

The Role of Cloud Computing Technology on Principle of Learning Holographic Organizations

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ABSTRACT

Nowadays, due to dynamic and increasing environmental changes, there is a need for flexibility in organizations for their survival to meet these changes; therefore, they are forced to grant more freedom of action to their units, and sub-components in comparison with the more stable environments. Since becoming independent and being a self-governing unit could become problematic due to lack of centralized affairs, therefore, holistic organizations or holographic organizations were designed; so that they can crystallize the general characteristics penetrated into every single the individual components of the organization. One of the significant characteristics of such organizations is self-organization, independence and freedom, flexibility, learning, and compatibility to achieve these holographic organizational objectives, is to transform it to learning organizations. To create a learning organization cloud computing will be of great help to the organizations. In this paper, while introducing holographic organization and its fundamental principles, the role of cloud computing technology in improve learning in such organization will be discussed as well. The results indicate the role of cloud computing in achieving a competitive advantage (merit) through learning in holographic organizations.

KEYWORDS: cloud computing, holographic organization, learning organization

1. INTRODUCTION

In today's complex environments, organizations have to deal with environmental complexities by moving toward increasing internal complexity, and also increasing their components and sub units as well. Therefore, organizations must be in search of procedures by which to convert holistic properties into crystallized individual components, so as each component mirrors the whole. The process of designing holistic organizations, or holographic method, is a manner by which organizations can have the opportunity to achieve the mentioned goals. [1]

Holographic performance is very similar to brain function. Holographic properties of the brain is derived from some kind of a communication among the nerve cells, and each neuron is connected to thousands of other neurons, which forms and results a special functional system, that both general and specialized [2].

This metaphor, provides principles, and theories commensurate with the information age, and emphasizes on two rings learning instead of single ring learning. In single ring learning all standards are predetermined.

However, in two rings learning (learning, learning), the standards can be adjusted and reset, and learning rings should be increased. The weak points of this metaphor, on the one hand are due to their lack of attention to the opposition from self-organized, and on the other hand, order and structure ruling the organization. [3]

Today, most researchers believe that the ability to learn faster than the competitors is a very important source in achieving a competitive advantage. One of the new technologies that facilitates learning, and can contribute to the holographic organizations, is cloud computing. Cloud computing is also known as the "cloud" which is a software platform with high capacity for extensions, and promise a very fast access to software and hardware on the internet, and it also facilitates management processes, and ordinary non-expert users to the internet. Learning through the use the cloud has been the center of attention of many organizations, and the ability to publish and access to information and knowledge in any geographical point over the internet. The increase in complexities, globalization and mobility are among the factors that makes this innovation more important for organizations, and having the ability to work with cloud learning is a key skill for both managers and employees.

2. A review of research literature:

2.1 cloud computing:

Cloud computing is a rapidly growing technology that has registered itself in the next generation of industry business and information technology.

Cloud computing implies the application, the hardware and IaaS (IaaS, such as Amazon's EC2, and Flexiscale and refers to hardware equipment which Provide cloud services by service providers, which are used by the end users on demand.), and are also delivered via the internet, and remote data centers. Cloud services have been converted into powerful, large-scale structures to perform complex computing tasks, which include roles of information technology, starting from recording to calculations, and database and application services. The need for recording, processing and analysis of large amounts data have made many organizations to choose cloud computing. At present, a large number of scientific applications for extensive experiments, we have been utilized in the cloud, and due to the lack of providing computing devices local services providers, there are no reduction of capital costs, and the increasing volume of data produced and used in experiments continues to rise [4].

Cloud computing is a support model through the use of information technology can provide services upon customer request for computing services (both software and hardware) regardless of the users systems and their location independently. Customers have access to the cloud-based application programs through web browsers, while the software and data is stored on an internal server, or the server in a remote location. Cloud computing is divided into two following forms: general cloud, and private cloud [5]. Cloud computing is a set of computer resources and services which is presented on demand through internet by an organization. General cloud infrastructure is to provide extensive services to the public.

