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Investigating the Index of Readiness of Frontier Technologies in the Context of Political Stability
Case Study: Selected Islamic Countries

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Abstract

Numerous factors such as political struggles, economic decline, colonialism, and anti-civilizational ideas lead to frigidity of scientism spirit and backwardness in technological development in the Islamic world. Despite such an experience, compensating the scientific backwaters requires transcending the shortcuts and discovering the unknown ways that may accelerate the scientific growth and development of the Islamic world. Readiness for frontier technologies is one of the ways for compensating the past for going towards the civilizational development in material dimensions. However, two

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questions arise as follows: “What is the situation of this readiness in Islamic countries?” and “How do conditions such as political stability affect that situation?” To answer these new questions, to which less attention has been paid in governance of development in Islamic world, we used the empirical data, while providing conceptual and theoretical explanations. The results of the comparative analysis showed that the aforementioned index has no ideal situation in most Islamic countries, and compared to other countries, this gap is much wider. Similarly, correspondence of those data with the condition of political stability showed that severe political instability is a factor coexisting with the abovementioned critical situation. Thus, the hypothesis of the study was compiled as follows: “Limiting the severe political crisis requires readiness for acquiring frontier technologies; however, it is not enough and creation of other factors such as establishment of developing state in continuing movement towards technological development must be considered as well.”

Keywords

readiness index, frontier technologies, artificial intelligence, political stability, political violence

Introduction

The history of science and technology in Islamic world is an account of values, attitudes, and actions summarized in three terms: commitment, indolence, and betrayal. Regarding the instructions provided by the Holy Quran and the Prophet on encouraging acquisition of useful and value-oriented knowledge, there are exotic frameworks based on which the Muslim societies may become the elites of human societies and civilizations (Anwar & Bakar, 1997, p. 23). But since the management of this ideal necessitates a composite of political will for appropriating resources, stable and safe environment, and individual efforts for obtaining scientific achievements, numerous factors have defaced it, and political struggles, economic declines, colonialism and anti-civilizational ideas cause frigidity of scientism spirit and lagging behind technological development in the Islamic world (Mehrabi Kooshki, 1400 B; Golshani, 2019 ؛Bakar, 2019). Despite such an experience, compensating the scientific backwardness requires transcending the shortcuts and discovering the unknown ways that may accelerate the scientific growth and development of the Islamic world. In other words, scientific leap and acceleration as well as readiness for acquiring it are a necessity for compensating previous backwardness.

Today, readiness for acquiring knowledge and frontier technologies is a path that can reduce the technological gap with non-Islamic civilizations. Gaining power in this newly emergent arena assists societies to obtain a larger share of the regional and global markets, experience economic growth and development, and promote the quality of welfare for their nations. In principle, pioneering in the arenas of science and technology "can create economic authority, create political authority, and generate national prestige and dignity for a nation before people of the world. A knowledgeable nation, as generator of knowledge, has dignity in the eyes of the international society" (Khamene'i, 1388/27/02).

The merit of readiness for acquiring and developing frontier technologies is not just related to opening an opportunity for developing countries in order to increase efficiency and improve people's subsistence. In principle, any delay in entering this path can widen the development gap among countries and make compensation more difficult, because the future global order moves towards being divided into technological dominance and technological dependence. This atmosphere will lead many nation states – in spite of their identity, civilizational, political and ideological claims – towards absolute dependence and following the established order, practically eliminating them from the scene of international power. In these conditions, the range of backward countries (Third World), developing countries, and developed countries will lean towards a sphere wherein the hope of moving from the point of backwardness to progress and excellence is almost dim and unattainable. The speed of progress in frontier technologies and the resulting consequences and achievements shows that any actor that neglects this process even for one day will lag behind for tens of years from the path of progress and power game. Thus, filling such gaps will be similar to a miracle.

