

The phenomenon of Information Technology and Enterprise Architecture of Electronics City

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Abstract: Today, information technology as an emerging phenomenon has a special place in the world. Expansion of information and communication technology causes changes in many different fields, including the electronic city, municipalities and citizens. Electronic city and municipality require basic enterprise architecture. Enterprise Architecture is designed as a process based on the optimal architecture of electronics city. In order to develop electronic city, we should use enterprise architecture maturity. Therefore, one of the important needs of organizations is the choice of activities according to the existing constraints. The studies show that there is a close relation between information technology, enterprise architecture and the electronic city. The purpose of this research is to explain the concept of information technology, enterprise architecture and electronics city and what relationship they have with together. Do information technology, enterprise architecture and electronic city require each other?

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1. Introduction

Undoubtedly, today information technology has created developments in all humanity social and economic areas and its impact on societies is so much that today's world is becoming from a traditional and industrial society to an informational society so fast. The term information technology or information and communication technology has found its global position in two last decades as an innovative, emerging and powerful. It seems that the various applications of information technology will affect all the daily affairs of the communities directly or indirectly soon. Influence and development speed of this phenomenon is so much so than now expected to make enormous changes in social structures that one of these developments is to create electronic city and its architecture. [1]

In fact, electronic city is the electronic and virtual model of activities in a city with the same relations and functions and same complexity of issues in it. It is necessary to use architecture in order to design an efficient electronic city. The architecture of an electronic city is a high level of abstraction that in result of it, useful analysis of the characteristics and properties of various parts of the electronic city is possible. [2] The architecture in the area of information technology, known as enterprise architecture. Today, the impact of the enterprise architecture is much so that not to use it considers as a sign of the inability of organizations to optimize management of information technology. Enterprise Architecture is a macro attitude to the organization's mission and functions, work processes, data entities, communication networks, hierarchies and order of doing tasks in an organization in order to

creating an integrated and efficient information systems. [3] To make enterprise architecture more successfully, the certain framework should be used. Therefore, framework considers as the most important part of enterprise architecture. The appropriate framework selection is one step of the architectural project. Zachman framework that is like "Mendeleev table" for enterprise architecture has a two-dimensional structure which considers six aspects of data include process; place, individuals, time and motivation from five viewpoints include programmer, organization owner, designer, builder and contractor. Zachman framework is so important because most of the enterprise architecture frameworks which have introduced since providing Zachman framework in 1993 use it and many concepts have been used in this context. Hence, zachman framework plays prominent role in essays and research literature as mother framework. [4,5]

2. What is information technology?

Speed and productivity of science in the world and new methods of information gathering and distribution on one hand and human increasing need to use different aspects of information on the other hand, led to emerge special social period named information age. The consequence of such developments led to emerge new form of technology known as information technology. [6] Living in a society based on information technology has three basic features:

- a) Shorter distances
- b) Flow of information as the main artery of life
- c) Converting information to product [7]

The affecting speed and development of this

phenomenon is so much so that now expected that fundamental changes occur in the cultural, economic, social and political structures and traditional foundations of society governance and new management system will have been introduced. Information and communication technology and its applications in the world was so affective so that world leaders formed the basis of information society by holding two major meetings (in Geneva and Tunis in 2003 and 2005 AD) and prepared themselves for further changes by providing proper and scientific programs for the global information society. More developed countries (that have acceptor systems to confront with new technology) accepted potential benefits and risks of information and communication technology and use it. Some developing or poor countries which don't have enough information about benefits and opportunities of this technology or necessary economic facilities to utilize this phenomenon, couldn't progress in this area. There are countries don't have financial problems, but they consider this emerging phenomenon ideologically and cause delay and prevent their people to use it. Unfortunately, this approach cause irreparable damage imposed to the society. [1]

Therefore, information technology is a branch of technology for study, designing, development, implementation, support and manage computer-based information systems, particularly software hardware computer applications as well as quick access to information and doing routines regardless geographical distances and time limitation.

