E-ISSN: 2301-3621

SINGAPOREAN JOURNAL OF BUSINESS ECONOMICS, AND MANAGEMENT (SJBEM)

www.singaporeanjbem.com Vol. 8, No. 4, 2021 Research Paper

FACTORS AFFECTING AND PROVIDING A MODEL FOR HOLOGRAPHIC INFORMATION CENTERS

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ARTICLE INFO

Article History:
Received: 11 Jul 2021
Revised: 11 Aug 2021
Accepted: 14 Sep 2021
Available Online: 05 Oct 2021

Keywords:
Information centers, holographic, data-driven organization, holism, dynamics

ABSTRACT

Objective: The main purpose of this research is to "design and present a model for holographic information centers" which is examined by identifying the effective factors in an information center and its holographic features.
Methodology: In the 21st century, holographic or holistic thinking was formed. One of the features of this period is the attention to unity and plurality. This thinking was influential in many sciences, especially the humanities. In this new pattern of thinking about each holographic phenomenon, we consider the following and choose the appropriate approach based on it. a) Unity and integrity of all components in the world; b) The total is greater than the sum of the components, and the self-organization of the components creates a general order; c) Every phenomenon contains total information and that whole is also a part of a larger whole; d) The relationship between components and the influence of phenomena on each other; e) Change in each component affects the whole, and change in the whole is possible only by changing the components; f) Every phenomenon has an esoteric order that is not separate from it but cannot be seen because it is hidden
Research Findings: Given that information centers are a kind of organization. Therefore, an attempt has been made to extract the holographic concept in the organizational field. Then, after identifying the sources related to the principles of holography in the field of organization, by searching for these principles in scientific sources, some related sources should be extracted. The holographic pattern brought about fundamental changes in the structure and architecture of new organizations and the storage of information and the science of organizing information. Information centers as data-driven organizations need sufficient response to change and consequently organizational change in today's world to survive. In fact, the activity of a data-driven organization in competition with other organizations is full of uncertainty and complexity, which depends on the organization's ability to manage organizational change. The evolution of new information centers has a holographic nature in which component changes affect the entire system and system changes affect components. A holographic structure that has the ability to reflect holistically on any of the components can lead to deformation. The findings showed that a comprehensive environment, efficient human capital, dynamic capacity building, increased self-management, intelligent structure and dependence on holographic information centers are effective. In this research, in order to investigate the relationships, the structural equation method by PLS software has been used. After extracting the resources to use the content analysis method, the keywords in the resources are collected and ranked by Excel software. After examining the meaning of each keyword, the indicators were extracted and refined and similar items were merged, which finally, according to the key concepts of holography, its principles are extracted.

Conclusion: The results showed that holistic environment, efficient human capital, dynamic capacity building, increasing self-management, intelligent structure and dependence on holographic information centers are effective.

1. INTRODUCTION

The two issues of "flexibility" and "simplification" are crucial in the new information centers. To achieve these two, special attention must be paid to integration and management, and processes must be "automated" and "virtual". Integration focuses on the relationship between "users", "processes", and "information" and provides tasks with flexibility and dynamism. On the other hand, management makes access to information possible. This allows for simplification, flexibility, and cost reduction. Simplification is based on two axes of automation and virtualization. Virtualization refers to distinguishing the direct dependence of physical resources and managing them through a more abstract, virtual layer. Virtualization has the following effects: 1) Organizations can have a unified view of all resources, 2) Costs concerning operations on resources and their maintenance are reduced, 3) Users' needs can be met dynamically, and 4) information is collected from different centers and accessed (Kiadi Moghadam, 2004, p. 128).

The Holographic Universe Theory is based on the studies of two scientists, David Bohm, a physicist at the University of London, and Karl Pribram, a neurophysiologist at Stanford University (Karimi, 2016). With a new view of the world and the creatures living in it, the Holographic Universe Theory expanded human knowledge about many phenomena previously considered incomprehensible and opened a new horizon for other thinkers. In this new view, all the parts of a system are completely related to each other and affect each other, and these connections affect the whole system (Karimi, 2016). In this new paradigm, the following items are considered for each holographic phenomenon and the appropriate approach is selected based on it:

- Unity and integration of all parts in the world;
- The whole is greater than the sum of the parts, and the self-organization of the parts creates a general order;
- Every phenomenon contains information about the whole, and the whole is also a part of a larger whole;
- The relationship between parts and the effect of phenomena on each other;
- Change in each part affects the whole, and change in the whole is possible only by changing the parts;
- Every phenomenon has an inherent order from which it is inseparable but cannot be seen because it is hidden (Karimi, 2016).

