

Informational Development: Concepts and Strategies

Gh. A. Montazer

Assist. Prof. of IT Eng.

School of Engineering, Tarbiat Modarres Univ.

P.O.Box 14115-179, Tehran, IRAN

Email: montazer@modares.ac.ir

M. H. Moghaddam

MSc Graduate in Pol. Sci.

Email: mh_moghadam@yahoo.com

Abstract

This paper contains three parts: The first outlines the new transformation which has been lead to a new paradigm, new society and new development. Notice to this transformation we provide new mode and conception of technology. Then we will provide our assessment of Iran concern to this new mode of development's criteria. At the end we propound a model for informational development.

Keywords: Network Society, Informational Development, Technology, Information Technology

Introduction

In the last quarter of 20th century, a new form of socio-economic organization has emerged. After the collapse of statism, in the Soviet Union and throughout the world, it is certainly a capitalist system. Indeed for the first time in history the entire planet is capitalist.¹ Even the few remaining command economies are surviving or developing through their linkages to global, capitalist markets. Yet this is a brand of capitalism that is at the same time very old and fundamentally new. It is old because it appeals to relentless competition in the pursuit of profit, and because individual satisfaction (deferred or immediate) is its driving engine. But it is fundamentally new because it is tooled by new information and communication technologies that are at the root of new productivity sources, new organizational forms, and the construction of a global economy.²

Hence a new techno-economic paradigm develops: the information-technology paradigm. This paradigm has five features: 1. information as the raw material to act on; 2. the pervasiveness of information technologies used; 3. the networking logic of any system using them; 4. flexibility and 5. convergence of technologies. It leads to a new mode of development called Informational Development or informationalism. This is "the attribute of a specific form of social organization in which information generation, processing and transmission become the fundamental resources of productivity and power"³. Castells demonstrates with lots of empirical data that this mode of development in general and networks within and between firms in particular come to dominate the world economy.⁴ These transformations have created a new society called Network Society.

Network society is simply a set of interconnected nodes. It may have a hierarchy, but it has no centre. Relationships between nodes are asymmetrical, but they are all necessary for the functioning of the network—for the circulation of money, information, technology, images, goods, services, or people throughout the network. The most critical distinction in this organizational logic is not stability, but inclusion or exclusion. Networks change relentlessly: they move along, form and re-form, in endless variation. Those who remain inside have the opportunity to share and, over time, to increase their chances. Those who drop out, or become switched off, will see their chances vanish.⁵

The main features the Network Society

We cite here the features which had already been demonstrated by Castells:⁶

1. An informational economy in which sources of productivity and competitiveness for firms, regions and countries depend, more than ever, on knowledge, information and the technology of their processing, including the technology of management and the management of technology. An informational economy includes informational agriculture, manufacturing, services and extraordinary potential for solving problems.

2. A global economy that is not the same as a world economy, and is a new reality. At its core it has strategically dominant activities which have the potential of working as a unit in real time on a planetary scale.

3. The network enterprise is a new form of organization characteristic of economic activity, but gradually extending its logic to other domains and organizations.

4. The transformation of work and employment; the flexi-workers. There is subcontracting and networking of labor, inducing flexibility and individualization of contractual arrangements. There is a growth of self employment, temporary work, and part-time, particularly for women.

5. The culture of real virtuality - the emergence of a similar pattern of networking, flexibility and ephemeral symbolic communication in a culture organised around the electronic media. The media form a culture of real virtuality in which our symbolic environment is, by and large, structured in an inclusive, flexible, diversified hypertext, in which we navigate every day.

6. Politics now needs to occupy media space if actors and ideas are not to be marginalized. The media has become the essential space of politics, particularly television.

7. Timeless time - time and space are related in society as is nature and their meanings and manifestations in social practice evolve throughout histories and across cultures. The network society is organized around new forms of time and space: timeless time and the space of flows.

8. The space of flows is the material organization of time-sharing social practices that work through flows. The space of places continues to be the predominant space of experience. In the Network Society a fundamental form of social domination is the prevalence of the logic of the space of flows over the space of places and induces a metropolitan dualism and a form of social/territorial exclusion which bypasses and marginalizes people and places. A new spatial dynamics is resisted/opposed by new social movements that appropriate technologies and penetrate segments of the space of flows with forces of resistance and expressions of personal experience.