On the other hand, from civilizational perspective, when we speak of reconstructing the Islamic civilization and opening a new season of the Islamic life under the title of 'modern Islamic civilization', it is necessary to investigate its material and spiritual requisites well so that we may prevent deepening the gap of development and progress between the Islamic and non-Islamic civilizations. With perceiving the global milieu and comparing our condition with that of others, we may explore the contexts of revival of the era of material and scientific grandeur of Islamic civilization and think of the level of readiness in Islamic countries for entering the fourth revolution and development of modern technologies and its proper milieu. Regarding the milieu

and context of technological development of countries, we may speak of numerous factors including intellectual, political, social and economic factors. Here, however, due to limitation of time and space, we have dealt with political stability among the political factors. This is because it seems that one of the fundamental factors in delay of technological development of Islamic civilization is political instability and being in the riot belt and internal crisis. This is in a way that the energy of the Muslims countries and nations runs towards the political and ethnic struggles instead of reconstruction and increase in their welfare. Thus, specifically, the main question of this study is posed as follows: "What is the situation of readiness in Islamic countries for developing frontier technologies and how do conditions such as political stability affect that situation?" To answer this new question, less considered in development governance in Islamic world, we used available empirical data while providing conceptual and theoretical explanation and referring to research background. This study is of comparative evaluation, and we have compared and evaluated the status of selected Islamic countries by referring to the statistics published by international organizations regarding the indexes of readiness and political stability. This study is focused on the hypothesis that political stability affects the high level of readiness of frontier technologies in countries under study. We expect that the comparative evaluation of the level of readiness for frontier technologies and its political background show the perspective of what our status is compared to our friends and enemies, and how much we need to plan for effective policies.

1. The conceptual and theoretical framework

1-1. Definition of frontier technologies

The world is in the starting point of a fundamental evolution called the

fourth revolution by relying on newly emergent technologies, which will have a variety of consequences in the international and social arenas. Enjoying the merits of this power and management of its challenges requires, of course, the formation of evolution-making human forces and the powerful technological foundations. In this study, the concept of "frontier technologies" introduces a collection of knowledge, products, processes, tools, methods and systems used for producing goods or services whom the context of digital connections enables to multiply their effects. This collection consists of 11 important technical instances including artificial intelligence (AI), internet of things (IoT), big data, block-chain, G5, 3D printing, robotics, drones, gene editing, nanotechnology, and solar photovoltaic (Solar PV). Considering the limitations of study, we refer the readers to the related source (UNCTAD report, 2021) for explaining and describing these technologies. In the existing conditions, however, what is important is the integration of these technologies with their classical types with their complicated and considerable effect on human life. This is an evolution called "digital age" and introduces a situation wherein the cyber-physical, computational, networking, as well as classic and newly emergent physical processes have been synthesized (See: Kan'ani et al., 1399 SH). Thus, the consequences of the technical structure of these technologies are more important, which add to the necessity of awareness and readiness in acquiring them.

1-2. The readiness index in frontier technologies

Development in science and technology has various indexes. One of the new forms of these indexes, dealt with in UNCTAD report 2021, is "Frontier Technologies Readiness Index" that shows how the national capabilities of countries are for fair using of and creating proper contexts in the sphere of frontier technologies. This index

includes five structural and semantic blocks including “information and communication technologies development, research and development skills, economic activities and access to financial sources”. This structure is based on idea presented by Lall (1992) that assesses the technological readiness with the aforementioned indexes. According to the diagram 1, this five-sided block is assessed with numerous components. In this regard, the level of development of countries in the sphere of information and communication is assessed on the basis of “the number of internet users” and its “speed”. Similarly, the index of skill means “the period necessary for education” (in terms of year) and the number of "skillful manpower". The research and development index is evaluated on the basis of number of 'scientific publishing' and 'inventions registered'. The economic activities introduce 'export of hi-tech items' and 'export of electronic and digital services'. The idea of financial access is also related to the quality and level of "access of private section to internal credits and resources". According to the evaluation of UNCTAD (2021), few countries enjoy ideal level of frontier technologies readiness. Among them are, after USA, Switzerland, England, Sweden, Singapore, Netherland, and South Korea. China is evaluated to be in the 25th rank and Russia in 27th rank. The countries with the least level of readiness are in the south of African Sahara and are mostly developing countries.