Compared to other technologies, information technology also has the following features:

- The ingredient is information or mind raw material
- It can improve by computers
- The final product is an abstract product
- It doesn't have location restrictions
- It doesn't have devastating impact on environment
- It uses hardware technologies to create powerful and fast processors to do computer complex computation. [8]

Information technology has changed the way of working people and state organizations and also has changed the economic and social affairs, and even the way people think. Therefore, information technology plays a significant role in citizens' life. Finally, information technology in the widest sense, includes all aspects of computer technology and as an academic discipline, provides issues of user protecting and its needs in an organizational and societal context through the selection, creation, implementation, integration and management. [9]

3. Enterprise architecture

In the middle of 1980, John Zachman, the Consultant business plan, developed in the Zachman Framework, which is designed to serve as a blueprint, or architecture, to facilitate the integration of IT systems. The "enterprise," for which architecture is created, refers to "The one area and the mission of the organization or rather than transcends organizational boundary (e.g. financial management, homeland security)" represents the architecture of the "big picture" view of how the enterprise operates and offers his services. Enterprise architecture (EA) serves as the blueprint of the business operations of the organization, and knowledge and technology necessary to carry these operations, both currently and prospectively. Back to you Why not be published tool. It is to comprehend it to be scalable and to the nature of the increase of the future needs. EA represents the business of design-driven approach to management that emphasizes interoperability and data sharing [10].

So enterprise architecture (EA) is a full expression of the company, a Master Plan "acts as a cooperative force" between aspects of planning activities, such as goals, visions, strategies and governance principles, aspects of the business such as business terms, the organizational structures, tasks, activities and information aspects of automation such as information systems and databases, and the technological infrastructure of the business such as computers, operating systems and systems networks.

In a large modern enterprise, a rigorously defined EA framework may require vision capable of acquiring "whole company" in all its dimensions and complexity. Enterprise Architecture (EA) program supported by a framework and approach that is able to coordinate many facets that make up the fundamental essence of a business in a holistic approach [11]

Architecture is usually divided into different types of architecture or enterprise or ownership. For Aerts et al. (2004) identify three domains of architecture, in which she replied: [12]

- Business architecture defines the nature of its business environment.
- The information system architecture (IT Architecture) details the information system components and business interaction.
- Your platform architecture (or architecture) architecture is the kind of resource that was being done to lay a platform for the construction and operation of systems in the enterprise. [13]

Enterprise architecture definition has changed and evolved in recent years. America electronic government law in 2002 explained the following meaning for enterprise architecture:

- A database of strategic information that will determine the mission

- Information that is necessary to accomplish the mission
- Technologies that are needed to accomplish the mission
- Transitional processes for implementing new technologies in response to changing needs and include three key parts:
 - a) Current architecture
 - b) Optimal architecture
 - c) A transitional program [14]

Two parts of enterprise architecture are management and description method.

- a) Management plan is in line with the following:
 - To converge resources include two subjects (resources planning and standards certainty)
 - Standardization policies include resource integration at the state level
 - support of decision making include financial control and configuration management
 - Avoid of making resources useless include getting help of life cycle for development and management
- b) The description method is in line with following:
 - Enterprise Architecture approach includes an framework of models and methodology of applying architecture
 - The current architecture includes a look at the status quo, strategy, processes and resources
 - The optimal architecture includes a look at the status quo, strategy, processes and resources
 - Architecture management program, including a plan for transition from the current situation to the desired situation [15]

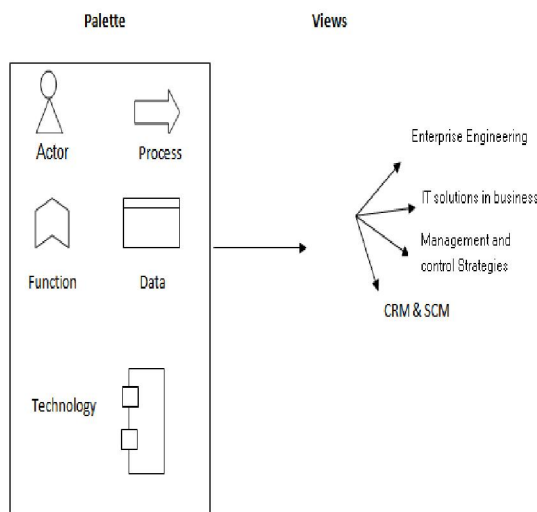


Figure 1: Enterprise Architecture

3.1. Enterprise Architecture Maturity Model

A copy follow the way of organization to the enterprise architecture program matures, and lays benchmarks to measure performance and the way is a natural progression in the development of enterprise architecture. It is found in the Tool-Kit provides guidance for the development process.

