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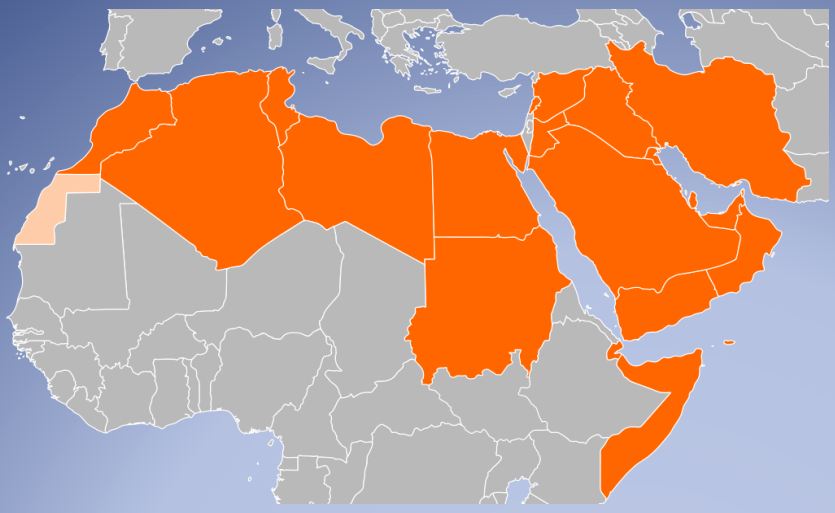

Knowledge Security of the Middle East and North Africa (MENA): Concept, Status and Dynamics

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İKSAD Publishing House

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1. Introduction

Many Muslim countries, including the Middle East and North Africa (MENA), are facing several problems including internal and external security challenges. Internally, they are facing economic, social, and political challenges. Externally also, they have failed to protect their sovereignty and security interests. The collapse of Iraq, Syria, Palestine and Afghanistan against the foreign invasion shows the gross inability of Muslim countries to defend their borders against invading external forces, especially the western countries. The failure of Saudi Arabia to protect its oil installations against the elementary drone technology also shows the low-level of preparedness or even ill-preparedness of a trillion dollars economy. Many north African countries are going through the phase of political instability. The main cause of these problems is presence of foreign militaries, exploitation of local resources and corrupt politicians. Even countries that are relatively (politically, economically and militarily) stable are prone to instability and collapse in the face of any major crisis e.g., Iraq and Syria. Thus, most of the countries of the region are facing many of these challenges.

These countries don't have any shared geopolitical vision for their security and establishing themselves as regional and global powers. They are divided on ethnic, geographic and economic lines. Therefore, for their security requirements, they have developed multilateral and bilateral alliances, especially with the western countries. Thus, many reasons may be attributed to the present situation of the countries of the region, but in the present study a new concept of "Knowledge Security", has been introduced to study and analyze this problem. It is based on the premise that the weak knowledge security is the main cause of all types of military, economic, political, social, and environmental insecurities, vulnerabilities and disunity. Many of these problems may be overcome by developing education, regional cooperation and global geopolitical vision.

The concept of knowledge security may be defined as achieving and maintaining the relative level of the development of theoretical and functional knowledge base of all related fields in any country which is required to defend its existence, integrity and create deterrence. It may also be defined in terms of self-reliance in the production and application of the critical knowledge. It may be achieved by developing institutions and necessary infrastructure, promoting the advancement of education, research and applications of the social, economic, political and natural systems to achieve self-dependence. In the following paragraphs the status of knowledge security of the MENA region has been analyzed vis à vis other regional and developed countries.

Knowledge security is discussed like energy security and food security in national and regional security.

1.1.About the Region (Location and geography, add map of the region)

The Middle East and North Africa (MENA) as the name itself suggests includes countries of west Asia and north Africa. Thought the region doesn't have any standard definition as many international organizations and scholars has identified different boundaries for different purposes. The World Bank has identified this region as constituted by 22 countries or territories of Asia and Africa. It is contiguous region spreading from Morocco in the North western Africa

to Iran in the western part of Asia. Therefore, this territory as a region is often taken by many scholars and organizations for comparative and regional studies. In the present study also the same definition and the territory of the MENA region has been adopted to explore the status, dynamics and development of knowledge and education. Though, Western Sahara, a disputed territory on the northwest coast and in the Maghreb region of North and West Africa is geographically a part of the region but because of its contentious nature (maximum of its area controlled by Morocco), it is not included by many experts in its territory. The region covers more than155 million square kilometers of area and 680 million populations. The region came to its present political and geographical shape in two stages, first after the collapse of the Ottoman Empire, when countries of the Gulf emerged independent, and in the second in the post-Second World War period when many independent states emerged in the Middle East and North Africa.

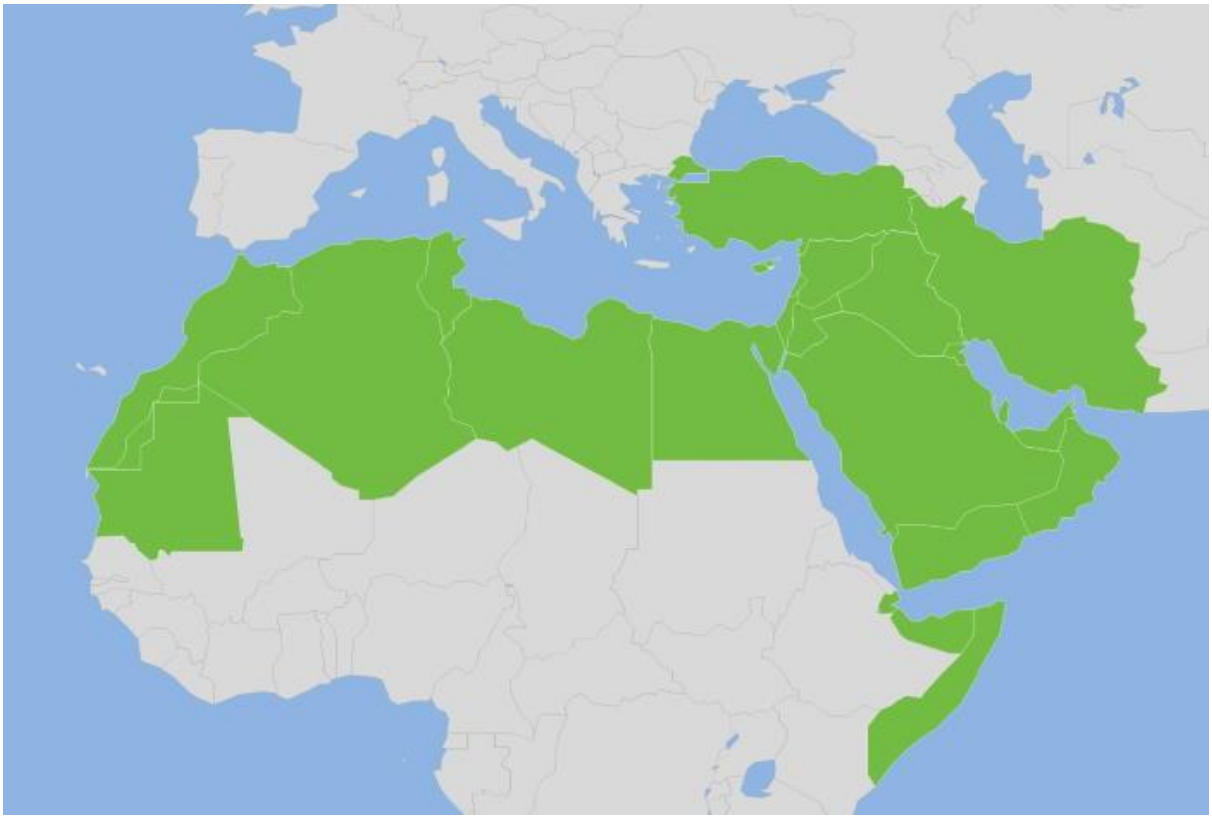
In Asia, the MENA includes the countries of West Asian Region (WAR) broadly covering the southwestern part of the continent. This part of Asia is also referred to as: West Asia, Western Asia, Southwest Asia, Middle East or Near East. The region is located at the crossroads between Asia, Africa, and Europe. In the present discussion the boundaries of this region to some extents are similar to 'Middle East'. Though broadly it is bounded in the west by the Mediterranean Sea and the Red Sea, in the north by the Black Sea, the Caucasus, and the Caspian Sea, on the east by the easter boundary of Iran, and in the south by the Arabian Sea and the Indian Ocean. The various regions of the West Asia include Anatolian peninsula, the Caucasus region, the Eastern Mediterranean region, the Mesopotamia region, the Syrian region, Palestine, the Sinai Peninsula, the Arabian Peninsula and the Iranian Highlands. The main countries of the regions are Bahrain, Iraq, Iran, Jordan, Kuwait, Lebanon, Oman, State of Palestine, Qatar, Saudi Arabia, Syrian Arab Republic, Türkiye, United Arab Emirates and Yemen. The region is home of old civilizations and the population is predominantly Muslim. The region is resource rich but comparatively less developed. It is also strategically located and has the potential to become a world power.

Despite being located in two continents, the MENA region is a single territory and has many similarities. From a geomorphologic point of view, deserts dominate the region, only Türkiye and Iran are an exception. Though, some scholars contest the idea whether Türkiye is traditionally a part of the MENA region or the only part of West Asia. It is because of its location, unique history and culture, it can be treated as a transitional country like Afghanistan which lies between South, Central, and West Asia. Historically, the term MENA and its definition are directly connected with Türkiye. During the 19th century British began to use the term for Near East, the territory of the Ottoman Empire in the eastern Mediterranean, the East to India, and the Far East was use to denote the region covered by China, Japan, and the western Pacific Rim (Hobbs, J. J, 2009). Traditionally, region is the birthplace of the most ancient civilizations and Abrahamic religions. Currently, the region's maximum population follows Islam, but it is also the birthplace of Christianity, Judaism, Zoroastrianism and many other faiths and belief systems. Arabic is the dominant language of the region. The region is also called the region of five seas, the Caspian Sea, Persian Gulf, Arabian Sea, Red Sea, and the Mediterranean Sea.

Egypt, Türkiye, and Iran are the most populous countries in the region (Table 2). geographically, the region is proximate to Europe, and historically also region is deeply engaged

with Europe. After a long historical process, both regions adopt different identities like Islam and Christianity and later Islam and modern secular democracy. Despite many positive and cooperative engagements both regions consider opponents of each other. Many recent historically defined events in the post-cold war era happened in MENA, and Europe and the west were directly engaged militarily in the region. No doubt there are many internal security challenges for the region, but currently MENA region in general and many countries, particularly individuals facing security threats from Europe. It is interesting to know that despite the more geographical area, the significant population and natural resource base of MENA west has dominated MENA for the last two centuries. Europe's total geographical area is 10.18 million square km with a 746.4 million population, while MENA occupies 15.3 million square kilometers with 688.9 million inhabitants. The region is one of the richest regions in the world in terms of natural resources, especially oil and gas. Nearly 65 percent of world oil and 50 percent of global gas reserves are located in this region. Because of low education and technological level large part of the economy of the region depends on oil and gas export. Energy represents 85 percent of merchandise exported in the region.

Fig. Location of the MENA Region



Source: https://africaports.co.za/wp-content/uploads/2022/11/MENA-region-Freetemplates-image-cr-700.jpg

1.2 Database

The study is based on secondary data collected from different resources, including books, journals, newspapers, news channels, web portals and reports. For the status of knowledge production, most of the data is collected from 'The SCImago Journal & Country Rank', Times

Higher Education Survey global university ranking. A lot of other data and information has also been collected from the World Bank, United Nations Development Program (UNDP), other agencies of United Nations, Global Knowledge Index for the status and performance of knowledge production in the MENA countries for 27 subjects. Data on intellectual property or patents, trademarks, and industrial design is collected from the World Intellectual Property Indicators 2021.

1.3 Research Methodology and Design

The region's performance in terms of education and research development as per the 'Times University Ranking' has been discussed with the relevant governance indicators. The quantity and quality of knowledge production in region in various fields has been analyzed vis à vis the levels of the same in other countries of the region and of the developed world. The causes of weak knowledge security are discussed in two stages. First, the status and situation of knowledge security is discussed with theoretical backgrounds according to the philosophy of history and sociology of knowledge. In the second stage, data and information collected from different government agencies, organizations and experts of the knowledge production is analyzed and discussed.

The present study is descriptive and analytical in nature. It takes into account various concepts of security are discusses them the context of knowledge security. The concept of knowledge security also is discussed with its components of knowledge community and knowledge society. The status of educational and research development in the whole region, including individual countries is listed and analyzed. A simple comparison with European countries and MENA is also made to put the performance of the region in the global context. The causes of current status of knowledge security in the region are discussed in the context of Arnold J. Toynbee's theory of "Failure of Self-determination" and the theory of sociology of knowledge. About the current situation and status, the opinion of stakeholders and the experts of the fields (discursive analysis) from all countries of the MENA region has also been taken into account.

2. Discussing Security in the Context of the MENA Region

2.1 Development of the concept of Security

Security is the most precious commodity ever. In a dictionary term, security is "The state of being free from danger, threats or state of feeling safe, stable and free from fear and anxiety."[1] Though there could be various levels or dimensions of security from individual to global in international politics and relations, it is referred to as a state, regional, and global. For many experts, security is the core value of human life (Jackson, P. J., 2011)[2]. Thomas Hobbs (1651) stated, "without security there is no place for industry… no arts, no letters, no society; and which is worst of all, continual fear, and danger of violent death; and the life of man, solitary, poor, nasty, brutish, and short". Nobel laureate Indian poet Rabindranath Tagore define the security in form personal to nation, that security is

[1] https://www.merriam-webster.com/dictionary/security
[2] https://london.ac.uk/sites/default/files/uploads/ir3140-security-international-relations-study-guide.pdf

Where the mind is without fear and the head is held high
Where knowledge is free
Where the world has not been broken up into fragments
By narrow domestic walls
Where words come out from the depth of truth

(Rabindranath Tagore ,1861-1941)

Nevertheless, international order is anarchic, and the state is the most rational player, so the state's security is the most rational variable because the state claims to be responsible for the protection of its entire population. However, the state does not claim to be responsible equally for all people or humans living in a state because all people do not have equal status. So, state provides a different types of security covers to different people living in its boundary. Another dimension is a non-military aspect of security like environment, drug trafficking, hunger, and corruption which create security threats not only to states in a different manner but to individuals and ultimately to humanity. There is no single definition and dimension of security. Different dimensions and context create different definitions and concepts of security like individual or personal, human, national, international and global levels. Technological progress also created a different context of security from individual to all other levels. Expert following different philosophical ideas analyze security and threats in different ways.

Security is an underdeveloped, dynamic, complicated, and controversial concept in international relations. It is also a multidisciplinary and interdisciplinary idea of science and includes a number of areas of knowledge. Traditionally military, economy, politics, society, and environment are considered an essential part of security studies at the nation, region, and global level. It is challenging to define security objectively. The concept and definition of security may differ at the individual, national, regional, and global levels. Therefore, security is an essential contested and a complex concept (Buzan 1983: 6; Smith 2005).

Traditionally, security refers to national security including protection of territorial integration and national interests. Communists' and liberals' rivalry has also strengthened this perception with the development of typical security structure. This is especially true in case of the post-world wars era, when both the blocks had concentrated on border sovereignty-based security mechanisms. Other aspects like human security, individual security, and environmental security were not in the debates. The notion was established that the military aspect of security is more important than others. The state was assigned or considered to have sole responsibility to protect the citizens. Priority was given to the security of the state, and it was assumed that the protection of citizens of any state is guaranteed when the state itself is secured. Therefore, the rights of individual citizens can be sacrificed to protect the state because if the state is not secure, then its citizens are also not secure.

During the post-world war era, the focus was on collective security with groups of countries having common interests, ideologies, and enemies with military threats. Many other concepts like common security, shared security, and cooperative security also emerged for the same purpose. Regional security was also one of the focused domains of this era. The world in this era was divided into two blocks, and winning against a rival's block was a matter of prestige for the county's citizens because they were ready to sacrifice their personal rights and demand in

exchange of the same. As a result, many common security groups like NATO and the Warsaw Pact were created.

Security is based on the interdependency of structure and system, which in turn depend on various substructures and subsystems. An individual is not sovereign, but, an essential part of any state. In the modern world system, an individual in many ways is dependent on the state for its security. Only in an extraordinary situation his or her security will be transferred to out of state structure. State also assures the security of every individual within its sovereign border.