This new society indicates a new mode of development called Informational Development (ID). In rest of paper we explain the Informational development (ID).

Informational Development

Modes of development are the technological arrangements through which labor works on matter to generate the product, ultimately determining the level and quality of surplus. Each mode of development is defined by the elements which are fundamental in fostering productivity in the production process. Thus, in the agrarian mode of development, the source of increasing surplus results from quantitative increases of labor and natural resources (particularly land) in the production process, as well as from the natural endowment of these resources. In the industrial mode of development, the main source of productivity lies in the introduction of new energy sources, and in the ability to decentralize the use of energy throughout the production and circulation processes. In the new, informational mode of development the source of productivity lies in the technology of knowledge generation, information processing, and symbol communication. To be sure, knowledge and information are critical elements in all modes of development,

since the process of production is always based on some level of knowledge and in the processing of information. However, what is specific to the informational mode of development is the action of knowledge upon knowledge itself as the main source of productivity. Information processing is focused on improving the technology of information processing as a source of productivity, in a virtuous circle of interaction between the knowledge sources of technology and the application of technology to improve knowledge generation and information processing.⁷

The main driver of the informational mode of development is the accumulation of knowledge for technological development and towards higher levels of complexity in information processing.⁸ Thus there has to be an interaction between knowledge and information so that the application of technology can improve.

There are several steps on the way when the transition from industrialism to Informational Development:⁹

- Transition from mass production to flexible production
- The crises of the large corporation and concentration on small business
- New management methods: management-worker cooperation, multifunctional labor, total quality control, and reduction of uncertainty
- Interfirming networking between small companies
- Corroborating strategic alliances
- The rise of the horizontal corporation and global business networks
- The crises of the vertical corporation model and the rise of business networks
- A shift to multinational enterprises, transnational corporations, and international networks
- The rise of the spirit of informationalism

Role of IT(information technology) in Informational Development

Information technologies are not the cause of the informational development. But without new information technologies none of what is leading to informational development would be possible. In the 1990s the entire planet was organized around telecommunicated networks of computers at the heart of information systems and communication processes. The entire realm of human activity depends on the power of information, in a sequence of technological innovation that accelerates its pace by month. Genetic engineering, benefiting from this wealth of information processing capacity, is progressing by leaps and bounds, and is enabling us, for the first time, to unveil the secrets of living matter and to manipulate life, with extraordinary potential consequences. Software development is making possible user-friendly computing, so that millions of children, when provided with adequate education, can progress in their knowledge, and in their ability to create wealth and enjoy it wisely, much faster than any previous generation.¹⁰

The crucial role of information technologies in stimulating development is a two-edged sword. On the one hand, it allows countries to leapfrog stages of economic growth by being able to modernize their production systems and increase their competitiveness faster than in the past. The most critical example is that of the Asian Pacific economies, and particularly the cases of Taiwan, Singapore, Malaysia and South Korea. This may be related to the attractiveness of booming Asian economies to global capital flows. On the other hand, for those economies that are unable to adapt to the new technological system, their retardation becomes cumulative.¹¹ Furthermore, the ability to move into the Information Age depends on the capacity of the whole society to be educated, and to be able to assimilate and process complex information. This starts with the education system, from the bottom up, from the primary school to the university. And it relates, as well, to the overall process of cultural development, including the level of functional literacy, the content of the media, and the diffusion of information within the population as a whole.

Availability and use of information technologies are pre-requisites for economic and social development in our world but generically information technologies as Kofi Annan says per se are not a panacea or magic formula and do not solve social problems.¹² So it is necessary to reconceptualize the concept of technology to have no misconception of it.

New Conceptualization of Technology

We have inherited many conceptual tools from the past which are not adequate for understanding the various social transformations caused by important technological changes. Although we have witnessed the rise of a number of new terminologies for describing social and technological changes since the 1950s -- such as the post-industrial society, post-Fordism, post-capitalist society, information society, knowledge society, information revolution, microelectronics revolution, the Third Wave, and post-modern society -- these concepts do not, in our view, capture the essence of the changes we have been experiencing. We think the best way to proceed is to characterize as accurately as possible the impact of modern information technologies on the conceptualization of technology itself.¹³

Technology has often been understood as "hardware:" e.g., a weapon, a production facility, or a piece of telecommunications equipment. For differentiating the conceptual structure of technology, however, we should note that technology, like Janus, has two faces: the "hardware face (material product)," and the "software face (technological knowledge)."¹⁴ Overwhelming technologies are not merely a material product nor merely technological knowledge, but usually a combination of both. Hardware is useless without the knowledge of how to use it. Moreover, technological knowledge alone often has no utility until it is embodied in tools, instruments, or machines. The hardware face of technology is generally easier to grasp, because of its tangibility, which is why we tend to think about technology in terms of hardware only.