The data of this index have been obtained from UNCTAD report 2021, which has used, in its turn, data of the International Telecommunication Union (ITU), United Nations Development Program (UNDP), International Labor Organization (ILO), SCOPUS database, United Nations Conference of Trade and Development (UNCTAD), World Bank (WB), International Monetary Fund (IMF), and Organization of Economic Cooperation and Development

(OECD) for evaluating and assessing the aforementioned components.

It is noteworthy that the readiness index can be evaluated in the level of country, individual, organizations and agencies. In the individual level, this index is focused on the individuals' readiness and tendency for accepting and using the new technologies in accessing the goals in daily life, home and workplace. In this method, evaluating technological readiness is a multi-dimensional psychological structure that offers a way for dividing consumers on the basis of their positive and negative technological beliefs (see: Parasuraman, 2000). Anyway, in the present study, country has been considered as the analysis unit.

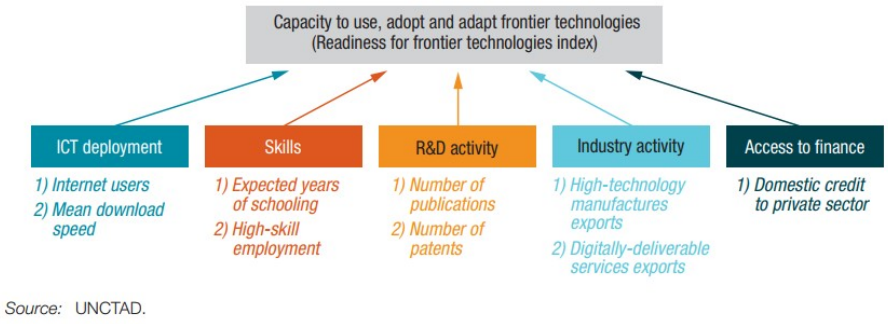

Figure 1: Structure of readiness for frontier technologies index (UNCTAD, 2021)

The advantages of countries' readiness and detriments of no readiness in the sphere of frontier technologies are numerous. It is estimated that such technologies soar up from 400 billion dollars to 3.2 trillion dollars in the future, and this share would go to those countries that have prepared the grounds for research and development of those technologies. The most important consequence of delay in capacity in that sphere will be an increase in the gap of development between the developing and developed countries. This is while the

efforts of developing countries for their presence in that sphere cause a modification in the structure of the existing order, a reduction in the mass and effect of the great powers with dispersal of power – which is called dissemination/ loss of power – and redistribution of power. The experts believe readiness in that sphere will lead to formation of technological superpowers in equilibrium with classic powers; that is, they will turn into decisive actors in rivalry of powers. The artificial intelligence superpower, drone superpower, and robotic superpower are examples that can decide the ground and rules of the future games (Fu Lee, 2018). Similarly, the features of frontier technologies are such that they are much used as the dual technologies for security and military purposes. Thus, national security strategies are in the state of "reverse spin-off" towards newly emergent dual and commercial technologies instead of concentrating on developing merely hard and military technologies. In the internal domain, good command of modern technologies, especially the big data, assists the good governance. In other words, using big data technology leads to optimized policies, reduction of state bureaucracy, management of sources and precise prediction of future trends. The big data technology omits wrong, arbitrary and deviated interpretations in information and surveys from the process of analysis and policy-making to increase definiteness and reduce the risk of the decision-making (Mir- Arab and Nowroozi Firooz, 1400 SH).

It seems that the frontier technologies will somehow affect all societies. Those that treat them actively will benefit from their merits, and those that treat them passively just as the final users at the end of "global value chain" will face more negative consequences, just as the governance of the cyber space has been turned into a serious challenge for societies with no technical and national substructures now. In the past decade, people's presence in streets for showing themselves,

composing and handing out leaflets, and striking were among the most important methods for expressing objections to some political or social issues. Now, the cyber space has offered a broader and cheaper arena for these actions. Besides, it has offered the tools for organizing those practices more than before. Just as we saw in Arabic Spring movement, Wall Street movement, and the events in the last years of Trump's state, the modern technologies can easily bring citizens and objecting social forces to streets, leading them to blind and sometimes purposeful riots (See: Michalska & Lilleker, 2017). However, those who have the technical contexts for that space can properly manage those challenges.