According to the UN Universal Declaration of Human Rights, all humans are born free and equal in right and dignity without distinction of any kind, such as race, color, sex, language, religion, political or other opinions, national or social origin, property, birth or another status[3]. All the signatory states have to follow the convention on human rights and guarantee the security of every individual within their sovereign borders. This declaration gives extraordinary power to the international community to interfere in any state on behalf of any individual denied his or her human right in his state. The UNO has intervened many times in different countries to protect the human rights of individuals and groups. However, it is a different matter that sometimes international institutions ignore or manipulate the facts because of big powers' political and economic interests. Recently UN had intervened in UAE when princes Sheikha Latifa bint Mohammad al-Maktoum – the daughter of Dubai ruler Sheikh Mohammed bin Rashid al-Maktoum was missing. The U.S and other big powers also intervene in different countries in case of any threat to human security. Human security also threatened because of internal security crises like a civil war in any state.

2.2 National Security

The complexity and different dimensions of the national security are explained by various models in security studies. With the passage of time, it becoming even more complex. The world is divided into many nations, and a nation or state is considered the most rational player in international politics. The idea of national security mainly emerged after the world wars because many new nations got independence, they developed economically and technologically so the issue and concept of national security appeared in mainstream discussion. The nation-state is also considered the extension of the will of the individual citizen and its higher relationship with society[4]. In historical process, the nation-state replaced all common political identities and structure of the past like clans, tribal societies, fiefdoms, free cities, medieval guilds, duchies, dynastic states, and even empires[5] (J. Jackson-Preece, 2011). G. Kennan (1948) defines national security as "the continued ability of the country to pursue the development of its internal life without serious interference, or threat of interference from foreign powers." The concept of national security is called "…as an ambiguous symbol" (Wolfers, A. 1952). National security is based on the idea of national interests. National interests may differ from values and welfare to security depending on stakeholders' interpretations. As core values the survival as a sovereign state, independence, national integration, and absence of any security threat are the most important national interests of any nation. Parliament of state, powerful lobbies and individuals,

[3] https://www.ohchr.org/en/instruments-mechanisms/instruments/declaration-human-rights-individuals-who-are-not-nationals
[4] https://london.ac.uk/sites/default/files/uploads/ir3140-security-international-relations-study-guide.
[5] ibid

dictators, the international community, and some powerful nations define any state's national interests. Means of national security are also debatable, as whether national security can be achieved through power or other means.

The means and strategy of national security in any state depend on the regional and global political and security environment and how stakeholders interpret it. Usually, a strong military is considered the most potent means to national security, but other policy means like neutrality and nonaggression pacts with powerful enemies or neighbors also play an important role. Nations pursue the offensive (attack) policy or defensive (resistance) policy depending all internal and external factors. These security policies are based on speculation about the level of threat and power of other nations. In the modern state system, there are many types of threats, and it is not limited to a military only. Any ideological, social, economic, moral, and combinations of various other threats may present a challenge to the state. Religious states always debate ideological threats, but liberal states also discuss the protection of democracy, and liberal values are more important than others.

Coast of security is also an important aspect of national security. It depends on the type of security threat to the state. If it's an economic threat, a state can compromise and may avoid a zero-sum approach. However, if it is for survival, it can go for an utterly zero-sum game like the USSR went during the Second World War period. Sometimes ideology may be a reason for total war. The USA launched war in Vietnam to counter communist ideology though this country itself was not a direct threat to the U.S. security.

For the same reason, Vietnam also chose the path of total war and mobilized all its national resources to counter U.S. aggression and protect the communist political system. Weak or developing states chose the middle path and try to follow a balanced policy. National security cannot be achieved for forever but only for a short or somewhat longer period of time. Sometimes states face unprecedented and unpredicted security threats like the 9/11 attack in different cities of USA. In weak states, terror may be a long-term national security threat. Many states face manufactured threats and crises designed and supported by powerful countries (like Iraq and Libya), fail to protect their national interests and collapsed. During the post-world war period both the west and USSR enjoyed long-term stability and peace. The USSR collapsed because of the combined threat of ideology, economy, and military.

There are three types of states big (and powerful), medium, and small. Small nations are most vulnerable to military security threats and search security in coalitions, neutrality, and compromise. Many countries that are not big in area and population but have big economies are also prone to military threats from outside. The period of security is based on many equations and the decisions of stakeholders. The mutual destruction concept also plays an important role in long-term peace stability e.g., nuclear deterrence played an essential role in long term peace in Europe and some other parts of the world. Sometimes states choose the war and lose their territory over the compromise and acceptance of any demand of the powerful state as Ukraine has done with Russia and Vietnam also chose the same route and had succeeded after a long war.

2.3 Regional Security

The contemporary structure of global political geography emerged in three periods of history, first in the colonial era, second in the post-world war political situation (simultaneous and anti-colonial movements), and finally in post-cold war reshuffling and emergence of many newly independent states. Despite the emergence of multipolar world in post-cold war world order, influence of colonial powers and bipolar super powers US and Russia (erstwhile USSR) can be witnessed in different regions of the world. In North Africa, France still has considerable influence on the security and politics of the region. The US has replaced Great Britain and continues to influence many countries and regions. Russia is continuously exercising its power in the geographic region of the former USSR. The current Ukraine crisis may also be said to be a result of Russia's desire to continue to influence the former USSR region. The long and continuing intervention of former colonial powers like France and UK is one of the causes of political instability and civil wars in Africa.

According to some experts, the region is also a vague and contested term[6]. Geography is no single criteria to define a region in politics and international relations, but many other criteria, like language, culture, economics, and resources, also play an essential role (Bailes, A. J. K. & Cottey, A., 2006). Regions are human constructs, and people draw the boundaries of any region according to their idea of homogeneity (Hobbs, J. J., 2009). There are also many transitional zones in between and among regions like the location of Afghanistan which lies geographically and geopolitically between South Asia, Central Asia, and the Middle East. Sudan also forms such example as it culturally lies between Africa and the Middle East. There are three types of regions. a formal or a uniform region is a well-defined area that share a common attribute such as language, culture, religion, or economic activity. A functional region is defined by a nodal geographic area which is surrounded by activities which may include commercial, social, political, or something else. The surrounding the central node can be considered its sphere of influence. A vernacular region is an informal and colloquial region that is defined by a person's sense of place or history. These are also known as perceptual regions or mental maps.

A vernacular or perceptual region is therefore, a region that exists in the mind of the people like common religious, cultural, linguistic, and historical belongingness despite living in different geographic regions. In political geography, a region is set of states which are geographically contiguous to each other. Throughout history, a state has considered its neighbor as a potential threat; therefore, the political landscape of any region is the result of war or clash between neighbors. Therefore, history is full of stories of war among the neighbors. First and second world wars were also result of conflict and rivalries between neighboring countries. Before the second World War, global politics was designed and controlled by some European colonial powers; therefore, creation of regional security order was very rare. Only the Organization of American States (OAS) created in 1890 was a notable name in this regard later it was renamed as the Pan American Union in 1910. The OAS is also considered the oldest regional security setup (Weiffen, B., 2012).

In post-World War period, the USSR emerged as a super power and threatened the liberal and capitalist world order. To protect their influence, western countries under the leadership of

[6] https://www.sipri.org/sites/default/files/YB06ch04.pdf

the US created different regional security and cooperation blocks, especially the North Atlantic Treaty Organization (NATO) and the Organization for Security and Co-operation in Europe (OSCE), etc. Many regions also tried to create different regional security organizations to cooperate with each other and to reduce their dependency on big powers. The Southeast Asia Treaty Organization (SEATO) and Central Treaty Organization (CENTO) were also formed with the support of the USA[7]. The USSR also created some regional security organizations, but these were few in comparison to western countries. The USSR collapsed in 1990, and with this the Warsaw Pact, and a significant security organization also dismantled, but US lead NATO continued. Presently, maximum number of countries of the world do not believe in individual security efforts, as they alone cannot protect their interests or security; therefore, they negotiate and establish some arrangements for the collective security with their neighbors.

Security and regional security are both complex and comprehensive issues, and cannot be limited to military security. As mentioned earlier many social, economic, and political factors also play vital roles in regional security[8]. Except a strong military, other factors like political and economic stability and progress are also responsible for national security. Defining and designing regional security concepts also depends on the region's situation. In Europe, the security threat is mainly military because of Russia and China's growing influence. Other factors are not so important because the continent is socially, politically, and economically stable.

Barry Buzan (1991) defines regional security as a complex and complicated concept. He defined regional security by dividing it into five sectors namely military, political, economic, societal, and environmental. However, he prioritizes military, political, and societal as most relevant. He argued that "economic relations are not nearly so much conditioned by geographical proximity as are military and political ones" (Buzan. Barry, 1991). A military factor of any region is concerned with the offensive and defensive capabilities. There are many regional military alliances, but only NATO give the guarantee to its members. Political security includes the stability of political systems, institutions, governance, and political ideology managed collectively in any region. Sometimes regional countries may agree to develop a common military system, but may follow different political systems. All regional countries try not to interfere in the political systems of each other and try to develop a collective security approach for the region. In the absence of any equilibrium, the political security of the region may collapse, and foreign or international powers intervene.

Economic security discusses any region's ability to arrange all economic resources such as natural, finance, and markets to sustain the region economically and reduce its dependency on the others. Through regional setup, countries cooperate with each other and engage with other regions and countries. Societal security explains the sustainability of social factors like identity, culture, religion, and language as common factors in regional security. Many regions in the world like Central Asia, the Middle East, and North Africa are defined on the basis of societal factors. In these regions, societal factors are more important than others. Environmental security concern the protection of the region's biosphere. In Africa and Asia, many security challenges have emerged from environmental factors.

[7] https://2001-2009.state.gov/r/pa/ho/time/lw/98683.htm

[8] https://www.sipri.org/publications/2011/towards-regional-security-regime-middle-east-issues-and-options

2.4 Knowledge Security

There are two dimensions of security or regional security, independent and dependents. In many cases, states or regions have a good military to protect their interests, but they are dependent on other countries for weapons and training systems, so in any crisis, they have to compromise, and if the threat is from a weapon supplier, it creates the worst situation for them. Maximum countries and regions that have good military and are capable of protecting their interests are dependent on nature. In the same manner, the economy of a state or region may be progressive, but, if it depends on foreign investment, technology, resources, and demand, its economic security may be threatened. The MENA, South Asia, Central Asia, etc., have good militaries and economies, but they are dependent for many of the factors of economic development. The independent states or regions like NATO and other European countries are not dependent on others for protecting their interests.

No country or region is totally independent, as a significant part of military power, economy, technology, and resources comes from other countries even if they are friendly countries. The independence of any state and region comes from its knowledge base or knowledge security. If any state or region does not have 'Knowledge Security' it is also weak in other factors of security. The classical example is recent Russian attack on Ukraine or the NATO war on Iraq and Afghanistan. Despite opposition from the global community, they sustained their aggression because they were not dependent on others and had enough knowledge and security to continue the war or to execute their foreign policy goals. Knowledge security is concerned with the development of capacity and capabilities of any region to produce enough information and skill to fulfill all their technological, human resource, and other demand, and defend their military, economy, society, political system, and environmental stability.

Knowledge security can also be identified as another sector of regional security complex theory. Gaining knowledge security is a difficult task because it needs visionary leadership, extraordinary human resources, huge funds, social and political reforms within the region, and long-term international cooperation and stability. At regional level collective efforts and arrangements are needed to minimize knowledge dependency. To achieve this goal, a region needs to establish a knowledge society and 'knowledge community' (KC) which is a group of people or institutions from the different countries of the region which are committed to producing, managing, and sharing knowledge to fulfill knowledge requirements of the region in different sectors of security like military, economy, and environment".

Many countries and regions have resources and capacity to become independent power and secure and protect their security interests in all sectors, but because of the low level of moral values, they are unable to use their potential and opportunity. Low or lack of morality not only affects political and economic security but all other sectors of security also. British historian Arnold Joseph Toynbee articulated that civilizations can sustain military and economic collapse but not the collapse moral values. Collapses of morality initiate the collapse of state or region in all sectors and dimensions of security. Though, it is difficult to precisely define and measure morality and its collapse, but some of its signs are visible in the form of rampant corruption, wealth concentration, money laundering, high rate of crime, injustice, and corrupt institutions etc. in any state and region. Moral collapse directly hit other sectors of security also. Therefore,

moral security is an essential factor in the security of any state and region. This type of security discusses the moral level and capacity of any state and region through which people and institutions can be convinced and managed to keep high morality and to protect the security interests of the state and region from immoral practices. To achieve the goal of 'moral security' the region and state can establish a ‘moral society’ (MS) and 'moral community' (MC) etc. A moral community is a group of people of any state and region who are convinced and give an assurance not to use immoral means to achieve their goals in all walks of life, including social, political, and economic.

2.5 Security Concerns of the Middle East and North Africa (MENA) Region

As is evident from its name or abbreviation, this region combines two subregions i.e., Middle East and North Africa, lying in in Asia and Africa respectively. Despite spreading in two continents, the MENA is a single region because of many geographic and cultural similarities. From a geomorphologic point of view, deserts dominate the region; only Türkiye is an exception. Though there is debate whether Türkiye is traditionally a part of MENA, or it is just a part of West Asian region. Because of its location, history, and culture Türkiye can be treated as a transitional country like Afghanistan, lying between South, Central, and West Asia. Historically, the term MENA and its definition are directly associated with Türkiye. During the 19th century, British began to use the term for Near East, the territory of the Ottoman Empire in the eastern Mediterranean, the East to India, and the Far East to China, Japan, and the western Pacific Rim (Hobbs. Joseph J, 2009). Historically, this region is the birthplace of most ancient civilizations and Abrahamic religions. Currently, the region's maximum population follows Islam, and also is the birthplace of the religion. The West Asian region is also called the region of five seas, which include the Caspian Sea, Persian Gulf, Arabian Sea, Red Sea, and the Mediterranean Sea.

The MENA includes 22 countries, including Türkiye and Palestine. Though, Western Sahara is geographically a part of the region, but, because of its disputed nature (its maximum area is controlled by Morocco), it is not included in the list by many experts. The regions nearly occupy 60 million square miles with 680 million populations. Politically, this region emerged took its present shape in two periods or stages, first after the collapse of the Ottoman Empire, when countries of the Gulf emerged independently, and second, in post-Second World War period when many independent states in the Middle East and North Africa got independence from colonial rule.

Egypt, Türkiye, and Iran are the most populous countries in the region (Table: 2). Geographically, the region is located near Europe, and historically been deeply engaged with the continent. After a long historical process, both the regions have adopted different cultural and political identities like Islam in West Asia, Christianity in Europe and later modern secular democracy in both the regions. Despite many positive and creative engagements, both the regions are considered opponents of each other by many scholars and politicians especially of Europe. Many of the recent history making events of the post-cold war era have happened in the MENA, especially when the west particularly Europe was militarily engaged in the region. No doubt, there exist many internal security challenges for the region, but currently the region in general, and many individual countries in particularly are facing security threats from Europe. It is interesting to note that despite having bigger geographical area and natural resource base, the

west has been dominating the region for the last two centuries. Europe's total geographical area is 10.18 million square kilometer and a population of 746.4 million, while MENA with an area of 15.3 million square kilometers has a population of 688.9 million. The region is one of the richest regions in the world in terms of natural resources, especially oil and natural gas. Nearly 65 percent of world oil and 50 percent of global gas reserves are located in this region[9]. Because of low education and technological level, large part of the economy of the region depends on oil and gas export. Energy represents 85 percent of merchandise exported from the region.

3. Analyzing Development and Status of Education and Scientific Achievements in the Region

3.1 MENA Universities' General Ranking

The level of education in any country and region defines their sociocultural and economic development. Similarly, higher indicators of education in a region or country are also taken to indicate the social and political awareness of the people and their leaderships' priority for all-round development and self-dependency. Development of a country into a military power is also directly related with the quality of education and research and institutional development. America and other western countries have achieved their present status as a result of policy of educational development.