In this paper we identify four related aspects of technology that have unique policy implications for technological development: material products, knowledge, institutions, and culture. Only the first two aspects of technology are included in the "restricted" meaning of technology. In order to grasp the whole picture, however, we also need an "extended" meaning of the concept which includes all four aspects. In the restricted meaning of technology, the adoption of new technologies is a purely pragmatic affair and has nothing to do with the possible impact of technology on institutions and culture. In the extended meaning of technology, technology policy is closely related to an assessment of the impact of new technologies on social institutions and culture.

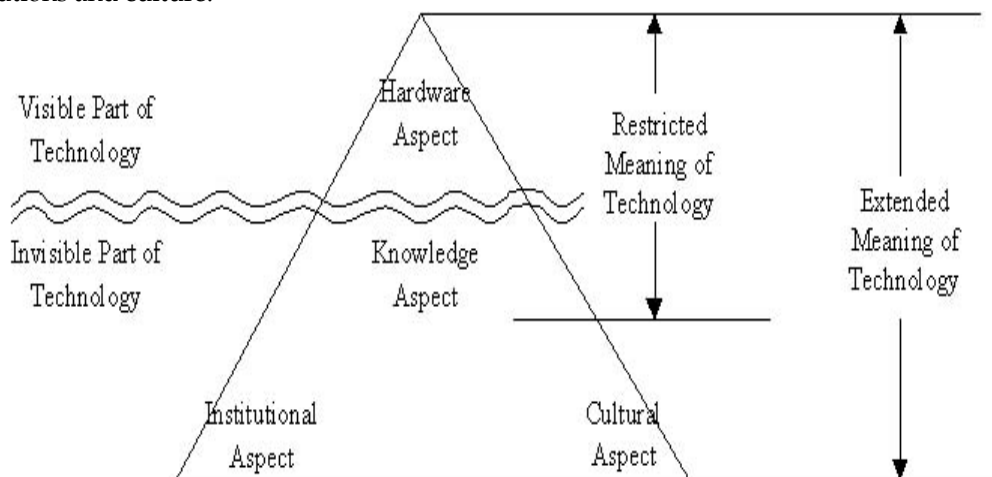


Figure1: Technology as an iceberg

Figure 1 implies that technology is like an iceberg -- with a visible part above the water line and an invisible part below the surface. The visible part of technology is often embodied in hardware; the invisible in supporting "software" including the knowledge that made the technology possible in the first place. The

emphasis on visible vs. invisible elements of technology may depend upon the conceptualization of technology in a particular society or culture.

Informational development in Iran

Iranian government has tried to adopt Iranian society with the new trends of information technology paradigm. TAKFA is one of the most important efforts in this regards.

On 2 July 2002, Iranian Government took an ambitious decision on “National Information and Communication Technology Agenda “(called TAKFA, the acronym in Farsi) around seven strategic axes:¹⁵

- Government
- Education
- Higher Education
- Services
- Commerce and Economy
- Culture and Persian Language
- ICT industry through SME empowerment

TAKFA sets out a development strategy supported by a multi-annual investment commitment in the key areas of infrastructural development (management structure, rules and regulations, information security, Persian language etc.), human resources development and setting up national scale application initiatives, with the ultimate goal of reinventing the public sector for better delivery of services and to provide a national basis for the promotion of collaboration and social inclusion. Direct assignment which TAKFA has received for existing national ICT projects is about \$350M.

Although Iran has this national plans and other similar ones and despite of the costs which has been paid, its status, specifically in contrast with other developing countries, in regard to indexes of informational development is very undesirable. We believe that lack of holistic approach to informational development is the main reason that can be suggested for this condition. If we want to explain it clearly the hitherto approaches to informational development have usually the concrete dimension of informational development and failed to comprehend about it abstractly.