In this study, several different disciplines of knowledge are brought together. On the one hand, the concept of holography, which is a branch of quantum physics, is placed next to the management of the organization, which is a branch of management science, and the management of information centers, which is a branch of information science and epistemology, is given special attention. Moreover, the effect of the holographic model on information centers is examined to provide a suitable model based on features such as progressive, integrated, dynamic, modifiable, and easily updatable. It is worth noting that information centers are considered as organizations because they have their specific system. Therefore, in this study, whenever organizations are mentioned, information centers are also included.

2. THEORETICAL FOUNDATIONS

Organizations are divided into three main types based on their function: task-driven, process-driven, and data-driven.

2.1 Task-Driven Organizations

In this type of organization, organizational units are designed and developed based on the tasks of the organization. In this structure, there is interdependence between the tasks of different organizational units. Efficiency decreases because tasks are not independent. For this reason, evaluation is very difficult, and the responsibilities of the various units are not very clear.

2.2 Process-Driven Organizations

Process-driven organizations consolidate activities and focus on results rather than dividing work between employees and positions (such as task-driven organizations). One of the most critical success factors (CFSs) for the development of a process-driven organization is the implementation of a multifunctional method.

2.3 Data-Driven Organizations

Data-driven organizations are those that have reached a level of data maturity and analysis that becomes meaningless if data is extracted from them. This means that the current affairs of the organization at all levels of

management are highly dependent on data. Besides, decisions based on available data are more than decisions based on the subjective and internal perceptions of managers.

2.4 The Concept of Data-Driven Organizations

Data-driven organizations refer to those organizations in which the continuous use of data for data-based analysis and decision-making is institutionalized, and the use of data and analysis by managers and employees has become integral parts of daily workflows. In this type of organization, data is recognized as an asset, all decisions are made based on the data, and the data value chain (including collecting, analyzing, deciding, taking action, and evaluating the effects of data-driven actions) is managed.

2.5 Definition of Data-Driven Organizations

A data-driven organization is a datafied organization that considers data as its strategic asset, its various organizational layers are datafied, and the data-driven decision-making process is ongoing at all levels of management (data chain to value). In this type of organization, a data-driven culture is promoted, data strategy is transparent, data analytics is used for continuous improvement and innovation in products, services, and processes, and data flow management is recognized as a strategic priority (Bontech Holding Online Magazine). In this study, information centers are considered as data-driven organizations.

2.6 Holographic Organizations

Arthur Koestler introduced the word "holon" in his book "The Ghost in the Machine". The word consists of "holos" meaning whole and the suffix "on" meaning a fine particle in a proton or neutron. So, every holon is a whole that is also a part. In other words, holons are complete entities that are made up of smaller holons, and at the same time, form larger holons. In this view, any organization can be considered as a holon. Accordingly, each organization, as a holon, is composed of holons. At the same time, it is a holon in a larger holographic system. In other words, each organization is composed of functional holons such as departments, offices, units, and individuals, and is itself a function of a larger holon such as industry, society, and the world (Kord Naiej et al., 2010, p. 65). In Organizational Metaphors, under the Metaphor of the Organization as the Brain, Garrett Morgan (1988) examines holography and identifies five factors as the design principles of a holographic organization. Morgan's key theory in the design of a holographic organization refers to the generalization of the general characteristics of the organization in all its parts (i.e., the definition of holography). The whole is reflected in all parts through four factors: culture, networked intelligence in the organization's information systems, organic organizational structure and holistic teams, and diversified roles.

Kenneth Mackenzie (1991) explains the characteristics of holographic organizations in his book The Organizational Hologram. He sees the organization as a means of doing things that cannot be done by individual parts but by combining parts. So, the organization must have added value over each of its parts to be called that organization. He considers the theories presented about the organization to be insufficient, arguing that they have not provided a complete view, and a more complete view is one that he refers to as the organizational hologram. By organizational hologram, he means the conditions in which all members of the organization participate and complement each other, as parts work in a hologram (Kord Naiej et al., 2010).