These types of clouds are managed through businesses and their multiple partners, which are somewhere outside of the cloud physical location. using the general cloud, and given that the cost of application programs is covered by third party providers end users will be able have access to application programs at affordable costs. Since users only pay for what they use, as a result the cost is held at the minimum. In contrast, private clouds are a kind of cloud infrastructure on location that that different user in different businesses units in one company has access to it. The need for lower risk and higher security level makes private clouds to appear as an interesting concept. In fact, the choice between private and general clouds depends on the costs and benefits related to the level at which security and flexibility is offered. [5] Juniper research predicts that the use of cloud application and programs will increase and amounts to approximately 9.5 billion in 2014. Such applications programs improves mobile cloud performance and the user experience, however, the limitations imposed by wireless communication network, the inherent nature of mobile machines, computing obstacles, impose large data recordings.

2-1-1 Advantages of cloud computing

- cost reduction:

The ability to quickly increase or decrease the use of hardware resources and software and in some cases acting automatically.

- Scalability:

"Pay as you use" provides more effective control on cost.

- Reduced investment:

Risk reduction, rapid progress on the proposed resources (hardware and software), and eliminating errors in computer programs.

- Support:

Enjoying the most advanced security processes, existence, and performance of experienced and knowledgeable service provider in this type of service.

- More security and accessibility:

Access to resources from any geographical point, and the ability to test and evaluate resources without any charges [6].

2-2 Holographic organizations

The lexicon for holographic is formed from (holo), meaning whole or all combined with (graph) which means picture or image, and it literally means the whole image or the whole writing[1]. In terms of evolution, three separate holographic perspective has been drawn:

- Seventeenth century (rising of scientific beliefs), and at the same time serious efforts were formed to eliminate religious beliefs, and were replaced by scientific beliefs based on cause and effect, as well as, emphasis on the unity instead of diversity.
- The second period began in the twentieth century, which was called the dawn of rational logic, and once again, there occurred changes in the course of science, and again, cause and effect were replaced by scientific evidence, again diversity became popular.
- In the first decade of the 21st century, holographic thought was formed, in which people like Bohem and Pierce are the pioneers of this period. The features of this program include the following: attention to unity, and diversity, and emphasis on and integrity. [7]

Table 1: A summary of the achievement of researchers in different areas of application related to holography

findings of research	Researchers/ researcher	Title / area of research results
presence of similarities between the components and the whole In nature	Polish mathematician called fractal geometry Benoit Mandelbrot	Geometric fractal
understanding of the components through significant whole Visible image of complete picture of an object in small parts and broken hologram	Max Wertheimer (1880-1943) Wolfgang Kohler (1887-1967) Kurt Kafka (1886,1941)	Gestalt theory
Wide distribution of storage at all levels of brain and the lack of a single point the possibility of removing about 90 percent of a mouse membrane without hurting learning	Denis Glore (1948) Peribram(1920) Carl Leshly (1950)	hologram neurology psychology
existence of order within chaos	Edward Lorenz (1965)	chaos theory
existence of inner unity and order in apparent diversity	David Bohem(1980)	physics

Metaphor of organization was first discussed in a book named Metaphor of organization is similar to brain by Morgan (1988) in which he examined holographic and stated that there are five factors as the design principles of holographic.

Morgan's key idea in the design of the holography is to implement the overall characteristics of an organization in all its components (the definition for holography).

This total reflection in all parts and components is done through four operating culture, networked intelligence, in organizational information systems, organic organizational structure, and holistic teams, and diversified roles. He continues to redundancy of function, requisite variety, and minimum critical specification, and learning to learn as the forming instruments in a holographic organization. [8] In his book of organizational metaphors Morgan quotes from Fred Emery (1969) that the systems having a redundancy of functions, have holographic properties from the point of view that all its components activities are in line with the overall function. This issue generates a completely new relationship among the components and the total entity of the system.

