Methodology of Existing Attitudes towards Valuation of Electronic Services (E-Services) in Technology-based Companies

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Abstract

Background/Objectives: In process of using technology to provide services, it would be required to have computable market value of technology and its provided services in order to compare them with other services. **Methods/Statistical:** The importance of this matter would be more in valuation of second type of technology-based companies providing their services through Information Technology (IT). It would be also required to consider the non-profit nature of these services. Hence, it would be a question that valuation of E-services is considered in which companies such as commercial institutions and or public institutions including governmental or quasi-governmental institutes providing non-profit services. What factors should be considered in valuation if it is required to calculate the value of E-services provided by non-profit institutions. **Findings:** This study has been conducted to point shortcomings of existing methods in accordance with type of their activity, nature and valuation theories through assessment of methods of evaluation, valuation and pricing of Information and Communication Technology (ICT). This paper has proposed recognized indices for valuation in frame of three mentioned variables from perspective of members of expert group. **Applications/Improvements:** According to the obtained results from study, these three variables have been accepted then 20 indices have been introduced for valuation of E-services.

Keywords: E-services, Evaluation, Pricing, Valuation

1. Introduction

It is not possible to valuate E-services through traditional methods. Analysts consider some factors such as negative profits and intangible assets as reasons to reject traditional methods to valuate E-services[1]. According to Accounting Standard No. 17 of Islamic Republic of Iran, the business entity is not able reliably determine the fair value of intangible assets because of the difficulty of determining the cost of intangible assets. Accordingly, it would not possible to clarify the real value of services provided by intangible assets and this obstacle has limited valuation of E-services to methods that evaluate systems and information technology. Studies indicate that the most important factors of evaluation of information technology are related

to effectiveness, user and customer satisfaction, goals achievement, competitiveness and quality improvement. There are other studies conducted to assess the valuation of information technology in technology-based companies. This paper has been conducted to assess the valuation of stocks and pricing technology of technology-based companies. According to assessment of conducted studies and methods, there are differences between type of activities and natures of companies and theories indicate the given research gap in field of valuation of E-services in large and non-profit institutions. It is believed that development of E-government has create a requirement to recognize the monetary value of provided services in electronical frame as well as computable value of traditional services in order to have a fair distribution of services between all

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society members. In this regard, it would be possible to compare the monetary value of various provided services to citizens in an electronical method.

2. Problem Statement, Status and Importance of Subject

Provision of E-services has been considered in government agenda of Islamic Republic of Iran lately. E-services have been provided in two forms of local and national through some communicational layers such as relationship between government and citizens, relationship between government and employees, relationship between government and companies, and relationship between government and other governmental organizations[2]. Majority of conducted studies in field of E-government have concentrated on creation of electronic government and some other have determined the key factors of success in E-government through futurology approach[3]. In some cases, possible and optimal access to the future of services of E-government has been assessed but there is not any conducted study in field of valuation of E-services related to communicational layer between government and citizens[4].

Moon has described E-government in four different aspects. First aspect is related to creation of required infrastructure such as a safe governmental intranet for an efficient interaction between governmental organizations, second aspect includes providing on-line governmental services, third aspect is related to creation of required infrastructure for E-commerce and fourth aspect includes digital democracy for transparency of government actions[5]. Majority of governmental are implementing through three forms of traditional, electronic and a combination form of both and this shows stability of required infrastructures to provide E-services (first aspect). This study has assessed calculation method of cost of E-services that is related to second aspect in which, the E-services resulted from information infrastructures are valuated.

The point is that technology and software include processes and assets that are not reflected in balance sheet of company[1]. Hence, there is not any considered value for providing technology-based services and their prices are considered in profit-loss statement only based on their costs. Dominant view assumes that an asset such as computer or software can be calculated if it is considered as a fixed cost[6]. Therefore, the value of information technology is considered equal to the book value of spent costs on this technology (total spent costs to create technology plus costs of maintenance and service providing) in financial statements. This issue would led to calculate demanded costs of providing E-services to citizens through an unreal method based on the book costs. The effect of this action can be seen in financial statements of technology-based companies providing E-services of government and managing as commercial institutions or in statement of contractors providing E-services of public sector. This effect would be appear in mentioned statement as unreal costs and its consequences can be observed in social justice and public satisfaction.