In his study titled "The Holographic Organization- A Design Model", Jon-Arild Johannessen extracted the criteria of the holographic organization from various sources, in particular by examining studies by Bauer (1985), Miller (1978), and Russell Ackoff (1981). In his book Living Systems, Miller (1978) points to the importance of information flow in the organization, seeing it similar to matter and energy in the organization. Bauer (1985, 1981, 1979) discusses the control and management functions of information flow. In Interactive Planning (1981), Ackoff describes the ideal organizations of the future. The Integral Theory in the field of organizational development has been proposed by Ken Wilber inspired by the holographic approach (Gardner et al. 2005). Wilber uses the acronym AQAL (All Quadrant, All Level) to describe the underlying framework of his theory (Niall, 2009).

2.7 Information Centers

The Online Dictionary Vajehyab[1] defines informing as the process of producing, collecting, organizing, storing, retrieving, translating, converting, applying, and transmitting the information. The Collins Dictionary defines the Information Center as a place where you can get information. The McMillan Dictionary defines the information center as a place where you can get information or advice. The McGraw-Hill Dictionary also defines an information

[1] https://www.vajehyab.com

center as a place that is specifically designed to store, process, and retrieve information for dissemination at regular intervals or on-demand and selectively according to user needs. A Cyclopedic Dictionary of Library and Information Sciences defines an information center as an organization whose job is to provide information and clear and principled answers to questions. In the Concise Dictionary of Library and Information Science, the information center is defined as a place where information resources are accessible and its employees are librarians.

However, what is important is that in all the definitions provided for information centers, there is an information system that has the following elements:

A) Inputs (data): data, information, and opportunities;
B) Processing: programs, equipment, and storage;
C) Outputs: solutions, reports, and calculations;

C) Monitoring: decision-makers and automatic monitoring. These information systems include information technology, data, data processing procedures, and people who collect and process data. It is also a collection of information resources designed to collect, process, maintain, use, share, distribute, or provide information (Kiadi Moghadam, 2005).

3. METHODOLOGY

Information centers are a kind of organization. So, an attempt is made to extract the concept of holography in the organizational field. After identifying the sources concerning holographic principles in the organizational field, by searching for those principles in scientific sources, some related sources are extracted.

Relationships are examined by PLS software using structural equation modeling, which is one of the new statistical methods and one of the most powerful methods of multivariate analysis. After extracting the resources to use the content analysis method, the main keywords in the resources are collected and ranked by Excel software. After conceptually examining each of the keywords, the indexes are extracted and refined, and similar items are integrated. Finally, the holographic principles are extracted according to their key concepts. The holographic principles are then explored among the studies concerning information centers to determine their relationship with the concept of holography and to provide a suitable model for information centers.

3.1 Questions

- What is the conceptual model of holographic information centers?
- What are the dimensions and components of holography?
- What effect do holographic dimensions and components have on the structure of information centers?

3.2 Hypothesis

The holographic model of information centers provides the optimal structure and higher-quality services.

However, in the sub-hypothesis, because of the type of study that is theoretically exploratory, the researcher seeks to find answers to the questions.

3.3 Statistical Population

The statistical population in the first phase includes experts and elites in the field of holography, management, and information science and epistemology who have relevant information in the field under study. The statistical population in the second phase includes managers of information centers in the public and private sectors and university departments in Iran and researchers and graduate students who have an article or research project in the field of study. The snowball sampling method is used to select the samples and form a group of experts.

The scope of the study includes thematic, spatial, and temporal areas. The study area is the information centers of Iran.

4. STATISTICAL ANALYSIS

According to the results of descriptive statistics in Table 1, 38 (63.3%) of the subjects are male and 22 (36.7%) are female. 10 subjects (16.7%) are less than 30 years old. 24 subjects (40%) are 30-40 years old, 17 subjects (28.3%) are 40-50 years old, and 9 subjects (15%) are 50 years old and older. 6 subjects (10%) have an associate's degree, 17 of them (28.3%) have a bachelor's degree, 26 of them (43.3%) have a master's degree, and 11 of them (18.3%) have a doctorate.