In any university ranking system, generally among the top 100 universities maximum belong to U.S. and Europe. For instance, according to Times Higher Education World University Rankings 2021, there were 21 American universities in the top 50 universities list, while seven universities belong to the United Kingdom. In terms of university ranking, the MENA region's performance is very poor. There are only 168 universities of 21 countries of the MENA region finding place in the ranking, and maximum of them or 96 universities were put in category of 1000 or 1000+ ranking (Table:1). Only 24 universities could find place in the ranking of 800-1000, while 16 universities were ranked between 600-800 among all select universities of the world. There is not a single university ranked between 1-100, and only one university from Israel managed to secure a place in the category of 100-200 ranking. There are merely three universities ranked between 200 to 300. Surprisingly, Iran is at the top with 47 universities finding place in global ranking, while Türkiye is at the second position with 43 universities in the list. There are at least eight countries of the region which do not have a single university in this ranking. African part of the region has to make great efforts to be even visible in this ranking system (Table: 1).

Table 1: Numbers of the MENA's Universities in Times Higher Education Ranking (2021)

Name of Country	University Ranking										
	1-50	51-100	101-200	202-300	301-400	401-500	501-600	601-800	801-1000	1000+	Total
Mauritania	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Morocco	0	0	0	0	0	0	0	0	1	4	5

[9] https://openknowledge.worldbank.org/handle/10986/20576

Algeria	0	0	0	0	0	0	1	0	1	8	10
Tunisia	0	0	0	0	0	0	0	0	0	6	6
Libya	0	0	0	0	0	0	0	0	0	0	0
Egypt	0	0	0	0	0	2	1	2	4	12	21
Sudan	0	0	0	0	0	0	0	0	0	0	0
Lebanon	0	0	0	0	0	0	0	1	1	2	4
Jordan	0	0	0	0	0	1	0	1	1	2	5
Palestine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Israel	0	0	1	1	0	1	1	2	0	1	7
Syria	0	0	0	0	0	0	0	0	0	0	0
Iraq	0	0	0	0	0	0	0	0	0	3	3
Iran	0	0	0	0	2	1	6	9	6	23	47
Saudi Arab	0	0	0	2		1	2	0	2	3	10
Kuwait	0	0	0	0	0	0	0	0	0	1	1
Bahrain	0	0	0	0	0	0	0	0	0	0	0
Qatar	0	0	0	0	1	0	0	0	0	0	1
UAE	0	0	0	0	2	0	0	1	2	0	5
Oman	0	0	0	0	0	0	0	0	1	0	1
Yemen	0	0	0	0	0	0	0	0	0	0	0
Türkiye	0	0	0	0	0	2	2	3	4	32	43
Total	**0**	**0**	**1**	**3**	**6**	**8**	**12**	**18**	**24**	**96**	**168**

Source :(Based on the Times Higher Education ranking). Available at https://www.timeshighereducation.com/world-university-rankings/2021/worldranking#!/page/0/length/-1/locations/ARE/sort_by/rank/sort_order/asc/cols/stats.

To study the quality and level of higher education in the MENA region, many educational indicators have to be analyzed and correlate them with the performance of the universities in the global ranking system. It is usually accepted that the quality and level of education development depends on expenditure, that's why in poor or developing countries, many pressure groups demand the governments for more budget for higher education. But, an analysis of the ranking data reveals that Iran, which has been facing the worst economic sanctions for a long time has performed well, while it spends less percentage of the GDP on education in comparison to other countries of the region (Table:1). Iran spends only 3.6% of its GDP for education, while the country having second place Türkiye, spends 4.3% of its GDP on the same.

Egypt is the third best performer, with 21 of universities in the list, spends 3.9% of its GDP on education. Tunisia tops the list of countries spending the highest on education with a share of 7.3% of its GDP, but only six of its universities in could finding place in the category of 1000 ranking (Table: 2). Saudi Arabia has 10 of its universities in the ranking list, the country also had 2 of its universities in the 201-300 ranking, while Israel had only one. Saudi Arabia spends 5.1% of its GDP on education. The human development index is also mixed for the region, as some countries especially the gulf countries have performed well, but it may not be correlated with their educational development. UAE and Qatar with 5 and 1 universities respectively in the ranking list have also made their presence. They have higher HDI ranking at 31 and 45 places respectively. Iran is the top performer university raking with 47 universities, but its human development index rank is at 70th place.

Türkiye's HDI ranking is relatively good securing 54th place in the world. Egypt's performance in HDI and university ranking is quite puzzling. Egypt's HDI ranking is 116th but it has 21 universities in the ranking list. Both, Algeria and Saudi Arabia have 10 universities each in the list, but there is a massive gap in their HDI performance. Saudi Arabia's HDI ranking is at 40th place, whereas Algeria's HDI ranking is 91th place. It shows that the human development

index is not correlated with educational quality in the MENA region and depends on some other factors also (Table: 2).

Table 2: University Ranking, Economic and Educational Indicators of the MENA Region

Countries	Total Pop. In millions	Total Uni. In Ranking	GDP Billion USD	GDP Growth Rate 2020	Per Capita Income USD	Expenses on Education %	Literacy Rate 15-24 Age	Human Development Index Ranking 2019	Education Index 1990&2019	IQ index Ranking (2022)	Expected Years in School	Urban Pop. In %
Morocco	36.91	5	114.73	-6.29	3,058.7	5.3	98	121/0.686	0.254-0.569	147/ 67.03	13.7	64
Algeria	43.85	10	145.01	-5.10	3,306.9	6.1	97	91/0.748	0.385-0.672	144/76	14.6	74
Tunisia	11.81	6	41.62	-9.18	3,521.6	7.3	96	95/0.740	0.406-0.661	122/79.22	15.1	70
Libya	6.87	0	25.42	-31.30	3,699.3	2.3	100	105/0.724	0.516-0.610	115/80.92	12.9	81
Egypt	102.33	21	365.25	3.57	3,569.2	3.9	88	116/0.707	0.389-0.618	142/76.32	13.3	43
Sudan	45.62	0	26.11	-3.63	486.4	2.2	61	170/0.510	0.159-0.345	125/78.87	7.9	35
Lebanon	6.82	4	31.74	-21.46	4,649.5	2.6	100	92/0.744	--0.604	110/81.7	11.3	89
Palestine	5.30	NA	15.56	-11.5	NA	NA	97	115/0.708	--0.678	134/77.69	13.4	NA
Israel	6.80	7	407.1	-2.15	44,168.9	6.2	99	19/0.919	0.714-0.883	49/92.43	16.2	93
Jordan	10.20	5	43.7	-1.55	4,282.8	3.0	99	102/0.729	0.496-0.667	117/80.7	11.4	91
Syria	17.50	0	22.78	3.75	1,334.4	5.9 (2015)	92	151/0.567	0.417-0.416	149/74.41	8.9	55
Iraq	40.22	3	166.76	-15.67	4,145.9	3.6	94	123/0.674	0.373/0.557	61/89.28	11.3	71
Iran	83.99	47	203.47	3.39	2,422.5	3.7	98	70/0.783	0.397-0.756	119/80.01	14.8	76
Kuwait	4.27	1	105.96	-8.69	24,811.8	6.6	99	64/0.806	0.476-0.638	129/78.64	14.2	100
Saudi Arabia	34.81	10	700.12	-4.11	20,110.3	5.1	99	40/0.854	0.489-0.789	141/76.36	16.1	84
Qatar	2.88	1	144.41	-3.56	50,124.4	3.2	95	45/0.848	0.507-0.659	116/80.78	12.0	99
Bahrain	1.70	0	34.73	-5.09	20,410.0	2.3	95	42/0.852	0.574-0.769	97/83.6	16.3	90
UAE	9.89	5	358.87	-6.13	36,284.6	3.1	98	31/0.890	0.474-0.802	106/82.5	14.3	87
Oman	5.10	1	73.97	-3.20	14,485.4	5.4	99	60/0.813	--0.718	128/78.7	14.2	86
Yemen	29.82	0	21.61	0.75	758.1	5.2 (2008) NA	77	179/0.470	0.219-0.350	182/62.86	8.8	38
Türkiye	85.90	43	719.95	1.79	8,536.4	4.3	97	54/0.820	0.399-0.731	77/86.8	16.6	76
Mauritania	4.86	0	4.65	-1.76	1,702.0	1.9	43 (2017)	157/0.546	0.178-0.396	188/59.76	8.6	55

Source: For Population: https://data.worldbank.org/indicator/SP.POP.TOTL?locations=ZQ
For GDP Growth Rate:
https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2020&most_recent_year_desc=false&start=2015
For the Freedom of Press Index: https://rsf.org/en/ranking/2021?#
For Per Capita: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=TR
For Education Expenses: https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS
For Human Development Index: https://hdr.undp.org/en/content/latest-human-development-index-ranking
For Education Index: https://hdr.undp.org/en/indicators/103706
For Intelligence Quotient IQ: https://worldpopulationreview.com/country-rankings/average-iq-by-country

It is also generally accepted that the development of the quality knowledge production system depends on many sociopolitical factors including nature governments and their vision for the country. In some countries good governance does not mean good and quality education but its vice versa. Though, in recent history, the region has relatively been politically stable, but democracy has always been weak marked by many military coups and rule of dictators, especially in the form of monarchy. Though, many countries of the region like Syria, Yemen, and Libya have been passing through civil wars and external interference.

As far as the governance indicators are concerned, Iran is at the top with presidential democracy with constitutional theocracy. Though, according to World Bank data, between 1996 to 2020, Iran's voice and accountability index declined from 19.50 to 8.2, and the same is true for the second highest performer Türkiye, where this decline has been recorded from 45.50 to 23.67 during the same period. Maximum countries of the region are facing same situation i.e., declining score or slow progress in voice and stability indicators. Only Tunisia gained significantly, from 31.00 to 57.00 in this index, and six of its universities have also found place in the global ranking list (Table: 3). Generally, the index values of other indicators of governance; like political stability and absence of terrorism, government effectiveness, regulatory quality, rule of law, control of corruption, hunger index, and freedom of press etc. do not seem to be much related with educational development as the situation is almost same everywhere, i.e., slow or no progress at all. (Table: 3). Only a few countries like Algeria and Tunisia have shown some progress.

Table 3: University Ranking and Governance Indicators of the MENA Region (1996-2020)

Country	Total Uni. In Ranking	Govt. System	Voice and Accountability (Percentile Rank)	Political stability and absence of Terrorism	Government Effectiveness	Regulatory Quality	Rule of Law	Control on Corruption	Corruption Index Rank	Hunger index Out of 116 in 2021	Press Freedom
Morocco	5	CM	36.50-30.43	39.89-35.38	55.19-52.88	51.63-48.56	59.30-50.96	53.23-42.79	86	43	136
Algeria	10	PrD	14.50-18.36	05.23-17.45	13.11-33.36	20.11-09.13	12.56-21.63	33.33-28.37	104	31	146
Tunisia	6	PR	31.00-57.00	55.32-24.60	62.84-43.75	60-87-39.42	41.21-58.17	35.48-52.40	69	22	73
Libya	0	TG	09.50-11.59	18.62-02.36	20.77-01.92	03.80-00.96	14.57-01.44	20.43-02.88	173	NA	165
Egypt	21	PrD/MD	22.00-07.73	27.66-11.32	36.07-32.21	53.26-25.48	51.76-39.90	38.71-22.60	117	56	166
Sudan	0	TG	02.50-09.66	01.06-05.66	15.58-05.77	08.70-04.33	02.01-12.98	06.99-06.73	174	95	159
Lebanon	4	PD	39.00-32.85	23.40-08.02	51.37-11.54	34.78-28.85	42.21-19.23	31.18-12.02	149	48	107
Palestine	NA	PrD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Israel	7	PrD	60.00-60.60	12.77-18.40	75.96-83.17	83.15-87.02	88.44-82.21	88.17-70.67	35	NA	86
Jordan	5	PCM	42.00-27.54	46.81-35.81	56.83-57.21	55.43-60.10	60.80-59.13	55.38-59.62	60	38	129
Syria	0	PrD/DT	11.00-01.45	34.57-00.00	21.86-02.88	14.67-03.37	33.17-00.96	19.89-00.48	178	NA but after 115th	173
Iraq	3	PD	00.00-20.77	04.79-01.42	00.55-09.62	01.09-08.65	05.03-03.85	00.54-09.13	10	86	163
Iran	47	PrD/CT	19.50-08.21	36.17-07.55	32.79-14.90	07.07-06.73	19.60-20.19	37.63-14.42	149	35	174
Kuwait	1	CM	41.50-29.95	52.66-54.72	59.02-45.67	64.13-62.50	67.34-63.46	70.43-53.85	78	118	105
Saudi Arabia	10	CM	09.00-05.31	40.96-22.64	49.18-58.65	41.30-61.54	56.28-60.10	51.08-62.98	52	35	170

Qatar	1	CM	26.50-14.01-	57.98-68.40	70.49-78.37	61.96-71.96	49.29-82.69	54.84-77.88	30	NA	128
Bahrain	0	CM	25.50-09.18	36.70-25.47	77.05-68.27	74.46-73.08	50.75-67.31	63.98-53.37	78	NA	168
UAE	5	CM	37.00-16.43	78.19-66.04	77.05-87.98	71.74-82.69	68.84-79.33	57.53-83.17	21	NA	131
Oman	1	CM	26.00-16.91	75.00-57.55	65.57-58.17	58.70-66.83	66.33-71.63	67.74-62.02	49	55	133
Yemen	0	CW	27.50-04.35	9.57-00.94-	31.69-00.48	32.07-03.85	9.05-03.37	27.42-01.92	176	115	169
Türkiye	43	PrD	45.50-23.67	10.64-11.79	55.74-52.40	59.24-51.92	47.24-40.38	51.61-44.23	86	118	153
Mauritania	0	PrD	33.50-24.64	59.04-19.81	53.01-21.15	35.87-20.67	35.68-03.29	34.41-23.08	140	85	94

Source: http://info.worldbank.org/governance/wgi/Home/Reports
For hunger Index: https://www.globalhungerindex.org/ranking.html
For corruption index: https://www.transparency.org/en/cpi/2020

Constitutional monarchy, CM; Presidential democracy, PrD; Parliamentary republic, PR; Transitional government, TG; Military dictatorship, MD; Parliamentary democracy, PD; Parliamentary constitutional monarchy, PCM; Dictatorship, DT; Constitutional Theocracy, CT; Civil war, CW

Iran, Türkiye, Egypt, and Saudi Arabia are top performers in the Times University ranking, but all these countries have been lagging in governance indicators. Therefore, the governance of these countries may be one of the reasons that no university from this region appears in the list of top 100 institutions and maximum universities lie in the category of 800 to 1000 and beyond.

3.2 Research Publications and Performance:

Knowledge production can be studied and measured through the number of research publications, books, documents, citations, and citations per document. The H index is also a criterion to judge the performance of any country or region's knowledge production and development of quality education quality system. Therefore, the h index has been taken here to analyze the level of education development and knowledge production.

Table 4: General Ranking (All Subjects) of the Universities of the MENA Region
(Based on Research Publication for the Period of 1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
173	Mauritania	964	907	12110	858	12.56	50
58	Morocco	93468	88034	946325	185488	10.12	232
57	Algeria	93727	90863	896338	178117	9.56	213
54	Tunisia	113626	107531	1245991	225365	10.97	235
114	Libya	8152	7782	99791	4160	12.24	94
36	Egypt	302626	290713	3812756	786275	12.60	349
100	Sudan	13309	12464	181733	14717	13.65	119
69	Lebanon	45782	41600	745429	62343	16.28	264
63	Jordan	60967	58789	738525	90396	12.11	219
102	Palestine	10971	10322	190215	15810	17.34	131
25	Israel	457975	415893	1268014	1493196	27.69	821
106	Syria	9942	9398	148718	11427	14.96	130
60	Iraq	79792	77910	455521	105670	5.71	155

21	Iran	733080	707897	8788390	2872308	11.99	416
38	Saudi Arab	299283	285929	4487881	712683	15.00	478
79	Kuwait	32882	31092	460773	41447	14.01	195
104	Bahrain	10751	9793	147546	6812	13.72	117
73	Qatar	42526	39137	698753	67249	16.43	238
59	UAE	87125	80662	1075950	109871	12.35	268
81	Oman	28405	26003	366998	35319	12.92	176
115	Yemen	7891	7562	108665	10291	13.77	98
20	Türkiye	767299	713081	9710816	2000813	12.66	535
MENA Total		3300543	3113362	47999368	9030615	14.54	Average:251.5
Europe Total		21923489	19779640	526591087	100651105	20.51	Average:685.92
Percent of Europe's performance		15.05	15.74	9.11	8.97		

Source: https://www.scimagojr.com/countryrank.php

3.3 The MENA Regions Universities' Performance (All Subjects)

An analysis of the 'all subjects' column reveals that Israel, Türkiye and Iran are the top performers. Türkiye with a global ranking of 20th place, and h index value of 535, is a leading country of the region. Iran is the second top performer with 21st rank and h index value (416) in the region. In comparison of Türkiye and Israel, Iran's performance is far more appreciable because, despite severe economic sanctions, the country has not only sustained but developed the quality of education and research for a very long time. Israel is the third country of the region to have maximum number of the universities in the ranking list. But its h index score of 812 is far ahead than that of Türkiye and Iran. In North Africa, Egypt is leading country with 36th global ranking and h index value of 349; its performance is comparable to Saudi Arabia, which has 38th global ranking with h index score of 478. Saudi Arabia's global ranking is far behind than that of Iran, but its h index performance is comparatively better. As far as the country's h index value concerned, it is the third best performer after Israel and Türkiye. Israel not only leads in the h index but citation per document as well with a score of 27.69. On the other hand, Türkiye, the top performer in the list has a citation per document score of 12.66 only. Qatar is a low-rank country in the university ranking list, but in the citation per document, it is the second highest performer with a score of 16.43. The same is true about Lebanon, it has a citation score of 16.28 which is comparatively better than many other countries of the region. Iraq is at the bottom of list with 5.71 citations per document (Table: 4).