3. Concept of Valuation

There are extensive methods to evaluate Information Technology (IT) including the concepts of pricing and valuation. According to theoretical literature of study, it could be found that there are considerable differences between three concepts of evaluation, valuation and pricing in spite of their similarities. The mentioned differences have created different models. Authors have separated these expressions to classify their application. The word of evaluation literally means determining value of something[7]. According to[8], evaluation is related to evaluation of performance. Both pricing and valuation would present a monetary value for a product so that they are synonymous in literature of price and value. It should be noticed that the main difference between price and value is related to calculation method of price of a product. In other words, determinant factors in payable price of a product of service should be clarified. In fact, cost factors would determine prices and value of a product would be obtained when cost factors including direct and indirect costs such as raw material costs and paid wages are combined with utility and efficiency of product. The value of products and services is different from the view of different people. According to[9], value is not a stationary concept or similar to other concepts and the value of every asset is related to various factors changing in different times.

As it was mentioned, the difference between pricing and valuation can be observed in comparison between book value and market value. Author in[9] believes that book value is an accounting and fiscal concept obtained through deduced accumulated depreciation from historical cost. Market value has been defined as cash or cash equivalent amount for as asset expressed between a willing buyer and willing seller so that each party has a

reasonable knowledge about all matters and there is no compulsion to buy or sell or rights of them[10].

4. Methodology

The purpose of this study is to recognize effective variables and indicators of these variables in valuation of E-services in non-profit institutions. For this purpose, first library method has been used to study theoretical literature then Delphi method has been applied to assess the determined variables. Delphi method is used for valuable issues that do not need any exact analytical techniques. This method is used when data are insufficient or indefinite or when real samples are not existed and or when it is difficult to collect people and talk about an issue. Since Delphi method is based on anonymity, controlled feedback and statistical group response, it would prevent from the influence of prominent people or pressure group to create conformity in discussion group. Therefore, a valid consensus of expert will be obtained using this technique[10]. Statistical population of study includes 15 experts with MA degree and PhD students in Management, Systems Engineering and Accounting and employees of Tehran Municipality.

5. Review of Literature and Background

Author in[11] have considered evaluation of technology as a scientific, interactional and communicational process to help social and political attitudes towards knowledge and technology in order to assess social aspect and effects of a technology. According to Stewart, IT is increasingly used for strategic reasons that improve efficiency, control and productivity of internal processes in organizations[12]. Hence, there are different methods to evaluate technology in scientific literature; the most important methods are Cost-Benefit Analysis (CBA), Information Economics (IE) and Balanced Scorecard (BSC). In accordance with conducted studies, it could be found there have been many disagreements on evaluation methods of IT among researchers and experts. Diversity of these methods and attitudes are more than benefits originated from IT. Majority of studies have accepted benefits of IT for institutes including reduced costs and increased efficiency and speed of processes and controllability[13].

Different attitudes can be evaluated based on different benefits of IT. Evaluation methods of IT have been divided into quantitative and qualitative sections in accordance with an attitude. Quantitative would try to calculate monetary value of technology through complicated mathematical calculations. There are five famous quantitative methods including cost-oriented, market-oriented, income-oriented, the method based on the concept of transaction authority and Monte Carlo. Three first methods are traditional method while the other ones are more advanced. Although qualitative methods of IT evaluation do not have advanced and complicated bases but are used very well and present optimal results in practical[14].

Quantitative methods are called as IT pricing methods in another classification in which, these methods has been classified based on the purpose as follows:

- IT pricing with legal purposes that is implemented based on reasons included in determining compensation at the time of the violation of intellectual property rights, determining the tax on wealth and revenue and determining the rates of applying right in litigation in cases such as bankruptcy, change in contract terms etc.
- IT pricing with commercial purposes based on reasons included in technology buying and selling, awarding royalties, insurance against accident and theft, mortgages with banks and other creditors and accounting purposes (reflected in the financial statements and reports).

Pricing with legal purposes include legal requirements such as tax and fine determination that is prepared to order a judicial authority while in pricing with commercial purposes, value and price of technology or right of technology applying is determined in order to contract a trade deal or business and provide business information for needs of owners and buyers.

It is stated that pricing with commercial purposes would meet two following main goals including 1. To support domestic decisions such as judgment about suggested investment plans in technology 2. To support foreign transactions such as selling an asset or negotiation about a contract of awarding royalties or tax determination.