Table 1
Demographic characteristics of the sample

Demographic variable	Group	Frequency	Percentage Frequency
Gender	Male	38	63.3%
	Female	22	36.7%
Age	Less than 30 years old	10	16.7%
	30 to 40 years old	24	40.0%
	40 to 50 years old	17	28.3%
	50 years and older	9	15.0%
Education Level	Associate's degree	6	10%
	Bachelor's degree	17	28.3%
	Master's degree	26	43.3%
	Doctorate	11	18.3%
Total		60	100

Table 2 presents the factors, items, and factor loading of the items concerning the indicators using the Delphi technique. Questionnaires are first prepared, then reviewed in terms of writing, and sent to the selected members. The received responses are then analyzed, reviewed, and then sent to experts and managers.

Table 2
Factors, items, and factor loading of items concerning indicators

Variable	Item	Factor Loading
Holographic environment	The fit of the system to the environment	0.896
	Scanning management (SM)	0.759
	Systems thinking	0.717
	Butterfly effect	0.870
	Double-loop learning	0.826
Efficient human capital	Timely feedback	0.762
	Organizational development	0.903
	Work teams	0.904
	Organizational orientation	0.756
Dynamic capacity-building	Synergy	0.872
	Organizational intelligence (OI)	0.853
	Data storage/retrieval	0.870
	Reduced hierarchy	0.872
	Data storage	0.858
	Data storage/retrieval/cloud computing	0.706
Increasing self-management	Facilitation	0.812
	Empowerment	0.767
	Shared values	0.928
	Participatory leadership	0.874
	Self-actualization of employees	0.905
	Creative thinking	0.842
	Participation in decision-making	0.929
Intelligent structure	Self-organization	0.837
	Cybernetics	0.919
	Decentralization	0.744
	Future studies	0.775
	Data Mining/Storage	0.871
Dependence	Fast response and dissemination of information.	0.830
	Platform evolution	0.870
	The integrity of components	0.770
	Intra-systemic reaction	0.840

4.1 Kolmogorov-Smirnov test

In this study, the Kolmogorov-Smirnov test is used to evaluate the normal distribution of dependent variable data. Therefore, the null hypothesis and the alternative hypothesis are developed as follows:

- Null hypothesis: The data are normally distributed.

- Alternative hypothesis: The data are not normally distributed.

The output of statistical software concerning the normal distribution of variables of holographic environment, efficient human capital, dynamic capacity-building, increasing self-management, intelligent structure, dependency, and holographic information centers indicates that the null hypothesis is confirmed at a significance level of 5% and that the data are normally distributed.

Table 3
The results of the Kolmogorov-Smirnov test

Variable		Test value	Significance level
Independent	0.107	0.356	0.356
	0.078	0.121	0.121
	0.076	0.232	0.232
	0.117	0.302	0.302
	0.088	0.101	0.101
	0.064	0.468	0.468
Dependent	Holographic information centers	0.076	0.232

Divergent validity: In studies where there is a low correlation between tests that measure different characteristics, the tests have divergent validity. The Fornell-Larcker criterion (FL criterion) is used to examine the divergent validity of the model. This criterion determines the degree of correlation between one variable and its indicators in comparison with other variables so that the acceptable divergent validity indicates that one variable has more correlation with its indicators than with other variables. In Smart PLS software, this is checked by a matrix whose cells contain the values of the correlation coefficients between the variables and the square root of the AVE values for each variable. This matrix, which is related to variables, is shown in Table 4. If the numbers in the main diameter of the matrix are larger than the numbers in the bottom column, the model has an acceptable divergent validity. According to Table 4, all numbers in the main diameter are larger than those in the bottom column, indicating acceptable divergent validity of the model.

Table 4
The divergent validity of the model

	Holographic environment	Efficient human capital	Dynamic capacity-building	Increasing self-management	Intelligent structure	Dependence
Holographic environment	0.900					
Efficient human capital	0.066	0.830				
Dynamic capacity-building	0.336	0.057	0.805			
Increasing self-management	0.188	0.403	0.345	0.728		
Intelligent structure	0.307	0.093	0.422	0.588	0.715	
Dependence	0.057	0.767	0.092	0.179	0.138	0.826

According to the data analysis algorithm in the PLS method, after examining the fit of measurement, structural, and general models, the hypotheses are tested by examining the significant coefficients of T as well as the standardized coefficients of factor loading of each path. The relevant path is significant at the 95% confidence level and the hypothesis is confirmed if the value of the significance coefficient of each path is more than 1.96. The results of factor loading and the significance coefficient of the conceptual model can be seen in Table 5.