A study of the research documents published during 1996-2021 reveals that, in comparison to Europe or the EU, the MENA region lags far behind. Even the individual performance of Germany, the fourth ranking country globally, is much better than the collective performance of the region. During the study period, total number of published documents in the MENA region were 3,300,543, while Germany alone had published 3,663,812 documents in the same period[10]. The citation per document of the MENA region was 14.54, whereas figure for Germany was 24.34, which is a much better achievement[11]. The h index value of the region is also very poor,

[10] https://www.scimagojr.com/countryrank.php
[11] ibid

with an average score of 251.5, while the same value for Germany is 1498, again indicating very high level of development of education and research in the country[12]. If a comparison is made with Europe Union, the difference is still huge and difficult to level without serious efforts (Table b: Appendix). The total number of documents published by Europe during the study period was 21,923,489, this number is which is 6.64 times higher than the total number produced by the MENA region. During the study period, the citation per document of the MENA was 14.54, while the same average for Europe was 20.51, it shows that there is lot of to be done in the region for the development of education and research (Table: 4).

3.3.1 MENA Performance in Agricultural and Biological Sciences Research:

Despite considerable efforts to reduce dependency on import region is highly dependent on imported food. The region imported nearly 40 percent of its food[13]. he Middle East, especially GCC countries are more dependent on import; the block imported nearly 85 percent of their food[14]. Türkiye is the seventh most significant exporter of agricultural products, with $29 billion in 2021[15], while Israel exported $2,181 million in food products in 2020[16]. Egypt is the world's largest wheat importer. Russia, Ukraine, and the U.S are the main suppliers to the MENA region. Food security is directly correlated to research in agriculture. MENA region's performance is very poor in research in agriculture. Only 257,567 documents were published, which is slightly more than 246,414 total documents published by the globally third rank holder, the United Kingdom, individually.

Table 5: Ranking of the Universities (Agricultural and Biological Sciences) based on Research Publication (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Document	H Index
171	Mauritania	196	194	4012	226	20.47	32
66	Morocco	6892	6797	105713	17114	15.34	105
65	Algeria	6977	6906	66891	14373	9.59	80
52	Tunisia	11000	10894	184232	35259	16.75	129
130	Libya	688	679	8625	426	12.54	42
36	Egypt	29794	29614	364916	75443	12.25	154
87	Sudan	2499	2485	31422	2957	12.57	67
94	Lebanon	2038	2002	31260	3401	15.34	70
77	Jordan	4545	4500	61025	6726	13.43	84
139	Palestine	596	590	7599	531	12.75	41
37	Israel	27696	26898	881388	113955	31.82	280
90	Syria	2331	2304	47429	4190	20.35	96
61	Iraq	8608	8588	28585	8824	3.32	53
18	Iran	64750	64131	704727	221264	10.88	175
45	Saudi Arab	18962	18768	306721	41700	16.18	155
103	Kuwait	1433	1424	19594	2734	13.67	57
150	Bahrain	408	399	4849	320	11.88	32

[12] ibid
[13] https://www.inrae.fr/sites/default/files/pdf/addressing-agricultural-import-dependence-in-the-middle-east-north-africa-region-through-to-the-year-2050-doc.pdf
[14] https://oxfordbusinessgroup.com/news/how-are-mena-nations-moving-bolster-food-security
[15] https://www.dailysabah.com/business/economy/turkish-agricultural-industry-logs-record-exports-of-over-295b
[16] https://www.trade.gov/country-commercial-guides/israel-agriculture

114	Qatar	1132	1111	16135	1582	14.25	51
80	UAE	3341	3283	48044	5945	14.38	77
86	Oman	2530	2464	46842	5435	18.51	89
135	Yemen	649	648	9872	502	15.21	45
19	Türkiye	60502	59859	823863	203102	13.62	211
MENA Total		257567	254538	3803744	766009	Average: 14.77	Average: 96.59
European Total		1545736	1505559	44051512	8962502	Average: 23.05	Average: 246.21
Percent of European performance		16.66	16.90	8.63	8.54		

Source: https://www.scimagojr.com/countryrank.php?area=1100

A comparison has been made of the various indicators of scientific performance in the field of Agricultural and Biological Sciences of five countries in the MENA region with Europe. According to University Ranking data, Iran is on top in the region with 18th global rank, while Türkiye, Egypt, and Israel stand at second, third, and fourth positions in the region with 19th, 36th, and 37th global ranks, respectively. Despite its low rank in the region, Israel is on top with respect to total citation with a figure of 881,388 citations, while Türkiye is at the second position with 82,386 citations. Iran, which ranks first in the region, stood at the third position with 704,727 citations, while Egypt and Saudi Arabia scored relatively low with 364,916 and 306,721 citations respectively. In case of citations per document, Israel is on top with 31.82 citations, while other countries lag far behind. Türkiye and Iran have scores of 13.62 and 10.88 citations per document. Saudi Arabia's performance is relatively good, with a score of 16.18, while Egypt received 12.25 citations per document. In case of h index value also, Israel secured the first position with an index value of 280, while Türkiye and Iran had achieved only 211 and 175 h index values. Despite the difference in their ranking, h index values of Saudi Arabia and Egypt are similar with a score of 155 and 154 respectively. Therefore, it may be concluded that Israel is the most progressive and influential country in the region, while Iran and Türkiye are making good efforts. In comparison to Europe, MENA's performance is dismal which had produced only 16.66 percent of the total documents of Europe. In case of citations per documents also, the region has a low score which is 8.63 percent of Europe. Therefore, the overall performance of the MENA region is still far behind Europe in terms of scientific output and impact.

3.3.2 MENA Research Performance in the fields of Art and Humanities:

Art and humanities are considered as central to the development of all human thoughts and culture progress. The progress in these fields also indicates the intellectual progress of any society. Industrial and economic progress, including development of architecture, literature, political, social, and economic thoughts and institutions are a result of the discussion and critical analysis in different fields of art and humanities. Progress and the level of development of art and humanities also reflects the governments' social and political approaches toward their societies. It also shows the people's interests and opportunities for their progress in this sector. Progress in art and humanities also determines the types of society whether it is open, closed, traditional or modern society. The MENA region is the central part of Islamic civilization and the Arabic language. For two centuries, European colonial powers have also influenced and shaped the region. Therefore, it has a long tradition of the development of art and humanities.

Table 6: Ranking of the Universities (Art and Humanities) based on Research Publication (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
191	Mauritania	9	9	56	1	6.22	3
76	Morocco	696	654	7645	736	10.98	38
85	Algeria	491	478	2174	382	4.43	25
74	Tunisia	737	694	7386	779	10.02	38
125	Libya	99	95	1171	42	11.83	15
56	Egypt	2076	1998	19004	2271	9.15	57
120	Sudan	138	129	2226	136	16.13	19
65	Lebanon	1096	1021	14754	1049	13.46	51
53	Jordan	2336	2307	6383	1025	2.73	36
102	Palestine	284	265	1813	205	6.38	21
15	Israel	21645	20387	414098	60549	19.13	265
121	Syria	138	99	2972	38	21.54	20
68	Iraq	1032	1013	2171	229	2.10	22
44	Iran	5779	5592	33941	8112	5.87	73
57	Saudi Arab	2015	1945	54127	3263	26.86	100
91	Kuwait	428	422	6382	354	14.91	31
115	Bahrain	166	158	797	61	4.80	15
75	Qatar	707	664	6423	515	9.08	41
60	UAE	1716	1646	21900	1308	12.76	61
89	Oman	440	434	2613	298	5.94	24
126	Yemen	98	97	1404	77	14.33	16
22	Türkiye	13356	12889	107027	19462	8.01	125
MENA Total		55482	52996	716467	100892	Average= 10.75	Average: 28.81
European Total		704791	653630	12014632	2424145	Average: 12.8225	Average: 184.07
Percent of European performance		7.80	8.10	5.98	4.16		

Source: https://www.scimagojr.com/countryrank.php?area=1200

Total documents published in the MENA region in different disciplines of art and humanities were 55,482 only, less than that of Italy, which was at the eighth position at the global level with 57,542 published documents. Israel is the top performer in the region with 15th rank at global level, and a very high h index with a value of 265 points. Türkiye is at the second position with 22nd global rank and h index score 125 points, but its citation per document is very low at 8.01, which even lower than the regional average of 10.75 citations. Though, Saudi Arabia is at 57th rank at the global level, far behind Israel and Türkiye, but in case of citation per document it is on the top in the region with an average value of 26.86 citations. At the regional level, Saudi Arabia is also at the third position in case of the h index with a score of 100 points. In the comparison of Europe, the MENA region's performance is very poor. The total number of published documents in the region (55,482) is only 7.80 percent of Europe. Citation performance of the region is also poor and constitute only 5.98 percent of Europe's total number. The same is true about the average the h index score also. The region's average h index score is 28.81, whereas same score for Europe is 184.07, which is much better and presents a challenge before the countries of the region to strive for the same (Table: 6).

3.3.3 MENA Performance in Biochemistry, Genetics and molecular Biology Research:

Research and development in different fields of the disciplines of Biochemistry, Genetics, and Molecular Biology are shaping the world in unprecedent ways. It is not only generating billions of dollars through its related industries but improving the health of people and environment. It is also creating new jobs. The size of the global biotechnological industry is worth 752.88 billion dollars.[17] The size of the Indian biotechnological industry only was 63 billion in 2019, and it is expected to grow to 150 billion by 2025.[18] The research and development in these disciplines is also contributing to the development of health, food and agriculture, but industrial development also. It is helping in natural resource and the environmental management also. Through research in biotechnology, genetics, and molecular biology; the economy, health, and life standard can be improved significantly.

Table 7: Ranking of the Universities (Biochemistry, Genetics and Molecular Biology) based on Research Publication (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
182	Mauritania	53	52	832	53	15.70	15
60	Morocco	6091	5970	100158	12643	16.44	115
63	Algeria	4898	4836	68057	10145	13.89	92
55	Tunisia	10818	10617	187674	29604	17.35	128
116	Libya	646	628	9436	388	14.61	45
33	Egypt	37744	37231	570737	105698	15.12	176
94	Sudan	1604	1571	23891	1903	14.89	62
69	Lebanon	4282	4071	97703	7074	22.82	127
67	Jordan	4474	4418	75264	6767	16.82	100
103	Palestine	886	868	15277	1249	17.24	57
25	Israel	61148	58520	2717167	282026	44.44	467
98	Syria	1117	1099	24928	1875	22.32	75
56	Iraq	9074	8999	46747	11133	5.15	74
22	Iran	75173	73742	1103747	351253	14.68	218
36	Saudi Arab	33222	32438	687240	81625	20.69	250
98	Kuwait	2321	2243	47710	3811	20.56	90
112	Bahrain	678	649	10468	520	15.44	44
73	Qatar	3757	3545	76197	6451	20.28	106
61	UAE	6028	5798	121482	10800	20.15	132
88	Oman	2000	1907	36482	3767	18.24	84
111	Yemen	679	670	9491	623	13.98	47
23	Türkiye	65757	63108	1229942	214324	18.70	261
MENA Total		332450	322980	7260630	1143732	Ave=18.15	Ave=125.68
European Total		2721046	2591723	107885377	17937530	Avg:33.26	Avg:365.32
Percent of European performance		12.21	12.46	6.71	6.37		

Source: https://www.scimagojr.com/countryrank.php?area=1300

[17] https://www.grandviewresearch.com/industry-analysis/biotechnology-market
[18] https://www.ibef.org/industry/biotechnology-india#:~:text=Market%20Size&text=The%20Indian%20biotechnology%20industry%2C%20which,expected%20to%20grow%20to%2019%25.

Table 7 presents the data related to the research and development in the fields of biochemistry, genetics and molecular biology. According to the data, the total documents published across the MENA region was 332,450, almost matching the total publications of France (327,795 documents) during the same period. France had sixth position at the global level in respect of total documents published in these disciplines. Iran and Türkiye were at the top with 22nd and 23rd global positions respectively. In the same ranking Israel was at the third place in the region but, its h index score is highest in the region, which was far ahead of Iran and Türkiye. Iran and Türkiye's scores were 218 and 261 respectively. Israel is also a leading country in citation per document with an average number of 44.44, while Iran and Türkiye's numbers were 14.68 and 18.70 respectively. Though Saudi Arabia has been behind in global ranking with 33rd position in the h index, but its performance is better than Iran with a score of 250 (Table: 7). In case of citation per document also and with a score of 20.69, its performance is better than Türkiye and Iran. Mauritania is the lowest performer with 182nd global ranking and h index score of 15 points only, but its citation per document is better than some countries of the region.

Compared to Europe, the performance of MENA region is quite disappointing here too. In case of total documents and citations per document region's achievement was around 12 percent and 6.72 percent of Europe respectively. The MENA region's average h index was 125.68, while the average h index in Europe was 365.32. The region lags well behind in terms of h index score as well (Table: 7).

3.3.4 MENA Performance in Business, Management and Accounting Research:

Creation of Modern industrial economies are built on the fundamentals of business management. Not only do management and finance complement each other well, but they have also developed into separate industries that generate billions of dollars in revenue and underpin the national economy of any given nation. Accounting, Management, and Business are crucial components of any democratic government. Any government's ability may also be measured by its promotion of knowledge and development of perfect management system.

Table 8: Ranking of the Universities (Business, Management and Accounting) based on Research Publication (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
169	Mauritania	14	14	52	2	3.71	4
61	Morocco	2169	2137	10460	1829	4.82	39
76	Algeria	1066	1060	5223	1125	4.90	31
52	Tunisia	3554	3493	24584	3482	6.92	60
111	Libya	221	220	1416	112	6.41	20
49	Egypt	3859	3807	46060	5872	11.94	83
115	Sudan	146	145	665	31	4.55	14
69	Lebanon	1466	1422	24314	2127	16.59	70
56	Jordan	3137	3113	23862	3782	7.61	63
92	Palestine	394	388	4457	447	11.31	29
36	Israel	8019	7695	211814	20920	26.41	183
117	Syria	138	138	1139	53	8.25	17
75	Iraq	1114	1107	4907	930	4.40	32
30	Iran	11930	11710	131541	32928	11.03	113

44	Saudi Arab	5877	5784	67986	7720	11.57	100
72	Kuwait	1337	1319	18955	1096	14.18	59
81	Bahrain	871	857	6387	802	7.33	34
67	Qatar	1483	1447	17913	1959	12.08	54
42	UAE	6324	6171	73658	7872	11.65	101
68	Oman	1473	1456	12657	1260	8.59	53
109	Yemen	239	238	1902	291	7.96	23
26	Türkiye	12991	12273	218370	27345	16.81	161
MENA Total		67822	65994	908322	121985	Average: 9.95	Average: 61.04
European Total		485983	460427	9833929	1760665	Average: 15.17	Average= 145.71
Percent of European performance		13.95	14.33	9.23	6.92		

Source: https://www.scimagojr.com/countryrank.php?area=1400

A total of 67,822 documents (Business, Management and Accounting) were published across all countries in the MENA region, matching the figure for Germany (65,230 documents), which ranks fourth in the world.[19] The total citations for the entire region were only 908,322, which is once again lower than the total citations for Germany, which stood at 1,016,271. If the countries of the region are ranked according to the total number of citations, Türkiye is on the top in the region with 26th global position. Iran and Israel are placed second and third in the region with 30th and 36th global position respectively. Though, in the overall ranking Türkiye is on the top, but, in case of citation per document and score of h index, Israel is on the top with 26.41 citations per document. Türkiye with 16.81 citations per document, is far behind Israel in this comparison. Israel is ahead in case of the h index also with a score of 181, whereas the Türkiye score is 161 only. Although, in case of total documents, Iran is at the second place in the region, but in citation per document it is far behind Israel. Mauritania is the lowest performer in the region with 169th global rank and a score of 4 for h index. The region's performance in the publication of total document in 'Business, Management, and Accounting' is nearly 14 percent of Europe while in case of total citation it is 9.23 percent only. Despite geographical proximity and greater availability of natural resources, these figures may help to explore the reasons that why the region is lagging far behind Europe. The region's average score for citations per document was 9.95, while Europe achieved a regional average of 15.17 citations per document. The average score for the impact level of research, or h index, was 61.04 for MENA and 145.71 for Europe (Table: 8).

