

Mathematical Modeling the Economic and Cultural Impacts of ICT in Iran

¹Farzaneh Chavoshbashi and ²Masomali Salimian

¹Department of Accounting, West Tehran Branch, Islamic Azad University, Tehran-Iran

²Department of Management, Chalous Branch, Islamic Azad University, Chalous-Iran

Abstract: Today, Information and communication technology due to its worldwide spread of information and cultural aspects of social, economic, political, stemming from its one of the most important issues that communities have to work. ICT, new definitions of all aspects of cultural, social and economic life has created a new era and its influence in all aspects is identifiable and measurable. In this study, First economic and cultural factors affect ICT identified, then experts and scholars determine the weight of the components and the final model is presented. Technical coefficients for modeling and paired comparison have been done using MATLAB mathematical software.

Key words: Consequences of ICT, information and communication technology, mathematical modeling

INTRODUCTION

In the past three decades, the occurrence of drastic changes in the areas of technology, very profound effects has on human life instead. The influences that have led to recent times be the basic difference with the previous periods in human life (during the agricultural and industrial).

Information technology needs little energy and material consumption, the effects of rapid and efficient in creating economic growth, at least its negative effects on the environment and results in significantly increasing the quality, productivity and efficiency of production and services, has led the Information Technology and communications tool becomes for accelerating the achievement of sustainable development.

Information and communication technology to developing countries in combating a wide range of social and economic problems and health to effective assistance. With improved access to information and communication, ICT can be play an important role in achieving development goals such as eliminating poverty, combating serious diseases, public education and gender equality and social etc. However, the benefit of ICT in many countries has not been fully realized: ICT often reach the poor and are those who are in rural areas. ICT related to technology, communications and electronic absorption, processing, data transmission, radio and television and print media etc. In recent years 'ICT new', such as mobile phones and the Internet with applications throughout the world are growing. Number of telephone access (fixed and mobile) in developing countries from 2% in 1991 to 31% in 2004, has increased. To use the

Internet as well as 0.03 percent of the population of developing countries in 1994 to 6.7% in 2004 grew. However, there wide disparities between developing countries. (Post note, 2006)

Information Technology is defined as Information Technology Association of America (ITAA), "To study, design, development, implementation, support or management of computer-based information systems, particularly deals software applications and computer hardware". The short, information technology deals to convert issues such as the use of electronic computers, and software , store, protect, process, transport and recovery way to perform safe and secure. Recently, a small change is given in this expression to this term is also included as a circle on electronic communications. So some want are used to more information and communication technologies. In the classical sense, technology crystallized in total knowledge of production tools and methods. Effect on the growth of the old technology has been discussed that can be divided into three categories: Point of view, in the form influence of technology capital goods embodied analysis that results in increased productivity of capital; In the second case, whether the technology, labor productivity increases; In the third case, whether or not the technology but not necessarily the total productivity or labor productivity of capital increases. Technology as a factor in the growth pattern is discussed. Solo pioneers in this field. Since the ICT producing industries has, the role of output and in consumer industries, role of Input. So we are faced with two of; Improve the quality of ICT to accelerate productivity growth in ICT producing industries and the rapid accumulation of input is in the ICT consumer

industry. Thus Neoclassical model predicts that economic growth thus deepening whether the rapid growth of labor productivity occurs in the ICT industry consumer and technology advances and whether the productivity growth in the total ICT producing industries. Objective of the study is design and explain Mathematical Model for Economic and Cultural Impacts of ICT that first, Factors the Economic and Cultural effective on ICT identified and then coefficient of each of them was according to the experts based on paired comparison.

THEORETICAL AND EMPIRICAL LITERATURE

Previous studies confirm positive relationship between ICT and economic growth. These studies show that ICT potentially reduce poverty in poor countries and also affects the value chain and has a positive effect in other sectors of the economy. Technology from governments and international agencies and relief organizations as an important tool are to allow greater access to health, education, services and economic opportunities for disadvantaged population groups. Other reports show that the technology benefits of wireless communications in many communities is the share of production. For example, in rural Cambodia, in Agricultural of economy information are used through wireless networks and villagers were able to access the market for medical and health services, and global industry it's through provide to make wireless technology communications. Developing countries generally users are considered to be the next ICT revolution. These countries were exposed with imitation of the industrialized countries with the potential for ICT technology as developed countries. Successful use of technological capabilities by developing countries has caused significant decreases formed in the economic gap in developed countries and developing. Economist Information Unit (EIU, 2004) shows in a study of the relationship between ICT and economic growth in 26 developed countries and less developed countries 34 countries between 1995 and 2002, there is evidence that strong positive relationship between ICT for economic growth of developed countries, but not for developing countries. These study shows, in the second group of countries, due to existence of the digital divide, offer remarkable is that economic growth will be achieved only if this gap is removed. In other words, if there the digital divide between developed countries and developing, Likely that leads substantial differences in economic development, Therefore, investment in ICT and the effective application of these technologies is important for economic growth. Social and cultural growth of people is toward their world, their environment and alters their