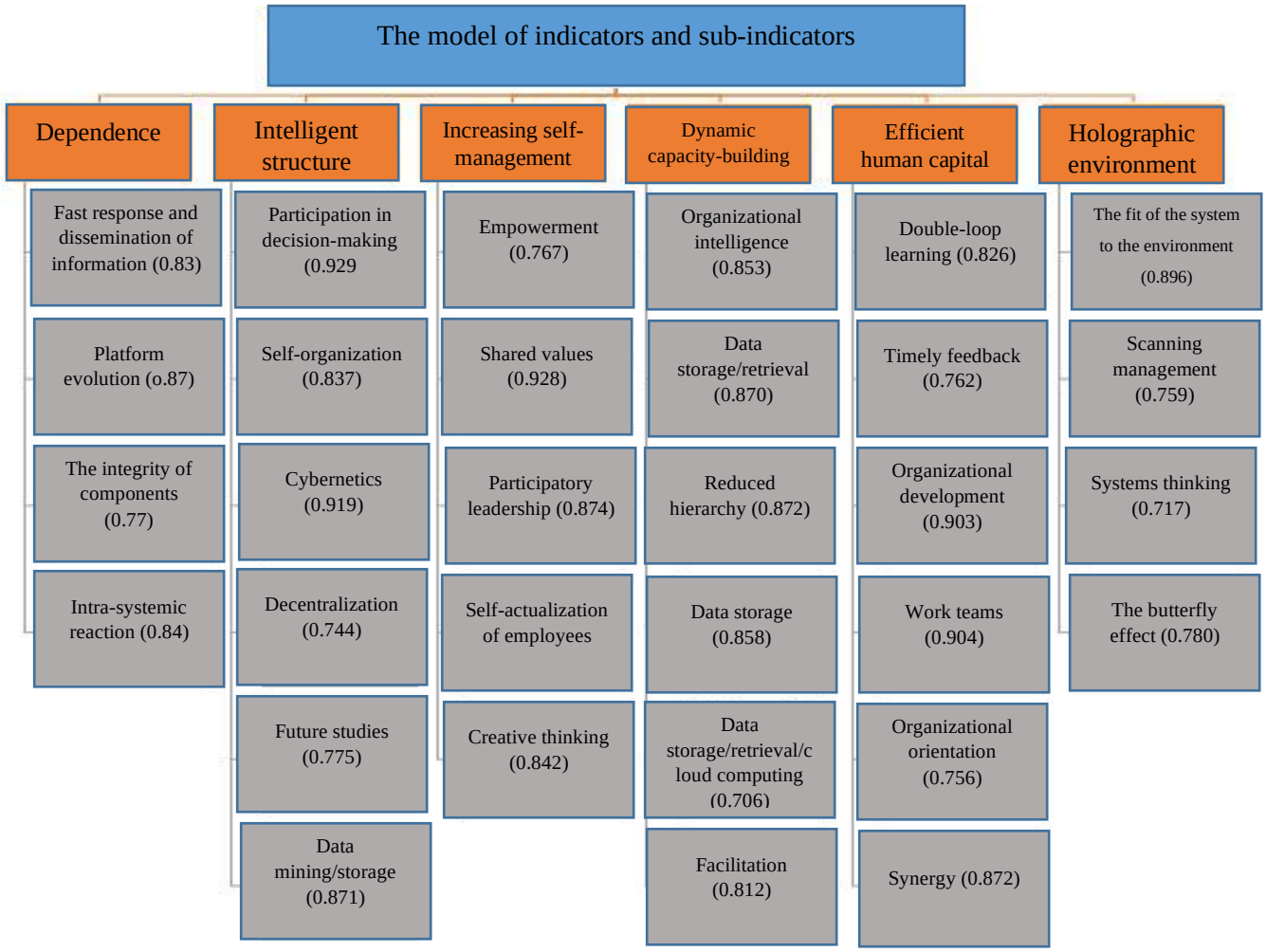
Table 5
Factor loading (Table 2) and significance coefficient (Table 3) of the conceptual model