Thornton states that we are faced different attitudes when evaluating Information and Communications Technology (ICT) in commercial scope. First attitude considers investment in field of ICT as an issue. Second attitude considers investment in ICT as a treatment for diseases originated from information complexity in current century and third attitude consider this actions as amount

of money spent unreasonably[15]. This issue has created other methods to evaluate IT in accordance with initial purposes of organizations and these methods have been created to evaluate the efficiency of information systems. According to[16], the most important aspects of evaluating the efficiency of information systems are as follows[16]:

- Efficiency of management information systems including response time, availability, specifications of used language(s), detection of user demands, error correction, data security model, system documentation methods, flexibility and compatibility of system.
- Information efficiency including output accuracy, output speed, output reliability and output format.
- Information manipulation including capacity of output.
- User satisfaction including participation of senior management, methods to pay for service costs, user trust in system and user participation.
- Personal influence including user expectations from computer-based system, commercial effects of supporting computer-based system through benefits observations.
- Service performing including technical abilities in using computer-based information system, position of employees in computer-based information system, the program of computer-based information system, program of computer-based information system for products and services, required time in information technology sector to realize demands. Processing time for changed demands of system provided support by seller, users' perceptions of system and provided educations for them.
- Conflict solving including relationships between computer-based systems and other organizations, priority in resources distributions through computer-based systems, relationships between users and staff of computer-based systems, controlling staff through computer-based systems and organizational position of staff in unit of computer-based systems[16].

According to theoretical literature, valuation of information technology has been considered as evaluation methods of IT and conducted studies in this field have considered technology evaluation in their studies. For instance, Author in[17] have evaluated the effect of E-services quality on trust of on-line customers. This study has been conducted to propose a model to determine effective factors in trust with emphasize on the role of E-services

quality, perceived risks and value. Another study has assessed the elements and features of E-services in websites of libraries in top universities in Tehran, Iran. In this study, assessment list of elements of E-services has been prepared for website of academic library and current position of websites of libraries in governmental universities in Tehran have been assessed based on the prepared list in terms of elements and features of E-services[18]. Another study has been conducted to assess the quality of public E-services based on the E-QUAL Model[19].

There is list of studies in field valuation in Table 1.

According to Table 1, it could be found that there are different methods to valuate IT in order to valuate stock, Brand and intangible assets. Author in[1] considers different methods of valuation in traditional and technology-based companies; in his view, relative valuation model is used to valuate intangible assets. Valuation models are indicated in Figure 1.

Table 1. Relevant studies to valuation

| Row	Researcher	Subject
1	6	Stock valuation based on accounting methods
2	20	Valuation of intangible assets based on
3	21	using methods of valuation of technology and information systems
4	22	Creating a common and separated model from organizational size for technology valuation
5	23	Complementarities in organizational design and the diffusion of information technologies
6	24	Impact of eBusiness technologies on operational performance: the role of production information integration in the supply chain
7	25	Business models for electronic markets
8	26	Multi-criteria decision making for e-marketplace selection
9	1	Assessment of hidden aspects of valuation through methods of discounted cash and relative flows
10	27	Assessing knowledge assets: a review of the models used to measure intellectual capital
11	28	Intellectual capital: an exploratory study that develops measures and models
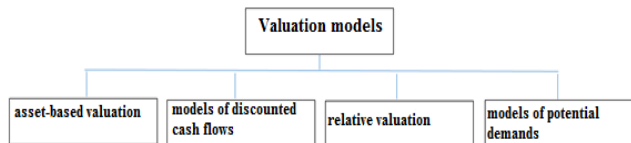
Figure 1. Valuation models.
Source: Damodaran, 2009, p. 37[9]

Researchers believe that these models are not compatible and more coherence should be between them in order to have usable input and output obtained from a model for other models[21]. There is a difference between relative valuation model with other models and this difference is related to calculation of intangible assets. According to an author, it would be a problem for companies to valuate intangible assets such as technology, brand and human resources contrary to tangible assets[20]. According to models indicated in Table 1, it could be found that these valuation models would determine the value of assets while they do not any action to determine value of services.

According to scientific terminology, there are two group of technology-based companies. First, companies that produce technological productions such as hardware and software and second, companies that use technology to deliver their products and services[1]. Therefore, the technology using method by companies should be considered in selection of appropriate model to IT valuation.

On the other hand, there is a set of models and frames for technology evaluation that can be different in accordance with firm size (small, medium and large)[22]. Additionally, differences between the natures of companies should be considered as other point in technology evaluation that prevents from using introduced models and methods in all cases of technology evaluation. For instance, Author in[29] have presented a web-based model that is not suitable for large and governmental companies. This model is an economic model to determine the value of transferable technologies.