Our Studies show that Iranian's emphasis are relatively hardware-oriented -- focusing on the visible tips of the iceberg of technology, and so are not willing to pay attention to the invisible part of technology. While the acceptance of the invisible as important as the visible part of technology. ¹⁶

To prove this claim we have studied and compared the informational development criteria among some countries. These criteria include: globalization index and e-readiness.

globalization index brings globalization into sharper focus by assessing changes in most important component in international relations and policymaking, trade and financial flows, or the movement of people, idea, and information across borders. The index tracks these changes across 62 advanced economies and key emerging markets to draw a picture of globalization across all the world's regions. . And, in addition to giving each nation an overall score, we provide a multifaceted view of a country's level of global integration by combining these indicators into four subcategories:¹⁷

1. Political engagement:
 - a. Number of membership in international Organization
 - b. UN security Council missions in which each country participates
 - c. Foreign embassies that each country hosts
2. Technology:
 - a. Number of internet users
 - b. Internet hosts
 - c. Secure Server
3. Personal contact:
 - a. International travel and tourism
 - b. International telephone traffic
 - c. Cross-border transfers
4. Economic integration:
 - a. Trade

- b. Foreign direct investment(FDI)
- c. Portfolio capital flows
- d. Income payments and receipts

This ranking of global integration among 62 countries (representing 82 percent of world's population) offers evidences for our assumption.

Table1:globalization index¹⁸

Rank	Country	Economic	Personal	Technology	Political	Trade	FDI	Portfolio Flows	Income payment	Travel & Tourism	Telephone	Transfer Payment	Internet Users	Hosts	Servers	International Organization	Peacekeeping	Embassies
1	Ireland	1	1	16	22	3	3	1	1	3	1	7	24	16	9	15	4	38
2	Switzerland	5	2	7	20	18	4	4	2	2	2	8	11	10	5	8	7	23
3	Sweden	2	9	5	5	21	1	5	8	14	9	22	3	8	7	3	1	14
4	Singapore	4	3	6	53	1	6	36	5	5	3	41	2	13	10	29	11	37
18	Malaysia	8	24	23	32	2	25	33	16	8	20	27	22	36	36	19	6	32
19	Israel	32	8	20	58	28	32	36	19	24	10	6	23	19	17	31	14	28
28	South Korea	40	42	15	33	23	50	24	50	39	28	32	5	31	33	19	9	15
29	Morocco	23	25	51	49	32	12	54	48	42	29	2	52	53	52	24	13	19
36	Uganda	49	20	57	60	49	23	54	58	58	33	1	60	59	57	29	14	43
37	Nigeria	25	46	58	15	13	30	54	18	58	33	23	61	60	58	13	4	17
39	Tunisia	34	31	42	43	14	44	51	35	27	26	17	40	58	51	18	11	31
41	Senegal	39	36	52	31	34	34	45	46	54	29	12	54	62	58	17	6	35
43	Kenya	57	32	50	23	37	59	53	56	53	33	5	49	51	58	21	5	27
44	Sri Lanka	44	28	53	55	22	51	41	43	50	30	4	56	50	49	25	12	41
45	Russia	51	54	43	3	40	49	50	365	33	30	56	44	38	41	12	2	4
46	Egypt	58	41	53	10	52	56	35	54	46	30	16	55	57	53	10	6	8
50	Pakistan	60	37	56	18	55	57	50	46	59	31	13	59	54	56	15	5	24
53	Turkey	38	58	41	35	36	41	31	31	40	28	61	41	40	38	13	9	25
56	India	61	49	54	14	58	55	49	57	58	32	35	57	52	54	14	5	11
61	Saudi Arabia	54	48	50	52	35	61	38	44	45	22	61	51	46	46	26	14	18
62	Iran	59	59	55	50	44	60	54	59	49	31	51	58	56	58	27	14	14

As can be observed in this ranking Iran, slip to 62nd place. Iran experienced a slight deterioration over period 2001-2005. This suggest that weak incentives and institutional mechanism play a determining role in the Iran's overall informational development performance. We see less developed countries which their

ranking to compare with Iran reflects many questions in our minds. Countries like that Morocco, Uganda, Tunisia, Nigeria, Senegal, Kenya, Sri Lanka e.g. However in Iran's visionary has been proclaimed that the country will be the first power in the West South Asia region by 2020, but the statistics show that Iran's competitors in the region are in a better situation than Iran. For example look at Turkey and Saudi Arabia.