In the following, each step begins in the writer of Enterprise Architecture Model is defined. Each step contains statements that are indicative of the degree to which the EA here. This statement of Enterprise Architecture has been organized in the following categories:

- Administration - the government and Responsibilities
- Council - EA program road map and implementation plan
- Framework - the processes and templates for Enterprise Architecture
- Blueprint - collection of the actual standards and specifications
- Communication-education and distribution of EA and Blueprint detail
- Compliance - adherence to published standards, processes and other EA elements, and process and from the track to the proof of the signs of hypochondria, the Integration - touch-points of management processes to the EA
- Involvement - the support you through the organization of the EA. [16]

Enterprise architecture maturity assessment models mainly include six maturity stages and in each stage provide criteria for evaluation of architecture and organization project that according to these criteria, the current maturity level of organization has been identified and are planning to upgrade to the desired level. In general, implementation of IT for maturity models is not the main goal but they are tools for assessment. [17] Enterprise Architecture Maturity Assessment goals include increasing awareness, identifying weaknesses; identify priorities for improvement etc. [18]

The important and valid frameworks of enterprise architecture maturity are [19] (2002) EAMMF, EAMM (2003) [20], E2AMM (2004) [21], OMB (2005) [22], GARTNER (2005) [23], Oregon State of (2007) [24]. Each of these frameworks using certain indicators measures the maturity level of enterprise architecture. [25]

Table 1: Characteristics of Assessment Framework of Enterprise Architecture Maturity Model

Framework name	Provided by	indicators
EAMMF (Enterprise Architecture of Maturity Model Framework)	GAO Five levels	<ol style="list-style-type: none"> 1- Showing commitment to perform activities and tasks 2- Opportunity to accomplish activities 3- Confirming activities and tasks by products and following results 4- Survey of successful and satisfactory completion of activities by measuring quantity and quality
EAMM (Enterprise Architecture of Maturity Model)	NASCIO Six levels	<ol style="list-style-type: none"> 1- Rules and Regulations 2 - Planning 3 - Framework 4- Business Plan 5-Communications 6-implementation 7 - Integration 8 - cooperation (synergy)
E2AMM (extended enterprise architecture maturity assessment)	IFEAD Six levels	<ol style="list-style-type: none"> 1- Mutual influences business strategy and information technology strategy 2- Extensive Organizational participation 3- Executive management participation 4- Commercial units participation 5- A department for extensive enterprise architecture planning 6- Development (implementation) of extensive enterprise architecture 7- Results of extensive enterprise architecture 8- Strategic monitoring 9- Organization program management 10- extended enterprise architecture 11- budgeting and purchase strategy of organization
Maturity assessment model of Enterprise Architecture to governance management and budgeting (OMB)	OMB Six levels	<ol style="list-style-type: none"> 1- change (oriented architecture strategy - strategic orientation) 2- integration (ability to work together - data -business logic-interface) 3- Convergence (components - technical platform - Performance - Security) 4- Convergence of business (strategic goals - and business goals)
Maturity assessment enterprise architecture framework GARTNER	GARTNER	<ol style="list-style-type: none"> 1- Scope and Capability of Enterprise Architecture 2- Support and participate in board 3- The process of defining enterprise architecture 4- Business concepts 5- Enterprise Architecture Concepts 6- Defining desired situation 7- Enterprise Architecture team 8- Effects of enterprise Architecture
State Enterprise Architecture Maturity Assessment Model Oregon	State of Oregon Five levels	Gartner indicators have been used and several sub-indexes are considered for each one.

4. Electronic city

One of concepts has been studied widespread in advanced societies in recent decades and has been implemented successfully in some countries is electronics city. The term "electronic city" was proposed in 1994 and in a conference about Digital city. This program administered in 1996 in some European cities like Helsinki and Amsterdam. Electronic City that is along with the development of information technologies in different countries enters to the social and economic in recent decades is the use of information and communication technologies in order to provide municipal services, timely and directly to citizens 24

hours a day, 7 days a week. Electronic City provides facilities to relevant access to urban information and services and wider opportunities for people to participate in the processes. There are many definitions of electronic city. In other words, in an electronic city all services needed by citizens are met through a computer network. According to this definition, we can say that definition of electronic city is a relative concept in the sense that the greater number of computer services be provided, electronic city be established better. [26] "Electronic City is a city where the opportunities created by Information and Communication Technology in order to increase success