The systems which are designed on the redundancy of parts (such as assembly lines where production staff, supervisors and quality controllers play a specific role) the whole system is a collection of pre-designed components, whereas, all parts manifest a holistic nature of identity, because if at any time, and in respect to the requirements and different issues anything unusual occurs in the system, they transform themselves to meet the demand. [3]. In the redundancy of parts, when a problem occurs in the assembly line, it usually interpreted as a "problem of another person", and for those who work down the assembly line, they often are not aware of the cause for the problem, or do not have the power to deal with it. Corrective operations to eliminate the problem should be started and controlled from somewhere else.

Morgan view of principles of holography, is summarized in table 2, and based on overall concept, the relevant factors are extracted.

Table 2: Summary of Morgan views on the design of the holography [3]

index	factor	row
self-organization	total reflection on all components	1
flexibility	Redundancy of functions	2
freedom	minimum of essential rules and vitality	3
flexibility	the need for diversity	4
learning	learning to learn	5

Kenneth Mackenzie published a book called organizational hologram in 1991, in which he explains the features of holographic organizations. He visualizes the organization to do the things that is not possibly expected from each part, but only possible with the combination of components, therefore, organization should have an added value which is more than the value of each part to be called an organization. He also finds the proposed theories about the organization inadequate, and claims that theories that have been proposed about the organization provide an in-complete view, and a fuller look, is look that he mentions under the term of a holographic organization. His view of holographic organization is a situation in which all parts and members contribute and are complement to each other, as in a hologram, in which all parts function properly. A summary of holographic characteristics raised by him is given in table 3. [9]

Table 3: indices and components extracted McKenzie theories [9]

index	factor	row
self-organization	simultaneously has basic characteristics in all parts as well as the whole system	1
self-organization	minimum effort is required necessary to guide, control and coordinate between the units	2
self-organization	Is capable of recording, reproducing the information on his own	3
flexibility	is resistant to the lack of certainty and interference	4
flexibility	is responsive to changes, and is flexible	5
self-organization	Loss of a single part, the required main organizational features remains intact	6
self-organization	Strongly agrees with the leadership following principles	7
self-organization	Is intolerant of the leaders whose actions are not based on the basic principles of performance	8
flexibility	functions on adaptive performance	9

Johnson (1991)[10] in his article "holographic model of the organization" has extracted and collected holographic standards of organizations from various sources and, in particular, a survey of work performed by Bayer (1985), Miller (1978) and Aykaf (1981).

Miller (1978) in his book titled living systems pointed to the importance of information flow in the organization, and believes that it is similar to the flow of matter and energy in the organization. Bauer (1979, 1981, and 1985) has discussed the control functions and management information flows. Also, Aykaf in his book, the interactive planning (1981), defines and maps the future ideal organizations. A summary of characteristics and holographic organizations criteria is presented in Table 4. [10]

Table 4: A summary of comments and issues proposed by Johnson [10]

index	Factor	component	row
flexibility	less control levels	fewer management levels	1
flexibility	decentralization	Discontinuing centralized control and management model	2
flexibility	flat structure	Transfer to a more flat structure	3
independence and freedom	individual responsibility	greater emphasis on individual responsibility for communication and interaction	4
freedom	dispersion of information resources	collecting information through diverse processes	5
Flexibility/ freedom	-	Flexibility and freedom of members in organization	6
organic structure	joint planning	The participation of all people in the planning process	7
self-organization	-	Cybernetic principles as the basis for the design of organization	8

In holographic which is one of the properties of human brain, the whole is reflected to the parts in such a way that each component can act as the whole. [11]

Holographic is one of the facts of universe which has been somehow pointed to in different areas of application (philosophical and empirical). For example, the theory of similarity of Plato as well as his mentioned theory somehow brings up the existence of holographic properties in the creation. In the theory of similarity every object and being in this world owns a truism which is derived from a much higher and well-developed truism which is impossible to understand. [12]

Quranic and religious culture have also different notations pointing to holographic effect, for example, in verse 32 from Sura of Mobarakeh mentions that "anyone who kills others not because of Ghesas, and not because of corruption, is considered as if he has killed all people, and whoever renders vitality is considered as if he has rendered vitality to all people. "(Quran, translation, Ayatollah Makarem Shirazi)" Killing one person, is considered equal to killing all people. In other words, one can represent the property of the entire, and be converted into all, and manifest the properties of the entire whole.