Raw	Independent variables	Dependent variable	Factor loading	significance coefficient	The relationship direction	Result
1	Holographic environment	Holographic information centers	0.550	5.614	+	Confirmed
2	Efficient human capital		0.498	6.123	+	Confirmed
3	Dynamic capacity-building		0.539	5.313	+	Confirmed
4	Increasing self-management		0.625	12.939	+	Confirmed
5	Intelligent structure		0.492	13.018	+	Confirmed
6	Dependence		0.705	10.336	+	Confirmed

5. RESULTS

It should be noted that this study is the first to examine the holographic organizational structure for information centers and that many experts are not fully familiar with this type of model. Also, the concepts of fast response, dissemination of information, data storage and retrieval, data mining, cybernetics, and cloud computing are introduced in the holographic model. However, efforts are made to comply with information centers as much as possible. Based on the results of the first hypothesis that the holographic environment affects the holographic information centers, it can be suggested that holographic information centers can be established using the fit of the system with the environment, scanning management (SM), systems thinking, and the butterfly effect. Based on the second hypothesis that efficient human capital affects holographic information centers, it can be suggested that holographic information centers can be established using double-loop learning, timely feedback, organizational development, work teams, organizational orientation, and synergy. Based on the results of the third hypothesis that dynamic capacity-building affects holographic information centers, it can be suggested that information centers can be established using organizational intelligence, data storage/retrieval, reduced hierarchy, cloud computing, knowledge management, and facilitation.

Based on the results of the fourth hypothesis that increasing self-management affects holographic information centers, it can be suggested that holographic information centers can be established using empowerment, shared values, participatory leadership, self-actualization of employees, and creative thinking. Based on the results of the fifth hypothesis that intelligent structure affects holographic information centers, it can be suggested that holographic information centers can be established using participation in decision-making, self-organization, cybernetics, decentralization, futures studies, and data mining/storage. Based on the results of the sixth hypothesis that dependence affects holographic information centers, it can be suggested that holographic information centers can be established using rapid response, dissemination of information, platform evolution, the integrity of components, and intra-system reaction. Information access methods and processes are rapidly evolving, and information management and access speed are the main issues facing information centers. To achieve this, methods must be used to crystallize the characteristics of the whole in each of its parts. Unfortunately, the implementation of many ideas has been challenged so far due to the lack of scientific, logical, coherent, and practical models. Holographic design is a method that allows information centers to achieve this goal. Accordingly, in this study, a model for holographic information centers is designed and explained. The Delphi qualitative method, principal component analysis (PCA), and the quantitative method of interpretive structural modeling (ISM) are used to design and develop this model and identify the relationships between the components. ISM is suitable for analyzing the effect of one element on other elements. This phase leads to the identification of components affecting holographic information centers and the design of a model for them.



6. RECOMMENDATION

Given the importance of holographic principles in organizations, especially information centers, the following :recommendations are provided

- Avoiding excessive specialization of tasks;
- Granting freedom of action to units and sub-units and making them autonomous;
- Enabling units to respond independently to environmental needs quickly and on time;
- Developing flexible organizational rules;
- Enabling the flow of information from all centers to parts using systems such as knowledge management;
- Forming a balanced and active leadership team;
- Creating a learning space and dynamic confrontation with new problems using double-loop learning;
- Strengthening the organic structure in organizations and distancing them from the mechanical structure;
- Organizing tasks so that people are independent and free in their work activities;
- Avoiding limiting people to a fixed and specific framework;
- Gaining enough maturity by information centers to apply new concepts.

Acknowledgments

The Vice-Chancellor for Research & Technology of the Islamic Azad University of Hamadan is thanked for its financial and spiritual support and cooperation in conducting this study.

Dr. Seyed Ali Akbar Famil Rouhani and Dr. Atefeh Zarei are thanked for reviewing the study and providing constructive comments.

The honorable judges are thanked for their constructive and scientific comments.

The authors consider it their duty to thank Dr. Behrouz Bayat for reviewing the study and providing valuable comments.

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