1-3. Political stability and readiness for frontier technologies

The important question is posed as follows: "What are the factors affecting the level of active readiness of countries in frontier technologies and can bring about more advantages for nations?" The answer to this question is not easy, and multi-layer variables affect it. However, here we refer to political factors and attempt to evaluate one of the background and important variables, i.e. political stability, effective in increasing that readiness. Thus, while explaining and investigating this hypothesis theoretically, we will comparatively analyze the empirical data.

There are various definitions of political stability. Sometimes, it is defined as no violence and continuity of the political system. Sometimes, it means existence of legal political regime and no structural change. In the negative aspect, political instability includes violence with political motivation (war and terror) as well as widespread civil objection (riot, demonstration, and strike). Instability inside political regime is also defined as political collapse, polarization of system, repetition of election, and long years of presidency of the

greatest party. Similarly, political instability is in line with repeated change of executive managers, cabinets, constitutional law, and some frequent changes in policies and laws (Kolstad, 2008; Altun, 2016).

Anyway, we may obtain one central concept in political stability, and that is lack of political violence. In this sense, violence is any action that harms persons or damages things and is along with civil disorder wherein we see collective resort to non-peaceful and violent methods in order to achieve special private and public goals (Ahmadi, 1376 SH, p. 126). This violence may be exerted by the state and groups supporting it, which includes actions such as suppressing the opponents and their adherents, Coups, and violent political struggles between various parties inside regime. It may be exerted by social and civil groups in the form of armed and non-armed actions against adherents of governing regime along with destruction of governmental facilities. Of course, ethnic and sectarian conflicts are also considered among the signs of political instability of a society (Ahmadi, 1376 SH, p. 127).

Regardless of the factors effective in political stability, this variable determines political, social and economic actions as environmental-background parameters, and no political instability is considered among the symptoms of political development, especially in the theories related to development. In Bashiriya's words, removing violence from the political life and political stability are among the symptoms of political development (Bashiriya, 1395 SH). Besides, political stability is also a prerequisite for economic development. In the framework of idea of "developmental state", progress and industrialization will accompany fundamental material evolutions when the elements creating instability are controlled and the state's energy is spent on accumulating assets, entrepreneurship, and creating the infrastructures of development (Evans, 1995, p. 101). Indeed, any kind of

moving forward will be successful if violence and disorder gets pale among the political and social forces. In such a desirable situation, individuals, intellectual and scientific elites and technological private companies will find the opportunity for long term planning for technological development.

The important point is that political instability can affect the economic growth and – accordingly – technological development in short and long terms. On the contrary, instability contains messages such as disorder in productive activities and investment, projects, increasing risks, less investment return, weak legal support of technological contracts and rights pertaining to their spiritual ownership, weak protection of investors, instability in public and private policies in the sphere of science and technology, non-definiteness about future, brain drain, and finally, less investment in innovative and technological projects that need long term commitments (Altun, 2016, p. 7).

One of the pieces of advice offered by UN regarding the technological development is that the political agents must improve environmental conditions including political and social conditions of technological development and accelerate innovation and spread of technology. Basically, in conditions that, due to lack of security and existence of political and economic corruption, the social environment becomes insecure, the innovation system gets dull and people, investors and industries lose their trust in government, and the investors and human assets prefer to invest in stable non-corrupted country and promote their innovative activities (United Nations, 2018, p. 123). In particular, the collapse of political system and violent actions such as terrorism and chronic ethnic and religious conflicts are a great challenge before the development including readiness for development

of frontier technologies. From the mental and psychological perspective, the sense of uncertainty, horror and insecurity in crisis-stricken societies lead to reduction of any kind of confidence in the sphere of innovation and technology as well as escape of internal and foreign investment. For instance, regarding Pakistan, especially ensuing September 11, 2001 and spread of political instability and increase in ethnic violence, many of the indexes of technological development in that country lagged behind and were subject to damage. Studies show that sustainable political environment increases innovative tendencies and, consequently, efficiency and innovations such as patents are encouraged. The mental sense arising from possibility of fall and change in states is also disappointing for investors' presence in technological sections. Similarly, instability causes emigration of skillful individuals including engineers and scientists. Loss of educated experts leads to depravity of countries from knowledge and innovation of the scientific elites and, consequently, reduction in technology export (Nadem et al., 2020, p. 2).