2-2-1 The properties of holographic organizations:

In general categorization, properties of a holographic organization can be stated as follows:

- Organizations with superb memory organized in a decentralized organization,
- Different perspective to management,
- Capacities, special information and control distributed in such a way that any member can become a vital component of the total,
- Holographic organizations, are the smart brains of the organization itself which are the reflection of a learning organization [1]

3. The principles of holographic organizations:

Innovatively, Morgan designed a new approach to do his work in establishing the concept of holography by using principle of abundance of functions of Emery (1967), principle of diversity necessary principles of Eshby (1952, 1960), learning concepts for learning of Bitsan (1972), and the least critical property of, Herbert (1974) and (Eshby, 1960) as is shown below:

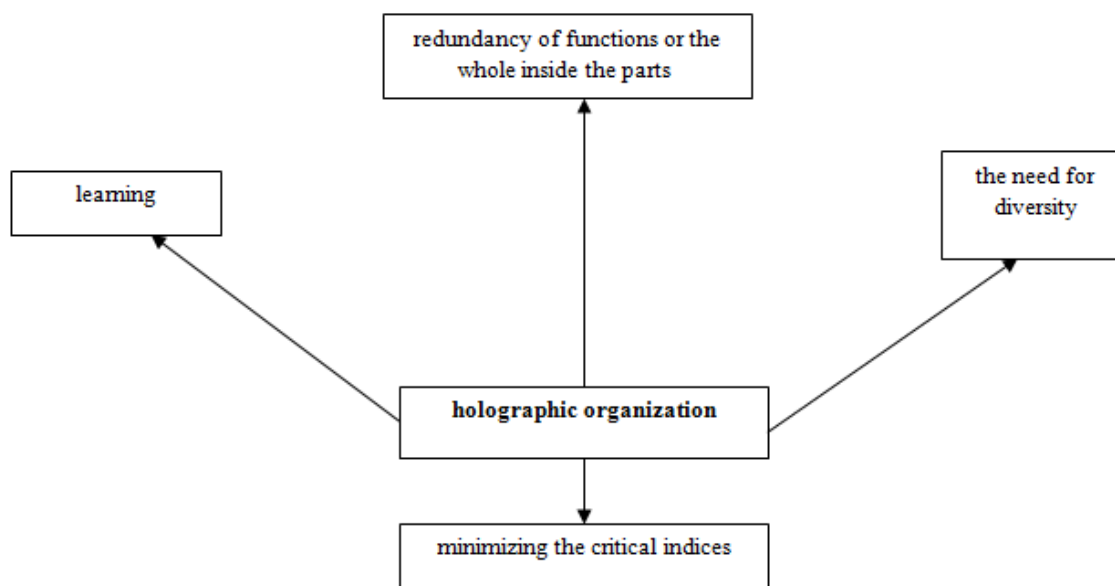


Figure 1: Principles of holographic structure (Morgan, 1986)

First principle: redundancy of functions or the whole inside the parts: Fred Emery (1967) Australian theorist has proposed two methods:

1. Redundancy of parts, which is designed so that each part has a specific function, in this method, the ability to redesign and changing the system is the duty of two parts who are responsible for this task.
2. Redundancy of functions, in this Method, rather than adding parts, new tasks are allocated to existing

functional parts , instead of having unique and specific activity, parts are able to take several jobs combined [13].

Since the overall ability of the systems having a redundancy of functions is also present in their parts, they have a holographic property which all parts manifest the nature of the whole.

