments*, J. Govern. Finan. Manag. Alexandria **51** (2002), no. 4, 8.

[25] M. Jardioui, P. Garengo, and S. El-Alami, *How organizational culture influences performance measurement systems in SMEs*, Int. J. Product. Perform. Manag. **69** (2019), no. 2, 217–235.

[26] R.S. Kaplan and D.P. Norton, *How strategy maps frame an organization's objectives*, Financ. Execut. **20** (2004), no. 154, 40–45.

[27] R.S. Kaplan and D.P. Norton, *The Balanced Scorecard: Translating Strategies Into Action*, Harvard Business School Press, Boston, MA, 1996.

[28] C. Kearney, R. Hisrich, and F. Roche, *A conceptual model of public sector corporate entrepreneurship*, Int. Ntrepreneurship Manag. J. **3** (2008), no. 4, 295–313.

[29] S.M. King, B.S. Chilton, and G.E. Roberts, *Reflections on defining the public interest*, Admin. Soc. **41** (2010), no. 8, 954–978.

[30] M. Krejnus, J. Stofkova, K.R. Stofkova, and V. Binasova, *The use of the DEA method for measuring the efficiency of electronic public administration as part of the digitization of the economy and society*, Appl. Sci. **13** (2023), no. 6, 3672.

[31] A. Kwarteng and F. Aveh, *Empirical examination of organizational culture on accounting information system and corporate performance: Evidence from a developing country perspective*, Medit. Account. Res. **26** (2018), no. 4, 675–698.

[32] M.C. Lee, *A Method of Performance Evaluation by Using the Analytic Network Process and Balanced Score Card*, Int. Conf. Conver. Inf. Technol., 2007.

[33] C.Y. Lin and T.H. Kuo, *The mediate effect of learning and knowledge on organizational performance*, Ind. Manag. Data Syst. **107** (2007), no. 7, 1066–1083.

[34] A. Mansouri and L. Fazli, *Providing a model for evaluating the quality of higher education centers' performance*, J. Res. Oper. Aappl. **17** (2020), no. 3, 23–43.

[35] R. McAdam, S.A. Hazllet, and C. Casey, *Performance management in the UK public sector: Addressing multiple stakeholder complexity*, Int. J. Poblic Sector Manag. **18** (2005), no. 3, 256–273.

[36] R. McAdam and R. Reid, *A comparison of public and private sector perceptions and use of knowledge management*, J. Euro. Ind. Tran. **24** (2000), no. 6, 317–329.

[37] R.P. Mc Gowan, *Improving efficiency in public management: The torment of Sisyphus*, Public Prod. Rev. **8** (1984), no 2, 162–178.

[38] A. Neely, *UPDATE The evolution of performance measurement research Developments in the last decade and a research agenda*, Int. J. Oper. Prod. Manag. **25** (2005), no. 12, 1264–1277.

[39] A.D. Neely, A.H. Richards, J.F. Mills, K.W. Platts, M.C.S. Bourne, M. Gregory, and M. Kennerley, *Performance measurement system design: developing and testing a process-based approach*, Int. J. Oper. Prod. Manag. **20** (2000), no. 10, 1119–1145.

[40] R.A. Noe, J.H. Hollenbech, B. Gerhart, and P.M. Wright, *Fundamentals of Human Resource Management*, Mc Graw-Hill, International Edition, New York, 2009.

[41] E.K. Papke Shields and K.M. Monaj, *Assessing the impact of the manufacturing executive's role on business performance through strategic alignment*, J. Oper. Manag. **19** (2001), no. 1, 5–22.

[42] P.H. Phan, M. Wright, D. Ucbasaran, and W.L. Tan, *Corporate entrepreneurship: Current research and future directions*, J. Bus. Ventur. **24** (2009), no. 3, 197–205.

[43] E.J.R.G. Posavac and R.G. Carey, *Program Evaluation: Methods and Case Studies*, Englewoods Cliffs, Prentice-Hall, INC, NJ, US, 1980.

[44] M. Rommny and P. Steinbart, *Accounting Information Systems*, Eleventh Edition, Prenhall, New York, 2011.

[45] T.L. Saaty, *The Analytic Hierarchy Process*, McGraw-Hill, New York, 1980.

[46] J. G. Sarhan, B. Xia, S. Fawzia, A. Karim, A.O. Olanipekun, and V. Coffey, *Framework for the implementation of lean construction strategies using the interpretive structural modelling (ISM) technique: A case of the Saudi construction industry*, Engin. Const. Architect. Manag. **27** (2019), no. 1, 1–23.

[47] H. Schein, *Organizational socializatuion and the profession of management*, MIT Sloan Manag. Rev. **30** (1988),

no. 1, 53.

[48] R. Singh and N. Bhanot, *An integrated DEMATEL-MMDE-ISM based approach for analysing the barriers of IoT implementation in the manufacturing industry*, Int. J. Prod. Res. **58** (2019), no. 8, 2454–2476.

[49] R.K. Singh and A. Gupta, *Framework for sustainable maintenance system: ISM–fuzzy MICMAC and TOPSIS approach*, Ann. Oper. Res. **290** (2020), no. 1, 2, 643–676.

[50] D.L. Stufflebeam and A.J. Shinkfield, *Evaluation Theory, Models and Applications*, Vol. 50, John Wiley & Sons, 2014.

[51] M. Taleghani, K. Shahroudi, and F. Saneyi, *Comparative comparison of AHP and fuzzy AHP in the ranking of purchase preferences (case study: home appliance industry)*, Nahaqiq Mag. Oper. Appl. **9** (2013), no. 1, 81–91. [in Persian]

[52] J. Taylor, *Closing the rhetoric-reality gap? Employees' perspective of performance management in the Australian public service*, Australian Journal of Public Administration **3** (2005), no. 74, 336–353.

[53] V. Teeroovengadum, R. Nunkoo, and H. Dulloo, *Influence of organisational factors on the effectiveness of performance management systems in the public sector*, Eur. Bus. Rev. **3** (2019), no. 31, 447–466.

[54] A. Tung, K. Baird, and H.P. Schoch, *Factors influencing the effectiveness of performance measurement systems*, Int. J. Oper. Prod. Manag. **12** (2011), no. 31, 1287–1310.

[55] S. Van De Walle, *International comparisons of public sector performance: How to move ahead?*, Poblic Manag. Rev. **11** (2007), no. 1, 39–56.

[56] J.G.M. Victor, M.J.B. Maria, and G.G. Leopoldo, *Transformationalleadership influence on organizational performance through organizational learningand innovation*, J. Bus. Res. **65** (2012), no. 7, 1040–1050.

[57] J. Vogel, *The future direction of social indicators research*, Soc. Indicat. **42** (1997), 103–116.

[58] U. Yudatama, A.N. Hidayanto and B.A.A. Nazief, *Approach using interpretive structural model (ISM) to determine key sub-factors at factors: Benefits, risk reductions, opportunities and obstacles in awareness IT Governance*, J. Theor. Appl. Inf. Technol. **96** (2018), no 16, 5537–5549.

[59] M. Zhang, M. Sun, D. Bi, and T. Liu, *Green logistics development decision-making: Factor identification and hierarchical framework construction*, IEEE Access **8** (2020).

[60] J. Zhang and W. Tan, *Research on the performance evaluation of logistics enterprise based on the analytic hierarchy process*, Energy Procedia **14** (2019), no. 14, 1618–1623.