1. **E-readiness index.** The e-readiness rankings are a weighted collection of nearly 100 quantitative and qualitative criteria, organised into six distinct categories measuring the various components of a country's social, political, economic and of course technological development. So e-readiness ranking is multi-faceted. E-readiness is not simply a matter of the number of computer servers, websites and mobile phones in the country (although these naturally form a core component of the rankings), but also such things as its citizens' ability to utilise technology skillfully, the transparency of its business and legal systems, and the extent to which governments encourage the use of digital technologies. In this study 65 countries has been ranked according to six categories (and their weight in the model) and criteria which are as follows:¹⁹

1. Connectivity and technology infrastructure

Weight in overall score: 25%

Category criteria: Narrowband penetration; broadband penetration; mobile-phone penetration; Internet penetration; PC penetration; WiFi hotspot penetration; Internet affordability; security of Internet infrastructure.

2. Business environment

Weight in overall score: 20%

Category description: In evaluating the general business climate, the Economist Intelligence Unit screens 70 indicators covering criteria such as the strength of the economy, political stability, the regulatory environment, taxation, competition policy, the labour market, the quality of infrastructure, and openness to trade and investment.

3. Consumer and business adoption

Weight in overall score: 20%

Category criteria: National spending on information and communications technology as a proportion of GDP; level of e-business development; degree of online commerce; quality of logistics and delivery systems; availability of corporate finance.

4. Legal and policy environment

Weight in overall score: 15%

Category criteria: Overall political environment; policy toward private property; government vision regarding digital-age advances; government financial support of Internet infrastructure projects; effectiveness of traditional legal framework; laws covering the Internet; level of censorship; ease of registering a new business.

5. Social and cultural environment

Weight in overall score: 15%

Category criteria: Educational level; Internet/web literacy; degree of entrepreneurship; technical skills of workforce; degree of innovation.

6. Supporting e-services

Weight in overall score: 5%

Category criteria: Availability of e-business consulting and technical support services; availability of back-office support; industry-wide standards for platforms and programming languages.

Table 2: E-readiness Index²⁰

2005 e-readiness rank (of 65)	Country	Overall score	Connectivity	Business environment	Consumer and business adoption	Legal and policy environment	Social and cultural environment	Supporting e-services
			0.25	0.20	0.20	0.15	0.15	0.05
1	Denmark	8.74	8.20	8.58	8.85	8.65	9.60	9.25
2	US	8.73	7.65	8.57	9.80	8.41	9.20	10.00
11	Singapore	8.18	7.65	8.62	9.05	8.74	6.60	8.75
18	S. Korea	7.66	7.20	7.32	7.60	8.14	8.20	8.50
19	France	7.61	6.30	8.24	8.00	8.05	7.60	8.75
20	Israel	7.45	6.85	7.67	7.40	7.24	8.00	8.75
21	Japan	7.42	6.90	7.34	8.00	7.27	7.60	8.00
32	South Africa	5.53	2.10	6.64	6.10	7.48	6.00	7.50
35	Malaysia	5.43	4.10	7.27	5.45	5.95	4.80	5.00
43	Turkey	4.58	3.30	6.49	4.15	4.71	4.40	5.25
46	Saudi Arabia	4.38	2.90	6.27	4.45	4.42	4.00	5.00
49	India	4.17	1.40	6.29	4.25	4.86	4.40	6.50
42	China	3.85	2.50	6.37	2.75	3.86	4.20	3.75
53	Egypt	3.90	2.20	5.48	3.65	4.74	4.00	4.25
56	Sri Lanka	3.80	1.40	6.19	3.35	4.81	4.20	3.75
58	Nigeria	3.46	1.00	4.65	3.50	4.60	4.60	4.00
59	Iran	3.08	2.35	4.61	2.00	2.70	4.00	3.25
65	Azerbaijan	2.72	1.70	5.29	1.30	2.34	2.80	3.00

This ranking gives a picture of countries' informational development. Figure 2 shows that Iran's e-readiness is at the low end of developing countries. Assessment of this year's e-readiness ranking illustrates that Iranian government despite of budgets and investments which has dedicated to develop the country informationally,²¹ fall to the minor rank versus the other less developed countries. E-readiness ranking 2005 shows that Iran spilled from 57th in 2004 to 59th place in 2005; whereas Turkey and Saudi Arabia, two main opponents of Iran in the Middle East region, have managed to move up in this year's ranking. They spilled from 45th and 48th in 2004 to 43rd and 46th place in 2005.