3.3.5 MENA Performance in Chemical Engineering Research:

Many modern industries are built on the principles of chemical engineering. The chemical, food, and fuel industries, as well as the biological and pharmaceutical sectors, are primarily supported by chemical engineering. The size of the chemical industry globally is currently estimated to be 3.74 trillion dollars, with a growth predicted to reach 4.30 trillion dollars by 2025. [20] Many essential compounds for chemical engineering can be found in oil. The MENA region is the world's greatest producer of chemicals and crude oil; however, the region lags far behind in industries and research connected to chemicals. India is one of the countries that

[19] https://www.scimagojr.com/countryrank.php?area=1400
[20] https://www.globenewswire.com/news-release/2021/05/04/2221967/28124/en/Global-4304-71-Billion-Chemicals-Markets-2015-2020-2020-2025F-2030F.html

depends on imported oil from the region, but its chemical industry too generated 178 billion in 2019 and is projected to rise by 304 billion by 2025. [21]

Table 9: Ranking of the Universities (Chemical Engineering) based on Research Publication (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
153	Mauritania	21	21	307	4	14.62	6
60	Morocco	3766	3730	69762	12896	18.52	105
52	Algeria	5980	5922	83072	13441	13.89	104
50	Tunisia	6370	6279	103283	16763	16.21	105
90	Libya	499	494	4759	212	9.54	33
28	Egypt	18584	18487	320670	73011	17.26	155
93	Sudan	484	482	5225	409	10.80	36
76	Lebanon	1142	1129	20813	1910	18.23	64
65	Jordan	2529	2486	46915	4777	18.55	92
94	Palestine	481	477	7517	873	15.63	41
34	Israel	14048	13671	508642	64522	36.21	248
97	Syria	433	430	4615	353	10.66	29
59	Iraq	4517	4482	45383	10296	10.05	81
13	Iran	57696	57363	1084239	376094	18.79	214
23	Saudi Arab	24011	23798	543739	86383	22.65	237
68	Kuwait	2192	2160	40510	3973	18.48	91
100	Bahrain	352	343	4782	312	13.59	36
63	Qatar	2660	2505	47905	5483	18.01	88
58	UAE	4769	4683	84485	8797	17.72	105
73	Oman	1524	1488	29397	2665	19.29	74
98	Yemen	428	427	5248	623	12.26	31
20	Türkiye	31196	30881	646664	131026	20.73	222
MENA Total		183682	181738	3707932	814823	Average: 16.89	Average: 99.86
European Total		843830	818345	23634399	4372091		
Percent of European performance		21.76	22.20	15.68	18.63		

Source: https://www.scimagojr.com/countryrank.php?area=1500

Table 9 shows the data of research and publications of chemical engineering in the MENA region and Europe. The region had published a total of 183,682 documents which is slightly higher than the number of documents (160,780) published in Germany, the third global ranking country. Germany is far ahead of the region in terms of total citations, despite being slightly behind in terms of total documents. German has 4,850,672 total citations, compared to 3,707,932

[21] https://www.ibef.org/industry/chemical-industry-india

for the region. Iran leads the region by a wide margin with a 13th place global ranking, followed by Turkey in second place with a 20th ranking. Saudi Arabia, which is ranked 23rd globally and fourth in the region, is the world's largest oil producer. Israel is ranked 34th globally and fifth in the region with 36.21 citations per document and a score of 248 in h index. Saudi Arabia has a score of 237 in the h index and 22.65 citations per document, placing it in second position in the region. With citations per documents and H index of 20.73 and 222, respectively, Turkey is ranked third. Because it published just 21 documents, Mauritania has the lowest performance in both the h index and the overall ranking. Nonetheless, compared to certain other countries in the region, its performance in terms of citations per document is superior. MENA's performance in terms of total documents is 21.76 percent when compared to Europe (Table: 9).

In comparison, the MENA region constituted only 15.68 percent of the Europe's total citation score. The average number of citations per document in the region was 16.89, whereas the average in Europe was 22.93 citations. The region secured the score of 99.86 in the h index while Europe scored a figure of 205.10, more than twice as much (Table 9).

3.3.6 MENA Performance in Chemistry Research:

Chemistry is one of the foundations of the global economy and industries. The use of chemicals is so vital that any modern industry cannot be run without the engagement of chemistry. The chemical industry is not only significant; knowledge of chemistry is also used to convert raw materials into different products. Chemical-related industries contribute 15% to the overall US economy22. All global industrial powers, including China and Japan, have well-developed chemical industries despite their dependence on imported oil and gas. Oil and gas play a vital role in chemical industries; therefore, MENA region can be a developed global hub of chemical industries.

Table 10: Ranking of the Universities (Chemistry) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
143	Mauritania	93	89	842	51	9.05	16
54	Morocco	9934	9841	155414	35074	15.64	127
51	Algeria	10562	10509	143342	25926	13.57	114
53	Tunisia	10472	10397	155856	32300	14.88	113
97	Libya	859	854	9909	471	11.54	43
23	Egypt	46433	46266	734143	206744	15.81	189
93	Sudan	1022	1018	14028	1311	13.73	52
74	Lebanon	2180	2170	39504	4168	18.12	75
65	Jordan	4407	4388	72188	9437	16.38	99
90	Palestine	1235	1231	18565	2652	15.03	55
35	Israel	30374	29840	1062142	140914	34.97	310
98	Syria	809	808	9672	949	11.96	43
59	Iraq	7719	7702	55109	15313	7.14	77
14	Iran	101314	100855	1749640	670931	17.27	233

[22] https://www.eliteindustrialcontrols.com/industries/industrial-chemical/

25	Saudi Arab	42342	42087	910250	149768	21.50	284
73	Kuwait	2544	2534	46237	5127	18.17	84
106	Bahrain	463	460	6847	405	14.79	42
70	Qatar	3187	3126	63272	6586	19.85	92
62	UAE	5096	5017	104050	10335	20.42	113
77	Oman	2034	2019	39974	3931	19.65	80
95	Yemen	939	929	8449	1357	9.00	37
20	Türkiye	60058	59673	1122777	279199	18.69	250
MENA Total		344076	341813	6522210	1602949	Average= 16.23	Average= 114.90
European Total		1821946	1794173	53954015	10659075	Average= 25.44	Average= 268.17
Percent of European performance		18.88	19.05	12.08	15.03		

Source: https://www.scimagojr.com/countryrank.php?area=1600

Total published documents in chemistry research by the MENA region are 344076, even less than fourth-ranked Germany's total published documents of 36362. Total citations in MENA Region are 6522210, 56 percent of the total citation in Germany. The regional average of titration per document and h index of the region is 16.23 and 114.90, respectively, which is still far behind Germany's citation per document of 31.56 and h index of 695 individually. Iran is on top in the overall ranking with 14th position at the global level, while Türkiye is at second in the region with 20th position at the global level. Egypt and Saudi Arabia are in 23rd and 25th position globally and third and fourth rank in the region. Israel is at fifth ranking at the regional level with 35th global position. However, in citation per documents and h index, it is on top with 34.97 and 310, respectively (Table: 10).

Though Iran is on top in the regional ranking, in citation per document and h index, it is behind Israel with 17.27 and 233. Even though the second potion at regional level Turkish position is better from Iran in citation per document and h index with 18.69 and 250 individually. Saudi Arabia's performance also is good, and it is in the second potion at the regional level after Israel in citation per documents and h index with 21.50 and 284, respectively. With compression of Europe region is still very far behind with 18.88 of total European performance in total documents, in total citation performance of MENA is poorer with 12.08 of total European citation. MENA's citation per document is 16.23, while the European average is 25.44 citations per document. Mauritania is the lowest performer in the region with a 143 global ranking and 16 h index, which is the lowest in the region (Table: 10).

3.3.7 MENA Performance in Computer Science Research:

The modern development of advanced technologies is based on the progress of computer science and information technology, these technologies are an integral part of today's life. The Internet of Things now dominates every aspect of knowledge and life. The standard of living in every country and region is also measured by IT performance. The upcoming technological era, the fourth industrial revolution, is based on computing capabilities. In many areas, military security is also based on cybersecurity. Cybersecurity or the practice of protecting systems, networks, and programs from digital attacks is a distinct dimension of national security. IT

surveys provide information about the IT skills and advanced level of knowledge and computing of each country and region.

Table 11: Ranking of the Universities (Computer Science) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
161	Mauritania	42	39	106	9	2.52	5
49	Morocco	18980	18321	82934	23536	4.37	76
47	Algeria	21014	20509	121474	26008	5.78	102
45	Tunisia	24754	24385	138894	35316	5.61	96
97	Libya	1254	1244	5995	553	4.78	35
42	Egypt	30507	29793	251913	49312	8.26	141
95	Sudan	1293	1274	7339	430	5.68	33
70	Lebanon	6612	6496	54497	6879	8.24	81
60	Jordan	11282	11062	105500	17554	9.35	108
91	Palestine	1590	1551	13447	1318	8.46	47
30	Israel	54350	53002	1118056	139171	20.57	351
111	Syria	676	668	4534	244	6.71	30
57	Iraq	13629	13514	57346	17028	4.21	65
18	Iran	82919	82226	855524	230589	10.32	208
32	Saudi Arab	43856	42927	451287	78084	10.29	180
77	Kuwait	4277	4214	44895	4156	10.50	80
88	Bahrain	1717	1645	7346	693	4.28	35
63	Qatar	8506	8223	122156	13624	14.36	118
50	UAE	18244	17548	151847	19864	8.32	122
78	Oman	3746	3593	28070	2722	7.49	62
99	Yemen	1131	1094	7600	1412	6.72	37
24	Türkiye	67085	65558	793899	131958	11.83	244
MENA Total		417464	408886	4424659	800460	Average= 8.12	Average= 102.54
European Total		2378494	2290639	31699486	6436881	Average= 10.87	Average= 216.85
Percent of European performance		17.55	17.85	13.95	12.43		

Source: https://www.scimagojr.com/countryrank.php?area=1700

The total number of computer science articles published by MENA region is 417,464, which is almost equal to the total number of articles published in the world's third largest country, Germany, 403,725. The number of citations in the MENA region (4,424,659) is below the total number of citations in Germany (5,425,202). Regionally, Iran ranks first, but Israel is at the top of the H-index with a score of 351 points. In the overall ranking, Turkey occupies second place after Iran, in the h-index also Turkey holds second place after Israel with an index value of 244 points. Saudi Arabia is close to Israel in the rankings, but its H-index and number of citations per document are significantly worse than Israel's. Despite being third in the ranking, Israel ranks first in terms of the number of citations per document and the H-index, with 20.57 and 351 points, respectively. In comparison to Europe, MENA's share of total documents is almost 17% and around 14% for total citations (Table 11). As usual, Mauritania is the worst performing country in the region, with 161th place in the world rankings and an H-index of 5 only.

3.3.8 MENA Performance in Decision Science Research:

Decision science is a multidisciplinary or interdisciplinary and integrated field of knowledge. This is also part of data science, management and research. Many areas of applied knowledge such as economics, mathematics, machine learning, statistics, operations research, forecasting, behavioral decision theory, and cognitive psychology also contribute to the development of this discipline. Decision science is closely related with data science. Expertise in these disciplines is essential to the knowledge economy. All major economies in the world are essentially knowledge-based economies. Developing countries are trying and even catching up developed countries in the development of decision science. India and China are making good progress in this regard.

Table 12: Ranking of the Universities (Decision Science) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
153	Mauritania	12	12	67	3	5.58	4
47	Morocco	3049	2919	11696	2923	3.84	40
52	Algeria	2107	2076	10260	2326	4.87	36
49	Tunisia	2973	2873	18500	3099	6.22	52
112	Libya	111	111	457	46	4.12	10
56	Egypt	3109	2978	23938	5200	7.70	59
105	Sudan	123	122	550	32	4.47	9
73	Lebanon	747	722	8269	677	11.07	43
54	Jordan	1828	1780	15273	2905	8.36	53
93	Palestine	222	216	2163	215	9.74	18
31	Israel	6306	6047	131216	14417	20.81	139
120	Syria	67	66	561	36	8.37	13
65	Iraq	1168	1140	3627	977	3.11	24
18	Iran	10697	10427	123833	34815	11.58	111
36	Saudi Arab	4864	4682	54654	7342	11.24	93
69	Kuwait	838	817	14197	1109	16.94	52
82	Bahrain	376	355	1919	163	5.10	21
64	Qatar	1209	1178	12182	1593	10.08	48
50	UAE	2903	2762	26658	2848	9.18	67
72	Oman	759	696	6300	555	8.30	40
106	Yemen	123	119	910	99	7.40	14
22	Türkiye	8412	7823	140760	21647	16.73	137
MENA Total		52003	49921	607990	103027	Average= 8.855	Average: 49.22
European Total		272769	256348	4881501	913730	Average: 13.12	Average= 113.35
Percent of European performance		19.06	19.47	12.45	11.27		

Source: https://www.scimagojr.com/countryrank.php?area=1800

The total number of decision science relevant academic papers published from the MENA region is 52,003, ranking almost equal with UK, the third ranker in the world, with a total of 50,364 individual papers published. Overall, Iran and Turkey lead the region and rank 18th and 22nd globally. Israel ranks third in the region and 31st globally. Saudi Arabia is ranked 4th in the region and 36th globally. Although Turkey ranks second in the total number of published

documents, but in terms a total of citations (140,760) it ranks first. Israel ranked second with 131,216 total of citations.

In case of citations per document, Israel leads in the region followed by Turkey with second place with a score of 16.73 citations. Iran ranks third in terms of citations per document with a score of 11.58. Surprisingly, Lebanon which is far behind in the overall ranking, competes with Iran with 11.07 citations. Israel is also at the top of the h-index with a score of 139, while Turkey is very close with an h-index of 137 points. Iran, which is in first place in the total documents ranking, is in third place in h-index with a score of 111 points. In Europe as a whole, the MENA region results represent almost 20% of Europe. However, the MENA region's performance in the cited documents is not sufficient as it comprises only 11.27% of Europe (Table 12).

3.3.9 MENA Performance in Dentistry Research:

Dentistry is part of health science and system. Research levels in dentistry also indicate the level of research in health sector.

Table 13: Ranking of the Universities (Dentistry) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
167	Mauritania	2	1	2	0	1.00	1
59	Morocco	370	361	1904	166	5.15	21
108	Algeria	30	28	222	4	7.40	6
64	Tunisia	240	237	949	127	3.95	14
71	Libya	151	149	1983	76	13.13	26
27	Egypt	2605	2538	29955	2776	11.50	67
72	Sudan	148	146	1598	140	10.80	22
52	Lebanon	599	587	7581	308	12.66	44
59	Jordan	1099	1080	22310	989	20.30	64
100	Palestine	56	54	716	20	12.79	13
21	Israel	3155	3046	79344	6269	25.15	109
57	Syria	456	450	4447	187	9.75	32
56	Iraq	504	497	2988	238	5.93	25
17	Iran	5965	5786	63175	14791	10.59	76
18	Saudi Arab	5476	5268	50154	7776	9.16	70
53	Kuwait	555	545	11698	530	21.08	54
103	Bahrain	54	44	502	9	9.30	11
70	Qatar	154	150	1135	50	7.37	19
42	UAE	978	937	8599	498	8.79	39
106	Oman	39	38	359	11	9.21	12
61	Yemen	303	292	2500	232	8.25	24
9	Türkiye	11094	10878	172206	28378	15.52	111
MENA Total		34033	33112	464327	63575	Average= 10.85	Average= 390.09
European Total		108583	101356	2851511	388602	Average: 20.45	Average= 80.64
Percent of European performance		31.34	32.66	16.28	16.35		

Source: https://www.scimagojr.com/countryrank.php?area=3500

The total number of papers on dentistry published in the MENA region is 34,033, which is equivalent to the total number of 32,248 published in Brazil, the second-place holder. Turkey ranks first in the region and ninth in the world. Iran and Saudi Arabia rank second and third in the region and 17th and 18th globally. Israel ranks fourth in the region and 21st in the world rankings. The lowest place in the region is occupied by Mauritania, with 167th place in the world.