As it was mentioned about the concept of valuation, the difference between pricing and valuation should be considered in valuation of E-services.

According to this point and classification of technology-based companies, there are three planar variables to valuate E-services as follows:

- Types of activities of technology-based companies that are divided into producer and consumer companies.

- Types of nature of companies that are divided into profit and non-profit companies.
- Types of theorizing including two pricing and valuation approaches of companies.

Figure 2 indicates different states of combination of three mentioned variables.

According to Figure 2, three dimensions of nature, activity and relevant theories to valuation and pricing have created eight different situations. Assessment of theories related to evaluation, valuation and pricing described in Table 3 indicate any study has not been conducted about the situation 8 in Figure 2 that is related to valuation of services provided electronically by non-profit institutions. However, it would be essential to calculate presented electronic services in order to compare different services (as the monetary value of traditional services was calculable) since the influence of IT has expanded into non-profit and governmental sectors. Valuation of these services would help society to evaluate the fair behavior of provided services in accordance with non-profit nature of governmental companies.

6. Discussion

As it was mentioned, it is required to consider three indices to calculate the value of E-services. These indices are included in types of activity, nature and theorizing.

- In terms of activity. Technology evaluation will be as determining the price of products in companies that produce technology. For this purpose, quantitative methods have been developed and these methods try
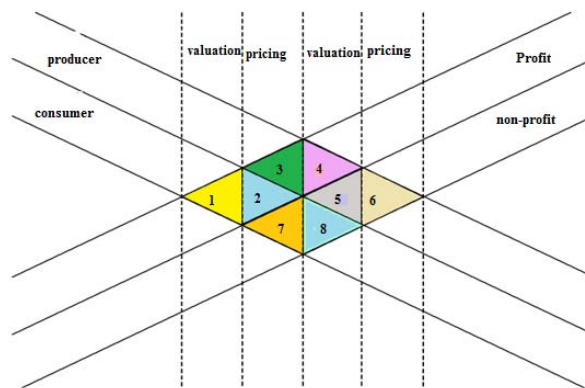

Figure 2. Three-dimensional diagram of E-services valuation.

to calculate the monetary value of technology using mathematical calculations that are sometimes complicated. The most known quantitative methods are as follows: Cost-oriented, market-oriented, income-oriented, method based on the concept of transaction authority and Monte Carlo method[14].

- On the other hand, there are studies in field of methods to measure the value of E-services in institutions using technology to provide services. These studies are affected by variables used in traditional method because it is not possible measure the cost of these services in a reliable way (Accounting Standard No. 12). There are three features described for technology-based companies as follows: First, the establishment age of these companies is one or two years with limited background. Second, their financial reports would determine little information about details of their assets. Third, these companies are unique in type of their business. Therefore, there is a limitation in information of valuation of these companies[1]. Hence, the market value of technology and provided services should be calculable to calculate value of E-services and this issue is based on traditional market-oriented method.

- In terms of nature. The large non-profit institutions that present E-services to citizens would consider investment in IT as an inevitable issue and these companies are included in companies that use technology to deliver their services. It would be essential for determined frames and models of technology evaluation to be different based on the firm size (small, medium and large)[22]. Author in[22] have assessed prominent models presented by Delone and McLean, Seddon, Farbey et al., Levy et al., to have common ICT evaluation for all organizations. The common frames determined by them have been classified into people issues, technology focus, evolutionary position, management aspects[22]. According to mentioned studies, firm size differences is a factor should be considered in IT evaluation. There were nine recognized valuation methods for information and communication systems in a case study of large and public organizations. The recognized methods have been compared in terms of eight factors and it was clarified that there was a limited coordination between these methods[21]. Therefore, size and nature of organization (in accordance with common indices of studies by Costello in relation with people issues) have a considerable role

in preparing an appropriate method for E-service valuation.

- In terms of theorizing and according to what was mentioned about valuation and pricing, two categories should be considered in E-services valuation.

First category is related to valuation indices recognized by value analysis method. Value analysis is an organized system to solve a problem that enables us to determine real value of products and services through resource and data collection[30]. The first step in value analysis is function recognition. Function is defined as the necessary function of product or service that is defined through two words, one verb and one name without considering method[30]. "Payment gay" and "delivery courier" are some functions of software system.