attitude. Including a major means through which they can be mental, mobility, sense of unity, and confidence was argued, is education. In this case, ICT can have a major role. ICT growth in less developed countries, especially in the field of mass media and audio-visual teaching aids are cause new opportunities in education. Studies show there are relationships clear between ICT and training and reciprocal (Fong, 2009).

Ideas such as "Global Village", "Computer World" and "Create a culture through visual means," have implicated the growth environment in which new information and communication technology and education are all around us. Example, the role of ICT in the cultural development program was called "popular cultural action" in Colombia to train literacy and basic skills in reading and those carried to create a series of radio programs gave rise. Role of mass media in the integration group very distant past is known. This history dates to 1840 De Tocqueville believed that the press cause will become clear public opinion and consensus is essential for democracy. Some other scientists wrote that the task of mass media is "strengthening social criteria and values Mass media to create a society means integration is necessary but not sufficient. Mass media are simply a tool, and depend on the existence of social infrastructure, new transportation routes, the national language and literacy. Overall, mass media are cultural devices that can be effective, however, have different dimensions. On the one hand can be a community of native culture and its relationship with the past and to preserve the other hand, can cause frustration people be eliminate or at least weaken the indigenous culture to the community and thus provide the image and aggressive be strangers.

There are wide disparities in the extent to which different developing countries, and different socio-economic groups within countries, benefit from ICT. Digital divide is a term to express the global distribution of non-equality in access to information and communications technology. In other words can be said to bridge the digital divide as a sign of strong powers that threaten the world in the century to little parts of unequal access to information are distributed. Technology advances quickly show that the world will be divided into two distinct parts. Under development in many countries is increasingly involved and countries the owner of the technology will progress day by day, and so on exploitation of underdeveloped countries will increase. The incidence of the digital divide much influence would in e-commerce, economy and education. Of this backwardness will in science and technology in developing countries. Deepens the divide separating the meaning of economic, political, social and cultural country that imposes the result of cultural goods and production technology to discourage owners of beliefs,

traditions and cultures in developing countries that kind of outcome will be cultural exploitation, young people without identity crisis, hopelessness and depression at the community level. Communities that suffered the increasing incidence of social disorders such as delinquency, theft, drug desire, increased divorce and will weaken the foundations of family, etc. The more important issue of inconsistencies in human communities is access to technology, so that the necessary technology to information technology looked at as a necessary matter.

The "Digital Divide" commonly refers to the gap between those with access to ICT and those without; however, many factors besides physical access contribute to these disparities. (Post note, 2006).

Even in developing countries with relatively high net ICT uptake, ICT is still out of reach of many groups due to:

- **Lack of appropriate products:** Products are often not designed to meet the needs of the poor, or those in remote areas. These groups can face constraints such as access to electricity (lacked by two billion people worldwide).
- **Cost:** Roughly half the world lives on less than four dollars a day. Many potential users are too poor to afford any form of access to ICT.
- **Education:** Even where there is physical access to ICT, many people do not have the technical skills needed to benefit from them.
- **Language:** Poor literacy is a problem with ICT such as the internet. Of those who can read, many know only a local language, while the internet is dominated by English-language content.
- **Human resources:** As in many sectors, the migration of skilled ICT professionals from developing to developed countries contributes to a lack of human resources to support ICT.

Lack of robust regulatory framework for ICT: can limit uptake. OECD countries have the highest access to new ICT, followed by South Asian and some African countries. Sub-Saharan countries fare worst (excepting South Africa). In 2004 Zimbabwe had 3.5 mobile subscribers per 100 people, compared with 4.3 for India, 36.3 for Brazil and 102 for the UK. Although levels of access are low in many African countries, growth over the previous five years has averaged 60% a year. In 2004 Africa was the region with the highest mobile phone growth rate. Growth rates in India averaged 90% over the same period, among the fastest in Asia. One reason for differences between developing countries is the wide variation in government policy on ICT (NOIE, 2002).