Strategies and Model for Informational Development in Iran

No major historical transformation has taken place in technology, or in the economy, without an interrelated organizational transformation.²² Information is the essential tool for informational development in our age; it conditions power, knowledge and creativity; it is, for the time being, unevenly distributed within countries and between countries; and it requires, for the full realization of its developmental value, an inter-related system of flexible organizations and information-oriented institutions.²³

Concerning with the theoretical assumptions that posed before about the nature of technology, informational development and the new society, assessment of Iran's Informational development indicators versus the other countries from which situated in Middle East to the other less developed countries, shows that Iranians have not succeeded to adjust themselves to new information technology paradigm. They still insist to achieve hardware without having a holistic approach to any kind of technology and information technology in particular.

Informational development is not just based on the hardware' faceted of information technology, in a nutshell, cultural, social, political, economic and educational development conditions informational development. We know from empirical study of the process of technological adaptation and diffusion that

technological change does not take place in isolation from institutional and socio-economic considerations. The direction of the process will not be decided by technology but by society. So catching up with the informational development inevitably is based on multidimensional realization and justification of the interactions between information development and society. Look to figure2.

As we see in figure2, development of technology in general and informational development in particular has a multicriteria nature. Namely these dimensions are interrelated, so we can not pursue them separately and in isolation from each other. For this purpose we design a matrix to model and realize these interactions and complex interrelations. Based on this modeling it will be prepared to foresight even the future of development in general and informational development in particular. In this matrix we split society to four main segments as political, cultural, social and economic institutions. Theoretically we believe that in each segment and institution we confront with many actors who influence on the mainstream of development. So if we want to catch up with informational development criteria, considering the role of key actors in each criteria is inevitable.

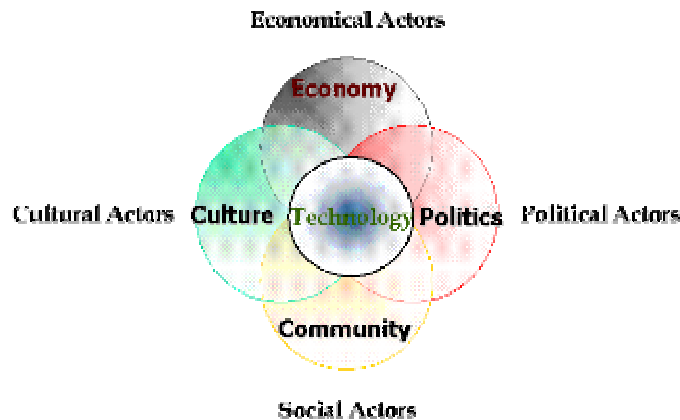


Figure 2: Technology development as a multiinterrelated process

In this model from strategic viewpoint we hold strength, weakness, opportunity and threat (SWOT) points for the interactions between key actors of social institutions and informational development.

Table 3: Suggesting Model for design Informational development plan

Actors \ criteria	Cultural	Social	Economic	Political
Strength(S)	CS	SS	ES	PS
Weakness(W)	CW	SW	EW	PW
Opportunity(O)	CO	SO	EO	PO
Threat(T)	CT	ST	ET	PT

In order to explain this matrix more clearly we show the interaction of political actors and informational development for sample. Basically when we say political actors it means that we recognize the importance of both intellectual political actors who lead academic communities and executive political actors who lead the

government and actually are stakeholders in the political matters. Political dimension of this matrix can be described in this way:

- PS: this refers to **political strength** of informational development.
- PW: this refers to the **political weakness** of informational development
- PO: this refer to **political opportunity** of informational development
- PT: this refers to the **political threat** of informational development

The interaction between political key executive actors and political intellectual actors for finding out the SWOT of interrelation among the informational development and political dimension can be molded as forgoing in the next matrix.

Table 3: Political Sector's Key Players

	Political Sector						
Key Players	Nation's Exigency Council	Islamic Consultative Assembly	Guardian Council	Foreign affairs ministry	Defense ministry	Supreme Council for National Security	Political academic elites

In this model it has been forecasted that different actors such as intellectual, executive actors in interaction with the key actors of informational development, on the whole will be able to determine the SWOT of the above interactions. This forecasting undoubtedly prepares the suitable political conditions for informational development with low risk and high productivity.