The design of the whole is possible through four methods:

- Through an organizational culture,
- Through the organization's information systems and network intelligence,
- Holographic structure,
- Diverse roles, and teams having the whole tendency.

The second principle, the need for diversity: It has a significant impact on the design of each aspects of the organization. The objective is to create an environment which is ready to accept it with all its diversity, and that the organization responds to the complexity of various issues. Ashby (1960)[14] states that the diversity and complexity inside the system should be proportionate to the complexity of the external environment [15].

The third principle, minimizing the critical indices: According to this principle, the primary role of management and organizational designers is to facilitate, and strengthen the conditions for future capabilities. This principle emphasize on avoiding too much concentration on one particular activity, and supports flexibility, and mentions that if the systems is planned to be self-organized, then it must have the benefit of certain amount of freedom of action.

The fourth principle, learning: the ability of the system for self-organizing, and controlling integration depends on its ability for learning process of a single ring, or a double ring. This process allows the system to set the values by referring to common norms to modify its behavior as well. To create holographic systems, we should increase the learning capabilities of the system. In other words, this principle simply guides us to teach people how to learn. We must establish a learning process in which people learn how to deal dynamically when encountered with the problems. To achieve this goal, employees in the organization must:

- consider environmental changes,
- make efforts to anticipate future changes,
- use the ring learning,
- use contingency plans to deal with the new issues.

4. Learning, and holographic organizations:

In organizational learning, paying attention to education is considered as a part from the whole while at the same time each one of those parts is looked at as a whole as well. For example, education is a part of learning, education affects on how to materialize learning, and the way we apply these approaches affects our learning which gives meaning and purpose and objective to education and the learning process as well. In organizations, training and learning is performed with special methods, also, learning, education, training and personal development, intellectual growth and development, all affect and influence the objective of the organization.

To understand the complexity of these relationships at various levels, we can visualize these interaction and these functions in the individual and the organization as a network chart so as, to easily achieve an insight and understanding more readily. (Figure 2) [16]

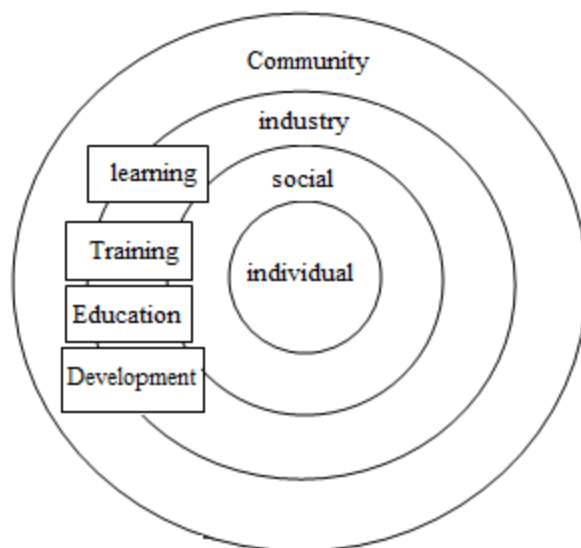


Figure 2: Understanding the holographic relationship between education, learning , development, emanating from the interaction between individual, social and organizational learning [16]

To reduce chaos in the process holographic organization, Morgan debates on how to learn the learning. The system is based and emphasizes on single ring learning which is progressing into two rings learning. In the first single ring stages, the objectives are analyzed, whereas, in two rings stages, the problem with terms and concepts are re-adjusted and combines more types and add them to the hybrids produced , and allow them to mix with environment. In a holographic organization, creating a learning culture and set up spontaneous adjustments in order to achieve optimal benefit, it is a combined usage of all four interdependent principles [17].

Ultimately, everyone in this type of organizational structure has access to professional information, and learning opportunity, and enjoying the power of quick decision making, and supportive response. In these organizations, knowledge is not stored in a special place but flowing around in the whole organization. Looking from one dimension, people are of the small part of organization, and from the higher and different dimension, they are the organization themselves. This perspective causes an ongoing dynamics organization, and in addition to continual progress, each individual is striving toward organizational improvement.