Digital divide is a complex issue as different countries will occur and Cause is operational and political challenges that the country. In addition, clear solutions that are used in developed countries cannot use in developing countries. Solutions should be based on understanding the country conditions and needs are presented. A threshold goal is the deployment of ICT. Global experience has shown that closed and monopolistic regulatory environments are less likely to attract private investment. While ICT infrastructure requires a significant capital investment, most national governments, especially in the developing world, are unable to meet the challenges alone. With few exceptions, private businesses and organizations have funded much of the world's nonmilitary ICT infrastructure. There is little indication that this trend will decrease. In fact, as more and more governments make it clear that they are not able or willing to finance the construction of ICT infrastructure, the role of non-governmental investment becomes increasingly more pivotal in bridging the digital divide. To attain the goal of an adequate and equitable deployment of ICT infrastructure, we recognize three necessary interrelationships: First, there must be a market demand for ICT. The end users of the ICT infrastructure, namely the members of a given community, are best positioned to demonstrate a market demand for ICT investment. Next, the regulatory environment must be stable and open such that fair competition is encouraged. The makers of public policy have a responsibility to develop and maintain an enabling regulatory environment that encourages investment by private organizations and businesses in ICT infrastructure. Finally, there must be a willingness by ICT investors to take a risk. Without the investment of private capital, the goal of adequate ICT deployment may never be realized. Hence, these three stakeholders (Community members, policy makers and ICT investors) are bound in an interactive, inter-dependent relationship (Mitchell and Gillis, 2003).

ICT is not a panacea for all the problems of developing countries. However, digital divide has important implications for these countries as the uneven distribution of ICTs access may mean that segments or groups who have no or limited accessibility to these technologies may be denied of socioeconomic opportunities such as (Fong, 2009).

Social equality: ICTs have the potential to dispel disadvantages that may be associated with cultural barriers. For example, ICTs may be used to improve gender equality in education. Through ICTs, girls may undertake their education through e-learning at home in a society where cultural barriers isolate girls. In addition

, they may be empowered to utilize high-end technology in their economic participation in later years.

Social mobility: Which refers to the upward movement in status of individuals or groups based on wealth, occupation, education, or some other social variable in a society where one status is not dictated or decreed by birth of origin? Advancements in ICTs are capable of bestowing advantages in education, job-training, health-care as well as social networking and quality of life that they could make a difference between upward social mobility and a declining standard of living. In other words, ICTs could improve life for those who are within reach of these technologies.

Economic equality: Bridging the digital divide has implications in terms of fostering economic equality, educational potential, and earning potential.

E-democracy: ICTs can be a powerful tool for increasing transparency and facilitating information and communication processes among stakeholders. ICTs may lead to increased democratization by enabling citizens or constituents to participate in the decision-making process of policymakers and government through the electronic channel. However-democracy has yet to reach its ideal level of actualization in the political participation process.

Economic growth and innovations: Long-term economic growth has often been associated with technological progress.

MODEL AND METHODOLOGY

In this model, cultural and economic outcomes as independent variables and ICT are considered as

independent variables and components of each variable in the model design have been determined. Using MATLAB software and citing experts consider the consequences of economic and cultural pattern measuring ICT in Iran has been evaluated (Fig. 1).

What this study as a mathematical model used is a kind of symbolic models, This type of model in terms of results from other models have been more applied, However, due to modeling issues that this format is very complicated and difficult, In many cases, work is difficult and even impossible. Today, most scientists to the field of Management Sciences for using these models are to optimize decisions and increased effectiveness and efficiency of decision making. Because if modeling issues in this framework occur, outputs can simply decide to change the model parameters is found in cyberspace. For this purpose, weight of each dimension to help the two kinds of ICT questionnaire (paired comparison comparing single semi-metric), which provides Person six of specialist courses in Economics, Management and Information Technology were cultural management, has been calculated.

RESULTS AND DISCUSSION

The effect of ICT: As is noted experts from a total of 100 score dimension the effect of ICT 64 score to Cultural consequences and economic consequences were to score 74 (Table 1).