and effectiveness of the investment.” Odendaal said. Electronic city will make easy participate in local government, improvement of local service and increase of operational and administrative efficiency. [28] This city is a proper environment for living, leisure, work and effort. People in electronic cities have more time for leisure and rest and economic growth and productivity in this kind of cities is more than current traditional cities. There are many jobs available in electronic cities and solving the unemployment problem through electronic cities is clear. [29] Creating electronic city will have many effects on economic, social, cultural and political contexts for the city. In economic context, e-commerce development, e-banking and commercial relationships with neighboring countries and other parts of the world are some of its effects. Providing timely services to citizens increases their satisfaction in the use of public and private services and provides making timely groups and communities as well as timely voting and fairly distribution of facilities. Using citizens’ opinions in city management is among social effects of electronic city project implementation. In cultural context, electronic city implementation has many effects that, for example, transparency, informing, virtual training for citizens in general and specific areas, publishing digital medias for citizens, publishing news and information timely and many other cultural effects can be named. [30, 31]

4.1. Main axes of electronic city

Electronic city has been made up of many parts which their conscious and bilateral relationships lead to the formation of a virtual environment for electronic life. These parts and axes are:

- Electronic life: developing electronic cities may lead to a new style of life for people and electronic citizens which include parts such as electronic education, electronic amusement, electronic communication and electronic.
- Electronic organization: IT makes globalization possible for companies and organizations. We can have: electronic business, electronic supplies, organizations programming system, and managing customer’s relationship.
- Electronic government: includes four basic aspects of: government and people, government and private section, government and employees, government and other sections. Electronic government is a method for states to use new Technology that provides facilities in order to have access to information, government services, improving their qualities and providing opportunities in order to take part in some events. In fact there is no definite way of describing Electronic government and this may be because of dynamic and versatile technology. The purpose of IT and communication is improving efficiency, impression, clarity of information

and exchanging money and information inter and intra states and organizations, government and citizens, government and private section of electronic government.

d. Electronic Infrastructure: Provides the required ground for IT.

Electronic Infrastructure can be divided into three subcategories:

- Laws and regulations
- Human power
- Cultural and environmental situation of IT infrastructure. (32)

The relationship between different sections is shown in the following diagram:

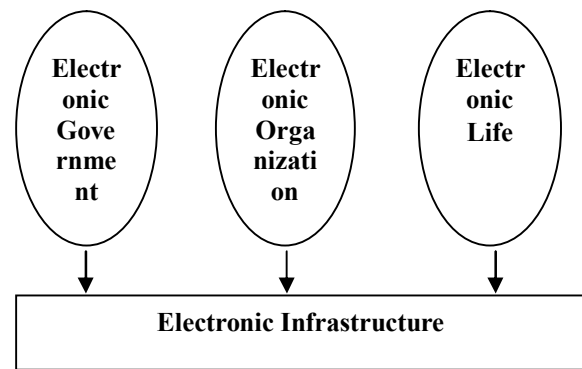


Figure 2 - Conceptual Model of Electronic City

5. Electronic City Architecture

Electronics City as a structure for electronic services to citizens can be divided into four main layers (figure 3). These layers include stakeholders, service channels, electronic services, systems and servers (platforms). Electronics City stakeholders can include all citizens, urban organizations, merchants and traders, factories, industries, and finally the government and government agencies. Different browsers, kiosks, electronic-telecommunications systems and tools can be considered among of service providing channels. Electronic city services include wide range services such as electronic banking, electronic insurance, electronic transportation, electronic health, electronic education and etc. Systems and platforms that provide electronic city services are in last layer. On one hand, these systems are distributed in different organizations and places and each one is designed according to special technologies and on the other hand, has interaction and cooperation ability to work with other systems. [33]