2. Research background

The investigation conducted on theoretical and empirical literature of the subjects of this study shows that in Iran, there are no related studies and what was done is overlapping in some discussions, and some others can be considered indirectly in this sphere. For instance, in the period between 1394 SH and 1396 SH (2015 to 2017), one article and two studies dealt with some aspects of this issue. In their article, Forqani and Qasemi (1394 SH) have dealt with evaluation of Iran's status in development of Information Technology and communication of the country. According to the results, the condition of Iran shows, in the past ten years, a descending movement in indexes

of development of information technology and communication compared to the countries of the world and the region. This is while one of the goals specified in the Document of Perspective 1404 SH is acquiring the prime position in economy, science and technology in the region. In a similar project in 1395 SH (2016), Tarbiat Modarres University confirmed those results and showed that Iran enjoys the rank 96 among the countries of the world in developing this new technology and rank 15 among the countries placed in the sphere of Document of Perspective. This is while the regional rivals of Iran enjoy the global ranks 21, 23 and 27 in that study. In another report prepared by Ministry of Industry, Mine and Trade on the basis of international statistics and indexes in 2016 (1396 SH), the Network Readiness Index (NRI) in Iran and countries of the region have been assessed. Estimations show that Iran's status has been descended from 78 in 2012 to 91 in 2016, while in the same year, the ranks of the selected countries in the region and in Islamic world, especially Malaysia, Israel, UAE, Saudi Arabia, and Turkey, were much better than Iran. In this evaluation, the rank of "political and regulatory environment" in those country was better than Iran.

Among the foreign studies, there are more studies related to this research. For instance, Okrah & Hajduk-Stelmachowicz (2020) have investigated the role of environmental factors, especially political stability, in dynamic formation of innovative activities in the modern society. By analyzing the data of 26 African countries between 1996 and 2016, they have concluded that there is a strong positive relationship between rule of law and political stability and their effect on innovative activities, including invention register. The article written by Nadem and his colleagues (2020) investigates the short-term and long-term effects of political instability and terrorism on

innovation in Pakistan. Their findings show that political instability and terrorism all have undesirable effects on innovation, and peaceful and stable environment along with major and effective economic projects, proper institutional quality and optimal use of resources for technological development of a country are of great importance. In an article indirectly related to the subject of this study, the effect of political stability on the economic parameters of readiness for frontier technologies have been investigated. The results of that study are much close to the results of the present study, in a way that higher degrees of political instability are related to the lower degrees of GDP growth. Political instability reduces productivity growth rate. This, in turn, affects economic growth negatively (Aisen and Veiga, 2011). One of the newest articles in this sphere (2021) shows that Africa has no proper situation in the sphere of frontier technologies, and these countries lack readiness necessary for just usage of these innovations. The article emphasizes that the process of global progress in this domain is along with to more severe inequality among countries and more backwardness in the sphere of social and infrastructural services, education and health (Aguboshim, Obiokafor & Onwuka, 2021).

3. Empirical explanation of investigation of existing data

3-1. The level of readiness in frontier technologies among the selected Islamic countries

To compare the existing situation, the examples under study were selected purposefully with considering several parameters. First, among the Islamic countries, we considered those neighboring Iran or allied with Iran (known as 'resistance axis'). Of course, Egypt as a symbol of ancient civilizations and Malaysia as a country pioneering in science and technology were added to that group. Beyond the

abovementioned co-civilizations, we named countries that are considered somehow as civilizational rivals out of the Islamic civilization. These included USA, China, India, and Israel. Thus, the members of this selected group were considered both for their being in Iran's geopolitical neighborhood and for their civilizational interactions or conflicts with Iran. Comparative study of the level of readiness for frontier technologies and its political background shows a perspective that delineates, despite scientific claims such as necessity of scientific authority, our position compared to our friends and enemies and our need to planning and policy-making. Besides, policy-making for knowledge-based regionalism – mentioned in the 'Manifesto of Second Step of Revolution' – requires awareness of regional and environmental capabilities and challenges (See: Mehrabi Kooshki, 1400 A). The effect of political stability on this capability contains lessons that direct the development of science and technology in the region. With this explanation in mind, we will have a look at the index of readiness in frontier technologies in this regard.