Table 1: Measuring the effect of ICT

| ICT | Single semi-metric | paired | Total weight | Final weight |
|-----------------------|--------------------|--------|--------------|--------------|
| Cultural consequences | 0.515 | 0.755 | 1.271 | 0.64 |
| Economic consequences | 0.485 | 0.245 | 0.729 | 0.36 |
| Total | 1 | 1 | 2 | 1 |

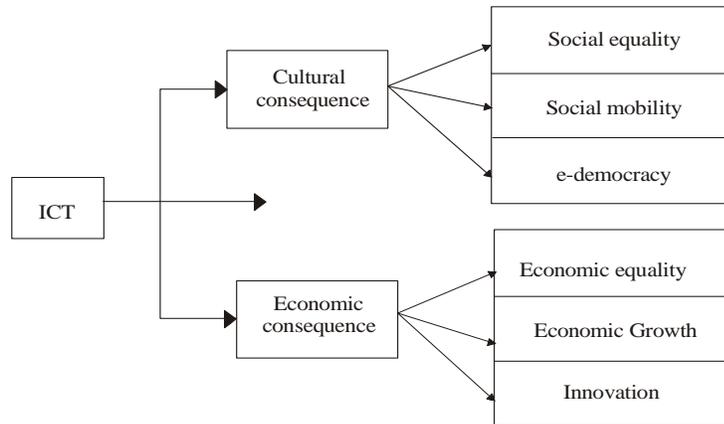


Fig. 1: Cultural and economic consequences of ICT

Table 2: Measurement of the cultural consequences

| ICT | Single | | Total weight | Final weight |
|-----------------|-------------|--------|--------------|--------------|
| | semi-metric | paired | | |
| Social equality | 0.308 | 0.679 | 0.987 | 0.49 |
| Social mobility | 0.352 | 0.235 | 0.586 | 0.29 |
| E-democracy | 0.340 | 0.086 | 0.426 | 0.21 |
| Total | 1 | 1 | 2 | 1 |

Table 3: Measurement of the economic consequences

| ICT | Single | | Total weight | Final weight |
|-------------------|-------------|--------|--------------|--------------|
| | semi-metric | paired | | |
| Economic equality | 0.276 | 0.369 | 0.646 | 0.32 |
| Economic growth | 0.348 | 0.508 | 0.856 | 0.43 |
| Innovation | 0.375 | 0.123 | 0.499 | 0.25 |
| Total | 1 | 1 | 2 | 1 |

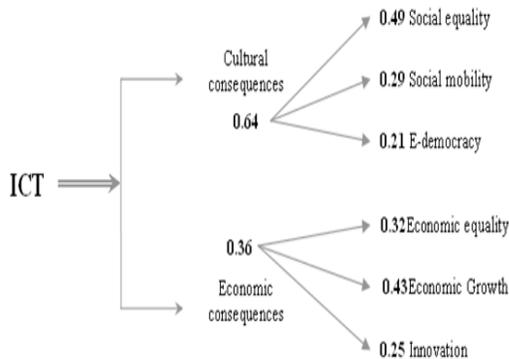


Fig. 2: Model coefficients

The cultural consequences: As is noted experts from a total of 100 score dimension cultural consequences 49 score to improve Social equality, 29 score to Social mobility and E-democracy in order to were score 21 (Table 2).

The economic consequences: As is noted experts from a total of 100 score dimension Economic consequences 32 score to Economic equality, 43 score to Economic Growth and Innovation in order to were score 25 (Table 3). Quantitative model coefficients are representing in Fig. 2.

CONCLUSION AND RECOMMENDATIONS

Potential in the potential of information technology to become a factor in the development of effective systems of economic, social, cultural and political fields to become one of the key strategies to achieve sustainable development provided. In many countries, especially developing countries, to develop strategy, the policies and approaches in modern information and communication technology have action. Strategies developed in our country as well as structural, educational, cultural and management was necessary in ICT and it will accelerate

sustainable development in the country with regard to two important cultural and economic consequences. Some of these strategies include:

- Providing networked infrastructure development and telecommunications facilities in locations throughout the country
- Using ICT as a tool to bring about efficient and operating system development indicators (economic, social, cultural, scientific etc)
- ICT industry development as a major expansion of infrastructure technology;
- Need to create awareness at different levels in society and the potential benefits of ICT
- Allows citizens access to public infrastructure, communication and use of ICT benefits
- To establish and develop the legal infrastructure
- To establish and develop friendly business environment and regional
- Action to increase the bandwidth to receive and send information
- Efforts to establish equal access to hardware needed
- Development of human resources skilled and trained in order to develop human capital
- Professional development centers and offices ICT
- Free training in urban areas and rural
- Constructive cultural practices related to educational technology.

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