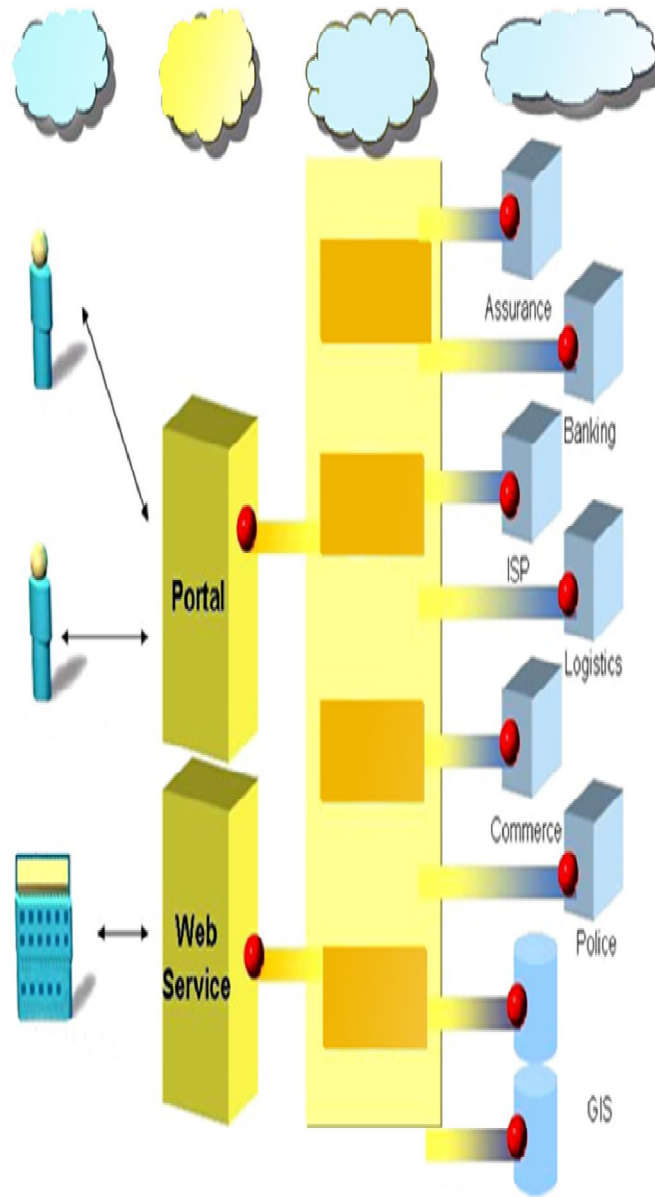


Figure 3- Layers of electronic city architecture

6. Conclusion

Today, the city is too vast and urban and social relations have been too complex. Also, we live in an age which is known as the information age. The most important indicator of information age is information technology, that along with it phenomena such as electronic government, electronic city and electronic municipal have emerged. Information technology requires and important and accurate architecture in order to provide its services to the government and electronic city and municipality and that enterprise architecture

element is presented by Zachman in 1980s. In this regard, electronic cities like physical cities are need architecture and planning. Enterprise architecture is also used for electronic city architecture. We have used enterprise architecture layers that include stakeholders, service providing channels, electronic services, systems and servers (platforms) to clarify exact meaning of electronic city. In order to electronic city architecture done correctly, citizens and government personnel and administrative bodies should train to use information technology to meet their own needs and be skillful to

provide services to others. Service channels also need to be carefully designed in order to have a trouble-free servicing. A small problem in each layer will be impaired all the system. So, we should use an architecture called enterprise architecture. Finally, based on our own research and others research we concluded that there is a closely relation between information technology, enterprise architecture and electronics city and each one of these elements needs other elements.