Among the countries under study, Malaysia and UAE enjoy a high position and Pakistan, Iraq, Afghanistan, and Yemen have an improper situation as far as readiness in frontier technologies is concerned. As regards the sub-indexes of performance, Malaysia and UAE are higher in development of communication technology; and in index of skill, UAE and Saudi Arabia are in a higher position. Research and development in Saudi Arabia and Turkey have had the greatest amount of investment and policymaking. In the index of industry, Malaysia has a privileged position and the scores of other countries are not considerable. As regards investment in the sphere of frontier technologies and financial access to them, the score of Malaysia and then UAE are high.

Table 1: Readiness Index in Selected Countries (UNCTAD 2021)

	Country	Total score	General rank	Group rank	ICT rank	Skill rank	Research/ development rank	Industry rank	Investment rank
✸	USA	00/1	1	High	14	17	2	20	2
✸	Israel	84/0	20	High	48	14	19	5	51
✸	China	76/0	25	High	99	96	1	7	6
1	Malaysia	71/0	31	High	29	65	33	12	19
2	UAE	63/0	42	Above average	34	57	38	44	38
✸	India	62/0	43	Above average	93	108	4	28	76
3	Saudi Arabia	57/0	50	Above average	56	41	26	129	69
4	Turkey	55/0	55	Above average	75	63	27	78	49
5	Bahrain	54./	56	Above average	40	59	93	69	46
6	Kuwait	53/0	58	Above average	49	81	84	65	31
7	Lebanon	50/0	63	Above average	85	60	63	72	22
8	Iran	46/0	71	Above average	82	74	37	130	53
9	Qatar	46/0	72	Above average	42	100	57	137	42
10	Oman	45/0	74	Above average	60	87	77	88	47
11	Egypt	38/0	87	Below average	117	67	42	100	116
12	Pakistan	20/0	123	Low	145	146	60	96	132
13	Iraq	19/0	126	Low	115	103	67	158	153
14	Afghanistan	05/0	152	Low	149	141	107	131	158
15	Yemen	03/0	156	Low	158	142	98	143	157

Of course, comparing the readiness index of the selected Islamic countries and the non-Islamic group including USA, China, India and Israel shows a big gap between the technological capabilities of these two groups. Except Malaysia, other Islamic countries have no considerable power in that sphere. Analyses and other diagrams also show this fundamental difference. Comparison of readiness index in geographical regions – which also suggests the civilization limits – shows that the western developed countries including the North America as well as west and north Europe have a much better condition than developing countries, especially in Asia and Africa. In other words, the readiness index in existing condition introduces technological gap and structural and perpetual inequalities among countries and civilizational spheres, and most probably, these historical inequalities will be transferred from the existing generation to the future generation, and individuals in low-income countries will suffer from higher poverty and deprivation, and in high-income countries, they will enjoy more prosperity and wealth. The following figure shows the readiness gap of frontier technologies in civilizational and geographical spheres.

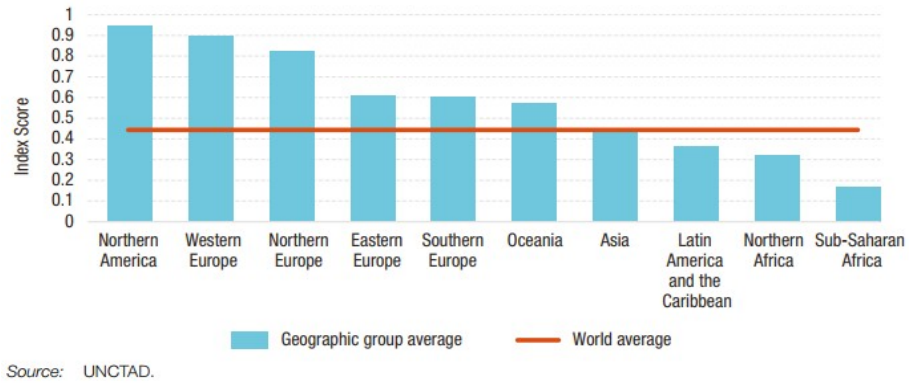

Figure 2: geopolitical groups and average readiness index

(UNCTAD, 2021)