In terms of the total number of citations, Turkey ranks first and is well ahead of other countries in the region. Although Israel ranks fourth in the region, it is just behind Turkey in total citations. Although it ranks fourth, but in terms of citations per document it ranks first with 25.15 per document. Surprisingly, Kuwait and Jordan, far behind in the overall ranking, hold second and third place with 21.08 and 20.30 citations per document. With 15.52 citations per document, Turkey ranks fourth in the region. In the H-Index, Turkey is at the top with an index of 111 points. Israel and Iran have second and third place with an H index of 109 and 76 points. Mauritania occupies the lowest place in the H-index. In comparison to Europe, MENA's contribution is 31.34% of the total documents and 16.28% of citations (Table 13).

3.3.10 MENA Performance in Earth and Planetary Science Research:

Understanding planet earth is critical to understanding the challenges faced by humanity in all dimensions. Many aspects of human life, like knowledge, population, politics, economics, and society, are directly and indirectly related to understanding our planet. This is a multidisciplinary and intra-disciplinary area of knowledge where physical, social, and natural science work together, therefore, to work in this discipline. Research in Earth and Planetary Science shows the expertise in many sciences.

Table 14: Ranking of the Universities (Earth and Planetary Science) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
163	Mauritania	95	92	1720	77	18.11	23
56	Morocco	4617	4518	68618	20208	14.86	97
59	Algeria	4520	4480	49859	11102	11.03	81
63	Tunisia	3614	3568	46426	15219	12.85	74
106	Libya	583	579	5419	495	9.30	35
41	Egypt	12529	12395	142202	42670	11.35	106
112	Sudan	525	519	8010	634	15.26	42
88	Lebanon	1198	1182	20749	2211	17.32	60
74	Jordan	2016	1999	27151	4365	13.47	67
132	Palestine	300	298	3230	371	10.77	29
36	Israel	16917	16482	522252	91851	30.87	235
110	Syria	548	539	14128	1092	25.78	52
54	Iraq	5316	5272	20536	6656	3.86	51
21	Iran	32187	31977	375345	144014	11.66	146
40	Saudi Arab	12624	12478	153438	31923	12.15	119
67	Kuwait	2623	2606	18486	3679	7.05	51
134	Bahrain	292	265	4065	213	13.92	30
81	Qatar	1351	1337	13696	1868	10.14	46
52	UAE	5997	5931	52063	7626	8.68	78
71	Oman	2160	2122	28353	3410	13.13	70

118	Yemen	456	451	9224	1177	20.23	46
29	Türkiye	25372	24853	408012	132246	16.08	181
MENA Total		135840	133943	1992982	523107	Average= 13.99	78.13
European Total		1217464	1186620	33753766	8975750	Average: 22.16	Average: 223.67
Percent of European performance		11.15	11.28	5.90	5.82		

Source: https://www.scimagojr.com/countryrank.php?area=1900

Total documents published in Earth and Planetary Science by MENA region are 135840, near the total documents 133222 published by globally seventh-ranked Italy. However, in the total citation, the whole MENA region is very far behind from individual performance of Italy. MENA region's total citations are 1992982, while Italy's total citations are 3375480. At the regional level, Iran emerged on top with a global rank of 21 while Türkiye and Israel on send and third position with 29th and 36th global ranks. Saudi Arabia and Egypt gained fourth and fifth positions in the region with 40th and 41st global ranks. Israel is lagging in overall rank, but in the total citation, it is number one with 522252 total citations, while Türkiye and Iran are sending third positions with 408012 and 375345 citations, respectively.

In citation per document, Israel is on top with 30.78 citations per document, while surprisingly, Syria is in the second position with 25.78 citations per document. Mauritania is always in the last position, but in citations per document, it is even better than Türkiye and Iran, with 18.11, while Türkiye and Iran score 16.08 and 11.66 citations per document, respectively. Israel is also on top in the h index with 235 while Türkiye and Iran are and second and third position with 181 and 146 h index (Table: 14). Though in the overall ranking, Saudi Arabia is one place ahead of Egypt, but in the total citation, Egypt is ahead from Saudi Arabia with 42670 in compression of 31923. Saudi Arabia and Egypt's performance is near each other in citation and h index. Saudi Arabia's citations per document are 12.15 with a 119 h index, while Egypt's citations per document are 11.35 with a 106 h index. In compression of Europe, MENA region performance in total documents is 11.15 percent while in total citation it is very low with 5.90 percent (Table: 14).

3.3.11 MENA Performance in Economics, Econometrics and Finance Research:

Economics and its related knowledge are the foundation of modern states and economies. All leading countries are focusing on high-level research in economy and finance. Major leading finance institutions are also having their headquarters in leading western economies. Research in economics and finance shows the level of knowledge of advanced knowledge in economy and finance and its applications.

Table 15: Ranking of the Universities (Economics, Econometrics and Finance) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
195	Mauritania	4	4	47	0	11.75	3
70	Morocco	842	734	5903	731	7.01	37

83	Algeria	451	432	4007	640	8.88	33
52	Tunisia	2784	2715	32581	4223	11.70	73
126	Libya	90	90	685	66	7.61	16
56	Egypt	2158	2045	29743	5797	13.78	56
116	Sudan	150	149	590	50	3.93	12
69	Lebanon	863	840	16319	1295	18.91	61
62	Jordan	1493	1464	6597	1115	4.42	31
110	Palestine	164	161	1043	130	6.36	18
36	Israel	6062	5839	135842	12698	22.41	144
124	Syria	96	94	459	39	4.78	13
86	Iraq	417	401	2261	332	5.42	25
37	Iran	5729	5613	68781	18935	12.01	92
48	Saudi Arab	3321	3248	37577	6446	11.31	78
77	Kuwait	625	615	8040	461	12.86	38
88	Bahrain	388	381	2966	449	7.64	26
75	Qatar	732	706	8096	738	11.06	39
50	UAE	3123	3001	30525	3117	9.77	69
73	Oman	768	717	7383	727	9.61	41
115	Yemen	151	147	1129	213	7.48	18
24	Türkiye	9397	8908	125944	19966	13.40	126
MENA Total		39808	38304	526518	78168	Average= 10.09	Average: 47.67
European Total		370163	352770	6858757	1247604	Average= 13.89	Average: 123.21
Percent of European performance		10.75	10.85	7.67	6.26		

Source: https://www.scimagojr.com/countryrank.php?area=2000

Total documents in Economics, Econometrics, and Finance published by the whole MENA region are 39808, which are close to 39207 documents individually published by global fifth positions holder France. The region's total citations (526518) are also less than France's total citations (589008) individually. In the overall ranking, Türkiye is in the top position with the 24th global ranking, while Israel and Iran on the third-ranking with 36th and 37th global ranking. Saudi Arabia and UAE are close to each other with 48th and 50th global positions, whereas Egypt is at 6th in the region with 56th global position. In total citations also, Türkiye is in the top position, and Iran is in the second position despite its third position in the overall ranking. Israel is in the third position and far behind Iran.

In citations per document, Israel continues on top with 22.41 citations, while Türkiye and Iran are far behind Israel with 13.40 and 12.01 citations per document. Though Lebanon is significantly behind in ranking in citations per document, it is in the second position after Israel, with 18.91 citations per document. In h index value, Israel is on top while Türkiye and Iran are in second and third positions with 126 and 92 h index values. Mauritania is the lowest in ranking and the h index (Table:15). In the compression of Europe, MENA's performance is 10.75 percent in total documents, while in the total citation, it is poorer with 7.67 percent of Europe (Table:15).

3.3.12 MENA Performance in Energy Research:

Energy is compulsory for every human economic and many social activities. As global warming and climate change create challenges to the survival of human society, experts are mulling different options, including renewable. The economy's future will depend on cheap,

renewable, and less carbon-emitted energy. All growing and developed countries and focusing research on energy.

Table 16: Ranking of the Universities (Energy) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
151	Mauritania	34	34	478	15	14.06	9
56	Morocco	4469	4291	38956	8305	08.72	73
43	Algeria	7412	7101	90196	16462	12.17	106
55	Tunisia	4715	4395	64290	9319	13.64	99
87	Libya	689	680	5865	429	08.51	36
26	Egypt	15703	15362	223940	46831	14.26	142
99	Sudan	410	402	5870	284	14.32	36
74	Lebanon	1578	1557	25168	2460	15.95	72
67	Jordan	2435	2373	34646	4251	14.23	80
96	Palestine	497	489	6634	661	13.35	42
46	Israel	5768	5668	134120	14756	23.25	141
92	Syria	546	533	6127	732	11.22	40
60	Iraq	3700	3649	40067	6954	10.83	80
14	Iran	39969	39601	678327	202253	16.97	189
24	Saudi Arab	19007	18678	325806	50299	17.14	186
64	Kuwait	2936	2877	31424	3163	10.70	76
93	Bahrain	535	525	5140	303	09.61	37
62	Qatar	3268	3195	48134	6506	14.73	85
42	UAE	7613	7397	89787	10279	11.79	108
70	Oman	2106	2040	27575	2703	13.09	72
106	Yemen	294	290	3920	437	13.33	30
21	Türkiye	24169	23723	534728	106961	22.12	228
MENA Total		147853	144860	2421198	494363	Average=13.81	Average=89.40
European Total		568253	555201	10593046	1955097	Average:16.22	Average:151.32
Percent of European performance		26.01	26.09	22.85	25.28		

Source: https://www.scimagojr.com/countryrank.php?area=2100

Total published documents by the whole MENA region are 147853, which are slightly more than the total documents 112418 published by the globally third position holder India. Iran is on top with 14th global rank, while Türkiye and Saudi Arabia are in second and third position with 21st and 24th global ranking. Egypt is in the fourth position in the region with the 26th global ranking. Surpassingly Israel is in the sixth position with 46th global ranking. In total citations also, Iran is on top while Türkiye is on send position (Table: 16).

Though Israel is in the sixth position in the overall ranking, in citations per document, Israel is in the top position with 23.25 citations while Türkiye in on the second potion with 22.12 citations per documents. Saudi Arabia is also behind in overall ranking, but in citations per document, it is in the third position with 17.14 citations. In the h index, Türkiye is leading with a 228 h index value while Iran and Saudi Arabia are on send and third position with 189 and 186 h index. Egypt and Israel are in fourth and fifth position with 141 and 141 h index, respectively.

Mauritania is in the lowest position with 151 global rank and an h index of 9 (Table:16). In compression to Europe performance of MENA is 26.01 percent in total published documents while in total citations, MENA is 22.85 of Europe's total citations (Table: 16).

3.3.13 MENA Performance in Engineering Research:

Engineering is the foundation of the modern world. The application of engineering is so vast that it covers every part of human life. Perfection in engineering is the backbone of the economy of any country and region. All powerful countries, including the US, the west, and China, are advancing technology and economy because of their advancement in high engineering like aerospace, chemical, and process, civil and environmental, computing and communication, electrical and electronics, energy and power, materials and mining, manufacturing and design, medical and bioengineering, transport and mechanical. Through many sophisticated applications, engineering plays a vital role in improving the living standard of people.

Progress in engineering also plays an essential role in employing a significant population.

Table 17: Ranking of the Universities (Engineering) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
158	Mauritania	79	76	444	21	5.62	10
58	Morocco	20281	19569	145787	38067	7.19	110
44	Algeria	32956	32069	278448	66536	8.45	147
48	Tunisia	27973	27240	231350	52310	8.27	122
95	Libya	1972	1939	14581	833	7.39	51
35	Egypt	62093	61180	663929	144997	10.69	186
96	Sudan	1913	1896	11119	849	5.81	41
69	Lebanon	8544	8456	86318	10632	10.10	104
63	Jordan	12909	12717	133760	18485	10.36	116
93	Palestine	2101	2075	21275	2791	10.13	61
38	Israel	56260	55060	1068325	145931	18.99	304
103	Syria	1270	1246	12657	1086	9.97	50
57	Iraq	22094	21822	123976	35730	5.61	91
15	Iran	180550	179137	2319916	720910	12.85	251
34	Saudi Arab	62164	61311	881502	158313	14.18	251
73	Kuwait	6650	6568	84671	7320	12.73	116
94	Bahrain	2100	2065	16538	1120	7.88	60
65	Qatar	10359	10161	159994	18105	15.44	125
51	UAE	23650	22878	244012	31033	10.32	147
76	Oman	5568	5378	60681	6415	10.90	92
101	Yemen	1363	1323	13443	1970	9.86	47
20	Türkiye	121062	119060	1670595	340095	13.80	278
MENA Total		663911	653226	8243321	1803549	Average: 10.29	Average: 125.25
European Total		3370644	3284170	49636458	10228523	Average: 12.64	Average: 125.25
Percent of European performance		19.69	19.89	16.60	17.63		

Source: https://www.scimagojr.com/countryrank.php?area=2200

In engineering research ranking, the Total published document by the whole MENA region is 663911, slightly more than 602388 published by globally fourth rank holder Germany. In total citation by MNEA region, the region's performance is close to Germany individually. Iran emerged number one in the region with a global rank of 15th, while Türkiye is in the second position with a 20th global rank. Israel got the fifth position in the region with 38th global position, Saudi Arabia and Egypt surpassed Israel and gained third and fourth position with 34th and 35th global rank, respectively. In total citations, Iran and Türkiye are in number one and two positions, respectively, while despite its fifth position in the ranking, Israel is in the third position in total citations.

In citation per document, Israel is in on top position with 18.99 citations per document, while Qatar is far behind in the overall ranking. However, in citations per document, it is in the second position in the region. At the same time, Saudi Arabia and Türkiye are in third and fourth positions in the MENA region. Iran is number top in ranking and total citations, but in citations per document, it ranks fifth with 12.85 citations per document. In the h index, Israel continues to dominate in the top position with a 304 h index value. Türkiye is in the second position, while Saudi Arabia and Iran on the third position jointly. Mauritania is in the lowest position in all domains (Table:17). In the compression of Europe, MENA's performance is 19.96 percent in total documents, while in total citations, it is 16.60 (Table:17).

3.3.14 MENA Performance in Environmental Sciences Research:

As the danger of climate change and global warming increases, research importance in that area is also increasing. Environmental research is multidisciplinary and influences human, physical, and social science. As a result, countries and global organizations are investing considerable funds in environmental-related research.

Table 18: Ranking of the Universities (Environmental Sciences) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
167	Mauritania	131	129	2380	99	18.17	26
56	Morocco	7415	7159	90214	20928	12.17	106
58	Algeria	7180	6838	86197	15532	12.01	107
54	Tunisia	7842	7476	132711	23405	16.92	108
117	Libya	668	655	6744	409	10.10	38
36	Egypt	21714	21098	314622	69144	14.49	155
106	Sudan	880	862	11691	746	13.29	48
77	Lebanon	2486	2427	41485	4522	16.69	81
68	Jordan	4099	4041	66515	8339	16.23	99
102	Palestine	980	970	13668	1471	13.95	52
42	Israel	14422	13965	381583	54030	26.46	195
98	Syria	1035	1017	17489	1313	16.90	56
52	Iraq	8413	8362	42339	10424	5.03	76
18	Iran	50968	50286	790968	254714	15.52	201
37	Saudi Arab	18853	18424	354613	53896	18.81	188
79	Kuwait	2390	2355	36050	5035	15.08	76
120	Bahrain	647	629	7578	468	11.71	43
78	Qatar	2436	2369	40374	4921	16.57	80

63	UAE	5880	5632	91579	11126	15.57	108
80	Oman	2334	2254	40159	4132	17.21	84
127	Yemen	559	550	6224	645	11.13	35
21	Türkiye	42747	42047	809178	170849	18.93	246
MENA Total		204079	199545	3384361	716148	Average= 15.13	Average: 11.36
European Total		1173994	1133479	31173707	6235123	Average: 22.56	Average: 230.42
Percent of European performance		17.38	17.60	10.85	11.48		

Source: https://www.scimagojr.com/countryrank.php?area=2300

There are 204079 total published documents 'Environmental Sciences 'by the whole MENA, which are less than to total documents published by global third rank holder the United Kingdom individually 205137. In overall ranking at the regional level, Iran emerged as the top rank holder with 18th global rank, while Türkiye is in the second position in the region with 21st global ranking. Saudi Arabia and Israel hold the third and fourth positions in the region with 37th and 42nd global rankings, respectively. In total citations, Türkiye is on top with 809178 citations, while Iran is in the second position with 790968 citations. Israel ranks third in the region with 381583 citations, while Saudi Arabia and Egypt position fourth and fifth with 354613 and 314622 citations, respectively. In citations per document, Israel is on top with 26.46 citations per document, while Türkiye and Saudi Arabia gained second and third positions with 18.93 and 18.81 citations per document, respectively.