Conclusion

As a whole, in informational development approach government plays a primary role. They provide essential economic and institutional framework and must encourage the necessary investment in knowledge, innovation and new technologies with appropriate incentives. If a country wants to become developed informationally, then its government action requires a new mindset. The role of government should not diminish but be adapted to the needs of this new development.

Studying the selected country experiences (Malaysia, South Korea, Portugal, Jordan, Emirates and Morocco) in informational development provide some guidance on key factors in successful visions.²⁴

A national holistic vision formulated at the highest level

In Jordan and Dubai a holistic vision helped to enter into the knowledge economy a national priority and addressed social openness, a regulatory framework, the primacy of innovation and education/training, the development of lifelong training, and continuous and self-sustained informational development.²⁵

If strong leadership is required to act as a driver and level for change, it is also essential for the design and implementation of strategies and their components to be inclusive. In societies where a broad and deep consensus is crucial, it is necessary to proceed with in-depth consultation for important reforms and to work closely with civil society for their implementation. In a similar vein, if national strategies should be complemented, then they must be preceded or followed, by others countries formulated at institutional level. They serve as examples that help to build confidence in the national vision.

Efficient implementation agencies

A strategy for ensuring that a holistic vision pervades society must be laid down and followed up at the interministerial level. This may be possible, for example, through an agency with the authority to arbitrate in regulatory and budgetary matters, set up to support the president, with the representatives of

the ministries concerned, as well as the representatives of the professional world and educational and training institutions.

Emulating success stories

It is necessary to publicize what works and to make success known in administrations, firms, and associations.

In sum if we know what we want, why we want it, and how to do it, we have the basic groundwork from which we can try to convince business and governments. We tend to think that it is in the interest of the most enlightened government and enlightened business groups to support the high road of informational development, linking up productivity, quality of life, and investment in technology and education throughout society.

References

-
- ¹ Manuel. Castells. *Information Technology, Globalization and Social Development*; Geneva: 1999. UNISD/ DP 114/99/13. p.2
- ² Ibid
- ³ M. Castells. *The Information Age: Economy, Society, and Culture*. Blackwell: 1996. Vol 1. p.21
- ⁴ Ibid
- ⁵ John Huckle. *Manuel Castells on the Network Society*. 1999. [on line] available at: www.tidec.org/geovisions/Castells.html
- ⁶ Ibid.
- ⁷ M. Castells. *The Information Age: Economy, Society, and Culture*. Ibid. pp.16-17
- ⁸ Manuel Castells. *The Informational City*. Blackwell:1989. P.10
- ⁹ M. Castells. *The Information Age*. Ibid
- ¹⁰ Manuel. Castells. *Information Technology*. Pp3-4
- ¹¹ Ibid
- ¹² Kofi Annan. Secretary-General of the United Nations. [on line] available at: <http://www.itu.int/wsis/messages/annan.html>
- ¹³ Hart, J. and H. Kim; “*Power in the Information Age*”; [on line] available at: www.vii.org/papers/ciprut2.htm; 1997
- ¹⁴ Ibid
- ¹⁵ TAKFA History.2005. [on line] available at: www.scict.ir
- ¹⁶ Mohammad Hoseini Moghaddam. *Survey the Causes of low growth rate of informational development in Iran: The Role of Sovereignty*. MA thesis at: Shahid Beheshti University 2003.
- ¹⁷ A.T. Kearney. *Measuring Globalization: Who’s up, who’s down?*. Foreign policy. January/February 2003.pp. 62-65
- ¹⁸ Ibid.
- ¹⁹ The Economist Intelligence Unit. *The 2005 e-readiness rankings*. [on line] available at: http://www.eiu.com/site_info.asp?info_name=eiu_2005_e_readiness_rankings
- ²⁰ Ibid.
- ²¹ We can point to the TAKFA(National Iranian ICT Agenda) has allocated \$340M for existing national ICT projects.
- ²² Manuel. Castells. *Information Technology*.p.4
- ²³ Ibid
- ²⁴ Jean-Eric Aubert & Jean-Louis Reiffers. *Knowledge economies in the Middle East and North Africa: Toward new development strategies*. World Bank: Washington, Dc.2003.pp55-59
- ²⁵ Ibid.p59