Of course, the aforementioned gap does not mean that the performance of the developing countries is in general weak; rather, in some indexes, they have had proper functions. For instance, India and Philippines had a better performance than some other countries in some sections. In the section of research and development, the index of China and India shows a good performance, which is due to fully skillful but relatively cheap manpower. Besides, they have great local bazars that attract the investments of great multinational corporations. Vietnam and Jordan have also taken good steps in this path, which shows the state's supportive policies. Jordan as an Islamic country was one of the first Arab countries that supported ICT as an independent economic section, and from 1999, it regulated its first general ICT strategy. Today, this country has a young population with acceptable digital literacy and high internet infiltration.

3-2. The level of political stability among the selected Islamic countries

As we stated before, the political stability is defined as no violence and terrorism in the political regime and the public atmosphere, and the idea that a state is instable or declining through illegal and violent tools is also a sign of political instability. Upon investigating the level of political stability in selected countries, we used the data of the global economics website whose results are an average of data of the economist unit, the world economic forum and political risk services (www.theglobaleconomy.com, 2021).

	Country	Total score of political stability in 2021	Rank in readiness index in 2021	Total score of political stability in the period between 1996 to 2019
1	UAE	83/0	42	70/0
2	Qatar	70/0	72	98/0

	Country	Total score of political stability in 2021	Rank in readiness index in 2021	Total score of political stability in the period between 1996 to 2019
3	Oman	59/0	74	79/0
✸	USA	30/0	1	47/0
4	Kuwait	20/0	58	25/0
5	Malaysia	11/0	31	22/0
✸	China	24/0–	25	43/0–
6	Saudi Arabia	33/0–	50	43/0–
7	Bahrain	66/0–	56	45/0–
✸	India	7/0–	43	51/1–
✸	Israel	78/0–	20	17/1–
8	Iran	02/1–	71	70/1–
9	Egypt	07/1–	87	91/0–
10	Turkey	34/1–	55	01/2–
11	Lebanon	34/1–	63	64/1–
12	Pakistan	12/2–	123	25/2–
13	Iraq	56/2–	126	27/2–
14	Afghanistan	65/2–	152	47/2–
15	Yemen	77/2–	156	06/2–

A comparison between the ranks of selected countries in political stability and their rank in readiness index for frontier technologies shows that most probably, severe political instability (more than -2) is mutually related to very weak rank in readiness index. That is, despite the initial hypothesis, we may not necessarily say that those countries with highly ideal political stability are necessarily enjoying ideal scores in the sphere of readiness index (UAE, Qatar, Oman). Nevertheless, a part of the main claim of the study can be confirmed, and we may say

that no political instability is the necessary condition of readiness for modern technologies; however, it is not a sufficient condition, and other factors – along with a minimum level of political stability – can help the technological development of countries. This claim, however, is not definite, and in future studies with more empirical accumulation, it is necessary to assess this relationship.

Anyway, political instability in a level wherein a country is entangled in civil wars, widespread terror, and security ethnic crisis, we may not expect its readiness for developing frontier technologies. The situation in Yemen, Pakistan, Iraq and Afghanistan in the two above tables confirms this. This is due to the fact that in those situations, the states and political regimes are subject to breakdown and become unable to manage affairs and fulfill the minimum needs of their citizens. However, in less tensional situations of political instability such as continuous change in political structure and civil laws and objects, however, the readiness index may not be necessarily in a low level and other factors may compensate for this weakness. For instance, as the above table shows, the readiness situation of frontier technologies in some of the selected countries such as China, Turkey and Israel is not the same in regard with political stability; that is, while political stability is in a non-ideal situation (not critical), their readiness index is ideal for developing modern technologies. On the contrary, some countries with no proper condition regarding political stability have no privileged rank, contrary to what we expect, in readiness index. Qatar, UAE, Oman, and Kuwait are among them. This shows that in these countries, other intervening factors specifies readiness for development of frontier technologies. Referring to the opinions on development describes a part of the reason for the final results. Leftwich and Peter Evans suggest that the condition for development is, along with political stability, the presence of