References

- 1- Bagherzadeh Kasiri S & Zeynali Azim A, " The role of information technology in urban management and stable development" Life Science Journal 2012;9(3) : 1250-1254.
- 2- Javad pour R, Shams F, "Performance evaluation of an electronic city architecture using colored Petri networks ",Second International Conference on Electronic City, Tehran, 1388
- 3- Samadi Avansar A, "Introduction of Architecture (specially for Managers)", Secretariat of council information, 1384.
- 4- Mahjoorian A, "Codification of service-oriented enterprise architecture planning methodology in order to cover Zachman framework", Tehran: Shahid Beheshti University, Master's thesis, Computer engineering, 1386.
- 5- Zeinoddini M, "A framework for enterprise architecture in electronic city", Tehran: Payame noor University of Tehran, Master's thesis, information technology management, 1389.
- 6- Montazer Q, "IT skills training and its impact on effective and inclusive learning", Journal of Human Sciences of ALZahra university , 12th Year, No. 42, 1381, pp. 175-187.
- 7- Abell A, "Skills for the 21Century" J. of Librarianship and information Science, 30(6), Dec. 1998, 211-214
- 8- Thomas N. Hubbard, "The demand for monitoring technologies", Quarterly Journal of Economics, may 2000: 533-560.
- 9- Barry M, et al, "Information Technology 2008 Curriculum Guidelines for Undergraduate Degree Programs in Information Technology" Association for Computing Machinery (ACM) IEEE Computer Society, Version: Posting Nov 2008: 1-139.
- 10- Jeffrey W, " Federal Enterprise Architecture and E-Government: Issues for Information Technology Management" CRS Report for Congress, Order Code RL33417, April 2008: 1-17
- 11- Schekkerman J, "Enterprise Architecture Validation Achieving Business-Aligned and Validated Enterprise Architectures", Institute For Enterprise Architecture Developments, 2003, 1-25
- 12- Aerts, A.T.M., Goossenaerts, J.B.M, Hammer, D.K. and Wortmann, J.C. (2004) Architectures in context: on the evolution of business, application software, and ICT platform architectures. Information & Management, 41, 781-794
- 13- Pessi K, et al, "Enterprise Architecture Principles and their impact on the Management of IT Investments", Electronic Journal Information Systems Evaluation Volume 14 Issue 1, 2011, 53-62.
- 14- Chief Information Officers Council, Federal Enterprise Architecture Framework (FEAF) Version 1.1, CIO, 1999.
- 15- Bernard S, An Introduction to Enterprise Architecture, Author house, 2004
- 16- National Association of State Chief Information Officers (NASCIO), "Enterprise Architecture Maturity Model", Version 1.3, December 2003, 1-16.
- 17- Office of Management and Budget (OMB-2005). "OMB Enterprise Architecture Assessment Framework", Version 1.5, May, p. 15.
- 18- Guldentops, E. (2003). "Maturity Measurement-First the Purpose, Then the Method", Information Systems control Journal, vol. 4, pp. 1-12. (www.isaca.org).
- 19- United States General Accounting Office,(2003). "A Framework for Assessing and Improving Enterprise Architecture Management", Version 1.1, p. 8, (www.GAO.gov).
- 20- National Association Of State Chief Information Officers, (NASCIO- 2003). "Enterprise Architecture Maturity Model", Version 1.3. p.19. (www.NASCIO.org).
- 21- Institute For Enterprise Architecture Development (IFEAD-2004). "Extended Enterprise Architecture Maturity Model (E2AMM)", Version 2.0, p. 18. (www.Enterprise-Architecture.info)
- 22- Greta, A., J., Brian, B. (2005). "Understand the Maturity of Your Enterprise Architecture" Gartner Research, Program Publication Date: 17 November, ID Number: G00136105, p. 4. (www.gartner.com)
- 23- Greta, A., J., Brian, B. (2005). "Understand the Maturity of Your Enterprise Architecture" Gartner Research, Program Publication Date: 17 November, ID Number: G00136105, p. 4. (www.gartner.com)
- 24- Amo, C.; Avilla, T.; Doyle, J.; Marecic, J.; Riordan, S.; Wells, D. (2007). "State of Oregon Enterprise Architecture Maturity Assessment Iteration- 1, Building the Foundation", Version 0.5, 1/8/2007. P. 4.
- 25- Mahmoodi J, "A framework for enterprise architecture maturity assessment", Journal of Information Technology Management, term 1, No. 3, Fall and winter 1388, pp. 107-120

- 26- Zeynali Azim A & et al, "Electronic city: A City of Today and Tomorrow", J. Basic. Appl. Sci. Res., 2(7), 6615-6621, (2012)
- 27- Odendaal, N, 2003. "Information and Communication Technology and Local Governance: Understanding the Difference between Cities in Developed and Emerging economies", Computers, Environment and Urban Systems, 27/6: 585-607.
- 28- Building an Information and Technology Vision for Toronto, October 2002, 2
- 29- Reddick, C., 2005, "Citizen interaction with e-government: From the streets to servers?," Government Information Quarterly.
- 30- King, S., 2007, "Citizen as customers: Exploring the future of CRM in UK local government," Government Information Quarterly, 24
- 31- Hadili B, Zeynali Azim A, "Creating electronic city necessity in stable development in 6th district of Tabriz", Beyond Management Journal, 4th year, No. 15, winter 1389, pp. 33-52
- 32- Safari S, Kanani Ahmad Begloo A, "Electronic municipality is infrastructure of electronic city", First International Conference on Electronic City, international conference hall of Milad Tower, Tehran, February 20, 21, 1386.
- 33- Mahjoorian A, Shams F, "Service-oriented architecture usage in layers of electronic city architecture", Technical Committee of Information Architecture of Iran, Secretariat of council information, 1386.

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