Iran, in the top position in the overall ranking, scores low in citations per document, with 15.52 citations. Mauritania, which is always on the lowest in all domains, scores 18.17 citations per document, which is higher than many top-ranking countries. In the h index, despite its second position in the overall ranking, Türkiye emerged in the top position with 246 h index, while Iran and Israel got second and third positions with 201 and 195 h index, respectively. Saudi Arabia and Egypt achieved h index scores of 188 and 155 and gained fourth and fifth positions individually. Mauritania gained the lowest performance in all domains except citations per document (Table:18). Compared to Europe, MENA's performance in total documents is 17.38 percent of Europe. In total citations, its 10.85 percent of Europe (Table:18).

3.3.15 MENA Performance in Health Professionals Research:

Research in health professionals is a multilevel and multi-dimensional activity. Research in health professional information and trends about disease and health risk factors are studied. Results of different treatments and medical interventions in public health are part of health research professionals. Studies and research of Government policies, budgets, and their impact on public health are an essential part of the area of knowledge in health professionals.

Table 19: Ranking of the Universities (Health Professionals) based on Research Publication (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
188	Mauritania	5	4	10	0	2.00	2
61	Morocco	713	662	5668	700	7.95	27

80	Algeria	290	285	2353	307	8.11	26
53	Tunisia	1414	1370	22455	3915	15.88	67
142	Libya	27	27	191	5	7.07	7
41	Egypt	2325	2258	22669	2975	9.75	56
97	Sudan	129	127	1035	145	8.02	18
62	Lebanon	672	623	6197	612	9.22	35
58	Jordan	811	785	7911	1435	9.75	39
100	Palestine	120	118	1294	163	10.78	20
30	Israel	6580	6168	136589	17292	20.76	127
115	Syria	70	69	571	36	8.16	12
66	Iraq	454	444	2784	640	6.13	27
22	Iran	9224	8897	76391	20124	8.28	80
36	Saudi Arab	2987	2886	31304	5279	10.48	70
74	Kuwait	372	359	4563	289	12.27	37
108	Bahrain	84	77	792	48	9.43	13
44	Qatar	1929	1733	41648	4616	21.59	89
59	UAE	807	757	7945	856	9.85	40
92	Oman	188	178	2553	169	13.58	27
133	Yemen	37	35	273	18	7.38	9
18	Türkiye	11567	10868	124820	21190	10.79	107
MENA Total		40805	38730	500016	80814	Average= 10.32	Average: 42.5
European Total		349340	323354	7269172	1505615	Average: 16.66	Average: 122.46
Percent of European performance		11.68	11.97	6.87	5.36		

Source: https://www.scimagojr.com/countryrank.php?area=3600

There are 40805 total documents in health professional research published by the MENA region, and these are less than individually published documents 46676 by global fifth rank holder Germany. In the region, Türkiye emerged in the top position with a global rank of 18th, while Iran and Israel are in second and third positions with a global rank of 22nd and 30th, respectively. Though Israel is at third position in ranking in total citations, it is on top while Türkiye and Iran achieved send and third position individually. In citation per document, surprisingly, Qatar is on top with 21.59 citations per document, while Israel on the second position. On the other hand, top rank holders Türkiye and Iran are far behind in citation per document with 10.79 and 8.28, respectively (Table: 19). In the h index score also, Israel is on top with 127 h index. At the same time, Türkiye is in the second position. Again, Mauritania performed lowest in all domains. In compression of Europe, MENA performance is 11.68 of Europe in total documents, while in total citations, it is 6.87 percent (Table: 19).

3.3.16 MENA Performance in Immunology and Microbiology Research-

Studies in immunology are essential for the immune system in the diversity of organisms: microbiology and immunology. The large human population is prone to suffering from bacterial diseases, and these diseases and its cure are researched with a combination of immunology and microbiology. The level of research in immunology and microbiology indicates the level of health system advancement in any country and region.

Table 20: Ranking in of the Universities (Immunology and Microbiology) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
165	Mauritania	88	87	1818	277	20.66	23
67	Morocco	1960	1904	37086	4328	18.92	79
71	Algeria	1580	1551	27355	3521	17.31	60
50	Tunisia	4028	3954	79045	12535	19.62	90
132	Libya	244	239	5610	231	22.99	36
34	Egypt	11087	10933	177152	30509	15.98	126
82	Sudan	1233	1210	23051	3390	18.70	65
77	Lebanon	1410	1323	29043	2490	20.60	74
85	Jordan	1081	1060	19212	1611	17.77	60
122	Palestine	269	265	5478	368	20.36	38
27	Israel	15477	14564	655281	67144	42.34	276
119	Syria	275	267	8621	252	31.35	35
78	Iraq	1299	1280	9827	1381	7.57	40
19	Iran	24013	23368	295377	102969	12.30	129
40	Saudi Arab	7895	7720	130402	17335	16.52	127
90	Kuwait	907	886	23867	2319	26.31	68
140	Bahrain	209	206	3110	212	14.88	29
88	Qatar	979	900	18363	1658	18.76	59
74	UAE	1465	1419	30679	2016	20.94	80
105	Oman	642	621	14315	1254	22.30	57
124	Yemen	266	262	3910	349	14.70	30
25	Türkiye	16884	15979	341177	57698	20.21	188
MENA Total		93291	89998	1939779	313847	Average= 20.04	Average: 80.40
European Total		752967	714211	30847829	5208012	Average: 34.76	Average: 24.89
Percent of European performance		12.38	12.60	6.28	6.02		

Source: https://www.scimagojr.com/countryrank.php?area=2400

There are 93291 total documents published by the MENA region, which is near to the total documents 95189 published by globally sixth rank holder France individually. In total citations also, France is far ahead of the MENA region. At the same time, MENA's region total citations are 1939779 while France's total citations are 3944999. In the overall ranking, Iran emerged in the top position with a global ranking of 19th, while Türkiye and Israel emerged in second and third positions in the region with 25th and 27th global rankings. Egypt and Saudi Arabia gained fourth and fifth positions in the region with 34th and 40th global ranks. Though in ranking, Israel is in the third position in the citation, it has emerged in the top position while Türkiye and Iran gained second and third positions in the region. In citations per document, Israel is far ahead of other countries in the region, with 42.34 citations per region. The top-ranking Iran score in citations per document is very low, with 12.30, while Türkiye performs well in compression of Iran, but in compression of Israel, it's half with 20.21 citations per document.

In h index performance also, Israel is at the top with a considerable margin with 276 h index, while Türkiye and Iran's h index score is low, 188 and 129, individually. Saudi Arabia and Egypt are low in the ranking, but in the h index, they are near to Iran and Türkiye with 127 and

126 h index scores. Mauritania's performance is the lowest in the region except for citation per document (Table 20). In compression of Europe MENA's performance in immunology and microbiology is very low. In the total document, MENA's documents are 12.38 percent of Europe, while the total citations of MENA are 6.28 of Europe's total citations (Table 20).

3.3.17 MENA Performance in Material Science Research:

Material sciences research is a multidisciplinary area ok knowledge. Material science is an integrated area of knowledge of physics, biology, chemistry, and math. Its relation with different technology and society is also part of research in material science. The material makes everything that humans see and use, so understanding material is essential for human philosophy and survival. Advanced cutting-edge technology and integrated research like energy systems, advanced material processing, nanotechnology, space technology, and advanced computer system are directly related to material science. Research level and quality in material science of any country and region indicate high advancement in a different area of knowledge.

Table 21: Ranking of the Universities (Material Science) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
133	Mauritania	79	76	575	45	7.28	14
54	Morocco	11923	11869	142623	34817	11.96	122
47	Algeria	16593	16483	192732	44493	11.62	128
49	Tunisia	13590	13371	164568	40824	12.11	105
96	Libya	813	800	9293	428	11.43	45
33	Egypt	40357	40161	602337	155109	14.93	183
88	Sudan	765	765	5961	583	7.79	34
76	Lebanon	2373	2356	30417	3507	12.82	67
66	Jordan	4813	4776	61661	8720	12.81	93
89	Palestine	1233	1231	15000	2772	12.17	53
34	Israel	35793	35243	843043	114990	23.55	287
97	Syria	781	777	9274	1220	11.87	42
55	Iraq	11260	11133	77889	23175	6.92	80
16	Iran	97157	96610	1570337	525880	16.16	225
30	Saudi Arab	43083	42753	810821	146439	18.82	265
73	Kuwait	2685	2656	35701	3620	13.30	76
93	Bahrain	984	976	13311	1052	13.53	56
68	Qatar	4137	4080	76074	8607	18.39	98
61	UAE	7708	7605	113973	14145	14.79	112
81	Oman	2133	2096	33968	3137	15.92	79
91	Yemen	1074	1072	11636	1863	10.83	45
20	Türkiye	68759	68235	1081494	260538	15.73	228
MENA Total		368093	365124	5902688	1395964	Average= 13.39	Average= 110.77
European Total		2004334	1974837	41127426	8359182	Average: 18.17	Average: 235.28
Percent of European performance		18.38	18.48	14.35	16.69		

Source: https://www.scimagojr.com/countryrank.php?area=2500

The total documents published by the MENA region in material science are 368093, near the total documents 320815 published by globally fifth rank holder India individually. The total citation of MENA is 5902688, more than India's total citations of 4738364. Individually, Iran emerged in the top position in the overall ranking with a global rank of 16th. At the same time, Türkiye and Saudi Arabia gained second and third positions in the region with 20th and 30th global ranks. Egypt performed at 4th in the region with 33rd global position, whereas Israel achieved 5th in the region with 34th global position. In total citations also, Iran is at the top position, whereas Türkiye and Israel are in second and third place. Saudi Arabia and Egypt got positions according to their ranking and secured fourth and fifth positions in the region.

Though in the overall ranking, Israel is fifth in citations per document, it is on top with 23.55 citations per document. Iran is on top in ranking, but in citations per document, it is far behind with 16.16 citations. Saudi Arabia performs better than Iran and Türkiye, with 18.82 citations per document. Despite its good performance in ranking, in citation per document, Turkish performance is relatively low, with 15.73. Despite its low ranking in the h index, Israel dominates the top position with a 287-h index, while top-ranked Iran got the fourth position with a 225-h index score; Saudi Arabia secured second position with 265 h index while despite its good positing in ranking Türkiye's performance in h index is low with 228 (Table:21). As usual Mauritania's performance is lowest in the region. In compression of Europe, MENA performance in the total document is 18.36 percent, while in total citations, Whole MENA citations are 14.35 percent of Europe (Table:21).

3.3.18 MENA Performance in Mathematic Research:

Mathematics is one of the essential tools of human life. Mathematics is also the foundation of modern high-tech modern civilization. Future technology, including supercomputers, quantum computers, biotechnology, medicine, and space technology, would is based on high-level applied mathematics. Expertise in mathematics indicates towards excellent education system and policy.

Table 22: Ranking of the Universities (Mathematics) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
142	Mauritania	89	88	380	26	4.27	11
49	Morocco	14229	13957	78534	25108	5.52	78
44	Algeria	15497	15402	99808	28103	6.44	94
48	Tunisia	14798	14580	92856	26798	6.27	84
104	Libya	521	519	3268	276	6.27	27
40	Egypt	21073	20805	208505	62804	9.89	128
101	Sudan	642	640	2694	277	4.20	22
74	Lebanon	3118	3090	22144	3565	7.10	57
60	Jordan	6410	6346	63687	14572	9.94	98
95	Palestine	834	827	5804	746	6.96	37
21	Israel	50304	48660	805584	131974	16.01	256
109	Syria	363	358	2817	377	7.76	23
59	Iraq	6553	6516	27473	9397	4.19	51
18	Iran	67414	66909	696261	250693	10.33	182
31	Saudi Arab	32809	32393	335065	85091	10.21	150
73	Kuwait	3120	3055	33441	3478	10.72	76

97	Bahrain	746	738	3652	365	4.90	27
72	Qatar	3208	3153	40830	5267	12.73	75
58	UAE	7520	7264	65209	9733	8.67	85
81	Oman	2357	2250	19601	2281	8.32	57
93	Yemen	937	931	6491	2028	6.93	35
20	Türkiye	51121	50085	573580	152787	11.22	184
MENA Total		303663	298566	3187684	815746	Average= 8.12	Average= 83.5
European Total		1667207	1609906	22851502	5530658	Average: 11.83	Average: 186.64
Percent of European performance		18.21	18.54	13.94	14.74		

Source: https://www.scimagojr.com/countryrank.php?area=2600

There are 303663 total documents published by the whole MENA region in mathematics which is slightly more than 284754 published by globally third rank holder Germany individually. Individually in the region, Iran is on top with a global rank of 18th, while Türkiye and Israel are in second and third positions individually with 20th and 21st global positions. Saudi Arabia and Egypt gained the fourth and fifth positions in the region with 31st and 40th global ranks. Although in ranking, Israel is in the third position, in total citations, it is at the number one position with 805584 citations. Iran and Türkiye gained send and third rank in total citations with 696261 and 573580, respectively.

In citations per document as well, Israel is at the top position with 16.01 citations, while Türkiye gained the second position with 11.2 citations per document. Top rank holder Iran achieved a low rank in citation per document with 10.33 citations per document. In the h index score, Israel is also at the top position with a 256 score. In comparison, Türkiye and Iran are far behind Israel with second and third positions with 184 and 182 h index scores (Table: 22). Mauritania performs lowest in the region in all dimensions. In compression of Europe, total documents of MENA published are 18.21of Europe while total citations of MENA are 13.94 percent of Europe's total citations (Table: 22).

3.3.19 MENA Performance in Medicine Research:

The realm of Medicine is so vast that it impacts the lives of every human being. Researches in Medicine need a high-level technological precision. Advance research is going on to improve the impact of existing medicines and to find new solutions for chronic and incurable diseases. Research in advanced Medicine needs huge funds, excellent education policy and system, and various government policies.

Table 23: Ranking of the Universities (in Medicine) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
173	Mauritania	329	312	3565	446	10.84	30
55	Morocco	22178	19828	213712	21777	9.64	141
84	Algeria	7227	6965	120013	12456	16.61	111
52	Tunisia	30106	27420	401238	47822	13.33	167

125	Libya	1872	1731	35111	1194	18.76	60
36	Egypt	85861	82755	1151902	165924	13.42	235
93	Sudan	5115	4881	92361	8915	18.06	95
60	Lebanon	19297	17367	368151	28205	19.08	198
65	Jordan	14299	13809	217024	17890	15.18	133
110	Palestine	2769	2648	65385	4839	23.61	83
25	Israel	148068	135905	4437653	414932	29.97	549
114	Syria	2605	2477	51948	2571	19.94	81
67	Iraq	13492	12831	100505	12242	7.45	102
21	Iran	194320	183907	2106008	666197	10.84	262
39	Saudi Arab	77814	73594	1144339	152644	14.71	265
75	Kuwait	9819	9259	168557	12254	17.17	131
101	Bahrain	4049	3721	60326	2412	14.90	81
70	Qatar	13012	11967	223489	18524	17.18	151
62	UAE	17637	16211	283830	19981	16.09	68
82	Oman	7789	6872	112435	8834	14.44	113
122	Yemen	2069	1999	35114	2256	16.97	66
15	Türkiye	319047	290169	3670539	632959	11.50	363
MENA Total		998774	926628	15063205	2255274	Average= 15.89	Average: 158.40
European Total		7022995	6287036	196720860	33187907	Average:	Average:
Percent of European performance		14.22	14.73	7.65	6.79		

Source: https://www.scimagojr.com/countryrank.php?area=2700

Total documents published by the whole MENA region are 998774, less than 1042005 documents published by globally fifth rank holder Japan individually. In total citations also individually, Japan is far ahead of the whole region with 20168764 citations in compression of 15063205 citations by the whole MNEA region. In the region, Türkiye emerged in the top position with a global rank of 15th, whereas Iran and Israel gained second and third positions with 21st and 25th global positions, respectively. Egypt and Saudi Arabia secure fourth and fifth positions in the region with 36th and 39th global ranks individually. In total citations, despite its third rank, Israel is on top while second position holder Iran's total citations are nearly half of Israel. Türkiye is in the third position in total citations.