It would be important to assess customer satisfaction about quality of functions of systems (E-services are presented in form of systems) after determining functions. According to authors, perceived quality of provided products and services by website has an important role in value creation. Businesses should create a value in mind of customers when using website in order to create a positive experience of website[31]. Creation value for customer would led to customer loyalty and loyalty would create more value, profitability and development[32].

Second category is related to indices of E-services pricing. According to the results obtained from[33], total cost of presented on-line governmental services include legal costs of presented traditional services and portal costs. Legal systems are include taxes, charges of services. Portal costs include price or discount of easily accessible and costs related to process of electronic payment. These costs are usually paid by banks or other financial institutes[34].

A questionnaire was prepared and distributed between experts in frame of Delphi method to assess the mentioned variables of E-services valuation. According to interdisciplinary concept of E-services, expertise of Accounting, Systems Engineering and Management experts was used in order to select members of expert group. Accordingly, 15 members of expert groups were selected (five members for each expertise). After explaining the issue to the statistical population, the questionnaire distributed among members in accordance with the Delphi method, and

after approval variables, measurement indicators of each of them were asked as open questions. The questionnaire was redistributed after classification of responses and omission of common responses. The population members were asked to determine each option through five-item Likert scale in order to determine the importance of variables and indices. The obtained results are indicated in Table 2.

According to obtained results from questionnaires determined in Table 2, it would be essential to consider variables valuation, pricing and evaluation to valuate E-services in accordance with opinion of members and percentage of each variable in determining the cost of E-services was 30%, 60% and 10%. Figure 3 has been presented in accordance with Table 2 and to better explanation of measurement indices of variables valuation, pricing and evaluation.

Table 2. Obtained results from Delphi method

| Importance average	Indices	variables
30%	Society expectation, functions of services (including E-payment ports, courier, idea exchanging, chatting, electronic professionality, publication of reliable documents)	valuation
60%	Social justice (fair price), hardware (facilities) costs, software costs (including relevant costs to supplies, domains, bandwidth and relevant software to provide information security and portals management), human costs (salary and wages of labor force) and administrative costs (including the costs of providing the physical environment, taxes and payments on all other institutes)	Pricing
10%	Public satisfaction (including notifications quality, speed of providing services, information accuracy, information sufficiency) and given scores by users to functions of services	Evaluation
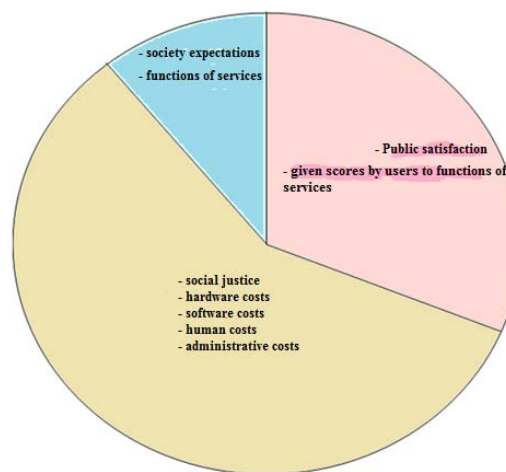
Figure 3. Variables and indices of E-services valuation.

7. Conclusion and Recommendations

In spite of all proposed models and methods in technology valuation, development of technology application in companies and its replacement with traditional methods have created new models and methods for valuation based on the features of companies. Technology influence in large and governmental companies is another factor that considers the valuation of technology-based services as a nesseccary need. Large companies and institutions that provide services of public sectors would use technological strategies to provide their services and three distinct features of them would make their methods of service valuation differ from other companies and institutions. Since there is not a specific method to valuate services, it would be the main challenge for large and governmental companies to select valuation indices to evaluate their services. According to assessments of valuation and pricing methods of E-services, it would be essential to use different points between E-services in public and private sectors in order to determine valuation indices. Non-profit nature of governmental services and size of governmental institutions have been the most distinguishable aspect of provided services by public sector. On the other hand, it would be nesseccary to have a precise definition of evaluation, valuation and pricing in order to determine the indices of E-services valuation because the concept of evaluation is related to public (people) satisfaction, valuation is related to society satisfaction and pricing is related to social justice. Therefore, it is recommended to consider effects of products' functions on E-services valuation, customer satisfaction with

product's functions, calculation of book costs, the use level of users of product's functions and appropriate accounting method (relative valuation) in order to valuate E-services in large governmental (non-profit) institutions.

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