5. The role of cloud computing in achieving holographic organization

How does cloud computing improve learning in a holographic organization?

Organizations use cloud computing potential as an investment on optimized learning services for their employees. Because cloud computing is a new emerging technology, the organizations using this method strive to train their employees. Cloud computing is a new way for organizations to provide educational services, and offers business services for their customers. Due to more flexibility and being cost effective, organizations can easily use cloud computing. Cloud learning is based on cloud technology. This technology supports and provides learning software through the provision of data which can be available in an online environment. Cloud learning is considered a kind of learning service. Because, when it combines the training methods, and uses different form of education such as learning through cloud learning within the organization, and organization, and learning by the colleagues, could bring about an extensive educational opportunity. Cloud learning is a key skill in management which is a significant technology for learning, and the development of professional careers, and to understand innovation in technology which could change the global business environment. Since, this technology can contribute to organizational development, and facilitate training activities; adaptation to cloud learning is an essential skill for an employee. Cloud technology is used by many organizations as a way for common partnership, and dissemination of information at any time and location. The development of cloud-based tools has been coincided with the increase in cloud-based communications and social cooperation. Traditional tools for training and education such as books, newspaper articles and blackboard, are all replaced by an integrated cloud technology in organizations. Organizations are using cloud technology to strengthen communication,

critical thinking and problem solving. Cloud technology, enables the staff to maintain communication with each other regardless of location[18].

Clouds provide the content at any time and place, and in a flexible framework, training-minded way for the users.[19] And thus, this innovation furnishes an image of work force in the real world. Some of the organizations store a readymade collection of PowerPoint on cloud, which can be used in application programs such as mobile so as to save employees' time while attending training courses. These interactive presentations which are stored on clouds make visual and textual education possible which are also usable on online courses. Therefore, teaching staff can be pursuing the statistics of accessibility, to learn how people realized the value of education through technology. Cloud technology means that people from different parts of the organization can work together by common partnership and share their learning experience throughout the organization. Since in a face-to-face training session, they clearly expressed their educational expectations, and try to run the course suited for their own time, therefore, the face-to-face situation in cloud is a driving force for learning. [18]

In addition, school administrators realize the benefits of cloud computing, and many of them use the holographic technology in their organizations.

Some of the benefits of cloud computing in learning include:

- since the cloud is an open system, learning contents the system is easily accessible, contents in the cloud is easily manageable and resources are available and high capacity and scalability to meet the needs of users.
- Clouds will cause execution, and quick review of the programs. The contents are easily and quickly released, emanated, and revised [19].

In comparison with the text distribution network which quickly enables the customers to receive the data they need through a geographically close server to them, a cloud-based learning system is a powerful tool for the correct distribution of the contents of the text in different geographic environments. Using the cloud learning, employees are able to access learning tools, to disseminate knowledge, search the resources and go beyond business ecosystems. They will be able to benefit from the lessons learned and a high level of operational activities in the organization. Users learn more, will be more efficient, and will have more innovation which makes them to achieve sustainable advantages. [20]

6. Conclusion:

In the holographic organizations old thoughts must be dismissed, and the organization and its people are continually growing their internal capabilities, and its environment is an ideal environment in which they learn how to learn, and new patterns of thinking are constantly boiling.

A next factor is needed, and in reality, it is in need of a desirable next factor for future. (What are we going to learn, and create, and where to reach?)

Cloud computing is a new kind of information technology, and by providing software and hardware platforms for users, it creates such an internet environment which the users can at any location and time have access to educational resources at the lowest cost, and by creating an interactive space with colleagues and others combined with education methods to develop jobs and improve creativity in their organizations. This technology offers learning software which solves numerous learning problems present in the traditional methods. In this article and with long term research accomplished it was found that cloud computing technology could play a significant role in organizations striving to achieve their learning objectives.

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