developmental state. In this framework, instead of emphasizing the form of government (democratic), we must put emphasis on the state's decision for accessing development. Accordingly, Peter Evans considers the idea of developmental state as a necessary condition for progress, and believes that without a developmental state, there will be no development. In regard with development, he identifies three types of state and explains the roles of 'developmental', 'predatory' and 'intermediate' states in development and underdevelopment. In stating the characteristics of the developmental state, he says that the developmental state manages the relative advantage in economy, entrepreneurship and capital accumulation to create a strong relationship with social institutions. This is while in predatory states, various costs are put on the society's shoulders and the state does not care about development. He cannot control personal goals in agents and personal relations are the only source for solidarity, and maximizing the individual interests are prior to collective goals (Evans, 1995, p. 101).

Conclusion and suggestions

Growth and development in the path of innovation and technology and choosing shortcut and options full of achievements can reduce and stop the technological and developmental gap between 'us' and 'others'; however, investigating the statistics of world organizations (here UNCTAD) shows that the Islamic countries, especially in neighborhood of Iran, are very weak in this regard and are considerably far from others. Upon investigation of factors effective in this readiness, we focused on the variable of political stability as the background and environmental factor. The results showed that most probably severe political instability is correlated to low ranks in readiness index, and reinforces the hypothesis that political stability is a necessary

condition for political development but it is not enough, and that other factors such as existence and presence of developmental state is complementary to the process of development and readiness for acquiring frontier technologies. Of course, the latter item needs complementary studies by using the data from the future years.

The general offers for increasing readiness in acquiring strategic and frontier technologies are as follows:

- Creating facilities and proper opportunity for increasing knowledge and acquiring skills for citizens: frontier technologies are founded on skills and capabilities of users and producers. Creating equal cheap or free opportunities (for cities and villages) is a cognitive necessity in learning skills and acquiring more readiness.
- Spreading and reinforcing the coverage of internet in both urban and rural areas are among the components of frontier technologies, because innovations and initiations of this sphere are realized in the digital context.
- Policymaking in the industries, services and agriculture for leading them towards employment in intelligent factories and intelligent cities can evolve the food security and employment.
- Investment and financial access for developing modern technologies can be financed through various ways such as risky investment, providing collective asset and funds of innovation and technology.

Progress is not realized without knowledge and any model of development needs knowledge, especially in the model of resistance economy, it is a definite necessity to reach the borders of scientific authority. That is, it precedes achieving the zenith of knowledge and a level of scientific power through which one can cover the next paths of development easily to compensate so many instances of backwardness

in the past. Besides, one of the sources of power and authority of a society is being armed with knowledge (knowledge is dominance)[1] (Ibn Abil-Hadid, 1404 AH, vol. 20, p. 319). The abovementioned ideal is realized in the framework of proper policymaking of knowledge and technology. Specifying the scientific priorities of the country in view of the country's fundamental needs both in the present time and in the future, especially in the spheres of energy, finance and cryptocurrencies, management of public thoughts and digital governance, offering efficient and transparent governmental services and removal of institutional conflicts are all possible through modern and frontier knowledge. However, technological and scientific development is not enough just through concentrating on the internal forces and needs division of tasks in the neighboring and regional environment as well as conquering the regional and international markets.

According to the results of this study, political instability and insecure social and political conditions cannot generate any fruitful option for development. Thus helping creation of political stability in the region and – secondly – supporting the establishment of developmental state can prepare the regional and neighborhood ground for Iran's technological progress. Besides, creation of modern Islamic civilization and compensating previous backwardness is not realizable except with unity and harmony among the Muslim activists of the past. No doubt, the problem of violence and political instability is not created overnight and is constructed by a process of mental, environmental and international evolutions. Thus, it is necessary to precisely study the strengthening contexts and processes leading to that situation and deliberate for a solution with a consideration of the unique social and cultural conditions.

1. Imam Ali said, "Knowledge is dominance. Whosoever finds it rushes with it, and whosoever loses it will be attacked" (Ibn Abil-Hadid, *Exposition of Nahj al-Balagha*,vol. 20, p. 319).

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