In citations per document also, Israel is on top with 29.7 citations. Top positions holders ranking Türkiye and Iran's performance in citations per document is poor, with 11.50 and 10.84 citations per document individually. Other low-ranked regional countries like Palestine, Sudan, Libya and UAE performed better than Türkiye and Iran. In h index score also, Israel is leading with a 549 h index. Other countries, including top-ranked Türkiye and Iran, are far behind Israel. Türkiye scored 363, while Iran scored a very low 262 h index. Saudi Arabia and Egypt score close to Iran with 263 and 235 individually. Mauritania scores lowest except for citation per document (Table: 23). In compression of Europe, MNEA's performance in total documents is 14.22 percent of Europe. In total citations, MENA performance is very poor, with 7.95 percent in Europe (Table: 23).

3.3.20 MENA Performance in Multidisciplinary Research

Though research in many individual subjects is based on intra-disciplinary and multidisciplinary, their area is specialized in single subjects. However, many high-level studies and journals like Nature and science focus on multidisciplinary research. These are high-impact journals, and publications in these journals need a high level of research culture and activities.

Table 24: Ranking of the Universities (Multidisciplinary) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
188	Mauritania	19	18	308	31	16.21	10
77	Morocco	827	794	17979	1793	21.74	54
71	Algeria	1026	1000	8916	1516	8.69	40
75	Tunisia	861	841	13873	1695	16.11	49
120	Libya	168	166	2805	94	16.70	27
33	Egypt	6331	6239	82668	13776	13.06	96
95	Sudan	388	375	5100	304	13.14	31
85	Lebanon	554	532	15743	783	28.42	53
67	Jordan	1074	1046	10791	1183	10.05	41
109	Palestine	239	235	3433	290	14.36	25
24	Israel	8539	8215	694483	56309	81.33	370
118	Syria	178	173	3293	79	18.50	21
62	Iraq	1190	1169	9886	2102	8.31	41
20	Iran	12288	11925	103169	26734	8.40	97
27	Saudi Arab	7733	7635	185502	18360	23.99	172
76	Kuwait	841	823	12207	1291	14.51	51
135	Bahrain	108	106	907	79	8.40	15
73	Qatar	896	862	22636	1832	25.26	62
56	UAE	1431	1369	35112	2211	24.54	70
91	Oman	460	438	8792	811	19.11	39
108	Yemen	240	233	2688	261	11.20	24
37	Türkiye	5556	5457	114732	11044	20.65	128
MENA Total		50947	49651	1355023	142578	Average= 19.21	Average: 68.90
European Total		363045	347714	22387361	3253538	Average:48.35	Average: 269.85
Percent of European performance		14.03	14.27	6.05	4.38		

Source: https://www.scimagojr.com/countryrank.php?area=1000

In multidisciplinary research, there are 50947 documents published by the whole MENA region, close to 48745 documents published by global fifth rank holder Japan individually. In the region, Iran was on top with a global rank of 20th, while Israel and Türkiye secured second and third positions in the region with 24th and 27th global ranks. Egypt and Türkiye gained fourth and fifth positions in the region with 33rd and 37th global positions. Though Israel is in the second position in ranking in total citations, it is on top by a considerable margin with Iran. Saudi Arabia's performance is also outstanding in the total citation, with the second rank in the region after Israel. Türkiye also performs in the third position in the region. Despite its top position in the ranking, Iran is far behind in total citation and slips to the fourth position in the region.

In citations per document also, Israel's performance is far better compared to other countries in the region. Israel's gained 81.33 average citations per document, while Lebanon is in the second position with 28.42 citations. Top rank holders like Saudi Arabia, Türkiye, and Egypt perform low with 23.99, 20.65, and 13.6 citations per document, respectively (Table: 24). Top rank holders Iran's performance is very poor with 8.40 citations per document. In h index also, Israel is far ahead of other regional countries. Israel scored 370 h index score while Saudi Arabia and Türkiye achieved second and third positions with 172 and 128 h index values. The top rank holder gained a 97 h index score. Mauritania performs lowest except for citations per document (Table:24). In compression of Europe, MENA performance in multidisciplinary research is poor as usual. In total published documents, MNEA is 14.03 percent of Europe's published documents, while in the total citation, it is lower at 6.05 percent of Europe's total (Table:24).

3.3.21 MENA Performance in Neuroscience Research: -

Research in neuroscience is relatively advanced because it needs enormous technological support. Therefore, it needs immense economic support to continue high-level research in neuroscience. However, like other advanced areas of knowledge, it is also supported by other areas like biotechnology and engineering.

Table 25: Ranking of the Universities (Neuroscience) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
157	Mauritania	21	20	148	4	7.05	7
60	Morocco	860	757	10064	731	11.70	47
83	Algeria	308	290	4599	472	14.93	36
58	Tunisia	960	834	15542	1971	16.19	55
141	Libya	41	40	361	13	8.80	11
41	Egypt	3463	3359	46578	4645	13.45	86
100	Sudan	127	122	1036	77	8.16	17
57	Lebanon	965	877	19426	1468	20.13	66
71	Jordan	563	545	8666	1098	15.39	48
104	Palestine	108	105	2367	257	21.92	21
18	Israel	20072	18990	784588	88082	39.09	289
133	Syria	47	43	813	43	17.30	16
74	Iraq	543	519	3787	642	6.97	30
26	Iran	10847	10285	137571	37650	12.68	106
40	Saudi Arab	3575	3448	68939	7345	19.28	102
79	Kuwait	462	426	7206	534	15.60	39
102	Bahrain	116	112	1477	56	12.73	20
65	Qatar	763	707	13500	1522	17.69	56
52	UAE	1328	1241	24284	2222	18.29	68
81	Oman	322	283	5199	374	16.15	38
121	Yemen	58	57	597	35	10.29	14
21	Türkiye	15785	14656	252791	37297	16.01	145
MENA Total		61334	57716	1409539	186534	Average: 15.44	Average: 59.86
European Total		705997	659303	26827307	4889864	Average: 29.33	Average: 211.03
Percent of European performance		8.68	8.75	5.25	3.81		

Source: https://www.scimagojr.com/countryrank.php?area=2800

MNEA publishes 61334 documents in neuroscience, which is slightly more than the total documents 58580 published by globally ninth rank holder Australia. In the region, Israel is in the top position with the 18th global rank, while Türkiye is in the second position with the 21st global rank. Iran gained the third position in the region with 26th global rank. Saudi Arabia and Egypt performed closely with fourth and fifth positions in the region with 40th and 41st global ranks. In total citations also, Israel is on top and far ahead of other competitors with 784588 total citations. Though Türkiye is in the second position, it is far behind Israel with 252791 citations only. Third position holder in the region, Iran gained 137571 total citations. Fourth and fifth position holders Saudi Arabia and Egypt scored very low with 68939 and 46578 citations separately.

In citations per document, Israel's average is very high compared to other regional countries. Israel's average of citations per document is 39.09, while second position holder Türkiye has only 16.01 citations per document. Saudi Arabia performed well with 19.28 citations per document, while third-ranked Iran scored only 12.68 citations per document. Other low-rank holders like Palestine, UAE, Qatar, Lebanon, and Syria also performed good scores in citation per document. The h index also the situation is very identical with Israel domination with 289 h index while Türkiye scores 145 with the second position in the region after Israel. Iran and Saudi Arabia performed closely with 106 and 102 h index values, respectively (Table 25). Mauritania performed lowest in all categories. In compression of Europe, MENA published documents are only 6.68 percent of Europe, while in total citations, MENA's performance is very poor with only 5.25 percent of total Europe's citations (Table 25).

3.3.22 MENA Performance in Nursing Research: -

Nursing is a vast profession and area of knowledge. In addition, it is a focused area of research related to public health; in nursing research, many clinical and non-clinical data are analyzed from different social and scientific backgrounds. Therefore, sociological and cultural studies, education, and the health system are essential for nursing research.

Table 26: Ranking of the Universities (Nursing) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
190	Mauritania	8	5	67	5	8.38	4
71	Morocco	485	459	6215	775	12.81	41
86	Algeria	286	284	2401	341	8.40	25
69	Tunisia	553	539	9096	1070	16.45	44
127	Libya	53	49	522	37	9.85	15
43	Egypt	2112	2042	23897	2691	11.31	64
94	Sudan	218	210	2371	241	10.88	28
51	Lebanon	999	957	13863	2054	13.88	55
47	Jordan	1803	1762	18392	2968	10.20	56
103	Palestine	169	163	1840	226	10.89	24
26	Israel	5654	5163	124473	12384	22.02	141
114	Syria	81	80	842	57	10.40	17
92	Iraq	260	247	1983	178	7.63	23
17	Iran	9356	8891	98292	33595	10.51	103
41	Saudi Arab	2677	2585	30345	4400	11.34	71

80	Kuwait	383	372	6955	620	18.16	41
98	Bahrain	210	199	2468	235	11.75	24
68	Qatar	588	545	8378	798	14.25	41
59	UAE	816	761	11358	1135	13.92	53
75	Oman	428	402	5281	534	12.34	36
113	Yemen	49	48	1211	27	24.71	14
21	Türkiye	8118	7697	90318	17167	11.13	97
MENA Total		35306	33460	460568	81538	Average: 12.78	Average: 46.22
European Total		332067	296181	7025484	1298341	Average: 22.18	Average: 129.78
Percent of European performance		10.63	11.29	6.55	6.28		

Source: https://www.scimagojr.com/countryrank.php?area=2900

There are 35306 total documents published by the whole MENA region, which is nearly 36561 documents published by globally sixth rank holder Germany individually. In individual performance in the region, Iran is on the top with 17th global rank while Türkiye and Israel are in second and third positions with 21st and 26th global positions. Saudi Arabia and Egypt perform closely to each other, with 41st and 43rd global positions. In total citations, Israel is on top despite its third rank. Israel received 124473 citations, while Iran had 98292 citations. Türkiye has 90318, with the third position in total citations. Surpassingly low-ranked Yemen is on top in citations per document with 24.41 citations, while Israel is traditionally on top with 22.02 citations. Top-ranked holders Iran and Türkiye perform poorly with 10.51 and 11.13 citations per document. Saudi Arabia and Egypt also perform near Türkiye and Iran with 11.34 and 11.31 citations per document. In the h index also, Israel is leading with a 103 h index value while Iran and Türkiye gained 103 and 95 h index scores. Mauritania performed lowest as usual (Table 26). In compression of Europe, MENA performance in total documents is 10.63 of total documents by Europe while in total citations it is poorer with 6.55 percent of Europe (Table 26).

3.3.23 MENA Performance in Pharmacology, Toxicology and Pharmaceutics Research: -

Drug discovery and its precise mechanism are important in health research. However, it is a focused area of knowledge but needs collaborations with other scientific branches. High-level Engineering and instrumentation also play a vital role in pharmacology, Toxicology, and pharmaceutics research. Clinical trials are also essential to pharmacology-related research; therefore, the engagement of different social groups and their structure is also essential to study. Sociology also plays a role in this research.

Table 27: Ranking of the Universities (Pharmacology, Toxicology and Pharmaceutics) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
182	Mauritania	19	19	231	12	12.16	9
63	Morocco	2287	2267	47207	8707	20.64	84
62	Algeria	2306	2272	23142	4782	10.04	57
61	Tunisia	2609	2564	45717	7199	17.52	79

98	Libya	436	431	4633	233	10.63	34
21	Egypt	22374	22138	345973	86781	15.46	149
82	Sudan	874	853	11501	1277	13.16	50
66	Lebanon	1515	1465	27997	3029	18.48	70
57	Jordan	3296	3260	42062	6192	12.76	78
95	Palestine	588	585	7906	1059	13.45	41
38	Israel	9811	9352	315469	35793	32.15	160
90	Syria	682	681	6100	469	8.94	39
43	Iraq	8039	8023	24554	9683	3.05	60
14	Iran	36576	35840	508139	184301	13.89	168
24	Saudi Arab	16969	16700	228621	41897	13.47	134
74	Kuwait	1135	1088	20402	2215	17.98	60
117	Bahrain	234	224	2029	159	8.67	23
71	Qatar	1168	1104	14200	1585	12.16	52
60	UAE	2643	2541	34198	4052	12.94	72
81	Oman	905	889	13351	1190	14.75	51
101	Yemen	375	372	5362	407	14.30	39
22	Türkiye	22198	21683	387923	94046	17.48	174
MENA Total		137039	134351	2116717	495068	Average= 14.27	Average: 76.5
Europe Total		650414	617908	17428392	3126721	Average= 23.24	Average: 174.96
Percent of European performance		21.06	21.74	12.14	15.83		

Source: https://www.scimagojr.com/countryrank.php?area=3000

There are 137039 total documents published by the MENA region, which are slightly more than 129668 documents individually published by globally fourth rank holder Japan. Individually in the region, Iran is on the top with a global rank of 14th, while Egypt and Türkiye gained second and third positions in the region with 21st and 22nd global rankings. Saudi Arabia gained the fourth position in the region with the 24th global rank, while surprisingly, Israel got the fifth position in the region with the 38th global rank. In total citations, Iran is on top with 508139 citations, while Türkiye and Egypt performed well with 387923 and 345973 total citations. Israel's performance is a little low with 315469 total citations, while Saudi Arabia scored lowest among top rankers with 228621 citations.

Despite its low overall rank, Israel is on top in citations per document, with 32.15 citations per document. Other top-ranked countries score lower in compression to Israel. Türkiye and Iran score 17.48 and 13.89 citations per document separately. Türkiye is on top of the h index with a 174 h index, while Iran is in the second position in the region with a 168 h index. Despite its good position in citations Israel stand third in the h index with 160, while Egypt and Saudi Arabia perform well with 149 and 134 h index, respectively. Mauritania performed lowest in all categories (Table 27). In compression of Europe, MENA's performance in total documents is 21.06 percent of Europe, while in the total citation; it is 12.14 percent (Table 27).

3.3.24 MENA Performance in Physics and Astronomy Research: -

Research in physics and astronomy is a very prominent area of knowledge. It needs high level of expertise, training, and institutions—focused area of astronomy knowledge based on high-level physics and mathematics. Everything which a human use is directly discovered or explained by physics. Therefore, it needs a high level of instrumentation and engineering

expertise. A considerable budget is also needed for high-level research in physics and autonomy. Different countries conduct collaborative research in astronomy and physics.

Table 28: Ranking of the Universities (Physics and Astronomy) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
151	Mauritania	62	62	344	28	5.55	9
57	Morocco	13787	13707	191295	42584	13.88	135
50	Algeria	19634	19557	189414	44241	9.65	110
55	Tunisia	14415	14337	147962	39054	10.26	96
104	Libya	759	753	6194	325	8.16	38
38	Egypt	38625	38453	542765	154677	14.05	174
97	Sudan	951	945	8208	918	8.63	39
78	Lebanon	3193	3172	41465	5266	12.99	72
70	Jordan	5464	5422	65464	10608	11.98	87
90	Palestine	1657	1654	19875	3189	11.99	61
25	Israel	69787	68881	1860702	282739	26.66	369
95	Syria	1064	1056	10802	1873	10.15	41
59	Iraq	13435	13374	65144	21531	4.85	79
20	Iran	97997	97593	1396161	488862	14.25	217
37	Saudi Arab	41115	40862	660158	144412	16.06	222
81	Kuwait	2672	2656	39022	4166	14.60	92
98	Bahrain	940	934	10396	1067	11.06	46
74	Qatar	4391	4344	78963	10297	17.98	97
63	UAE	8048	7957	97998	13236	12.18	99
83	Oman	2427	2404	33449	4273	13.78	74
94	Yemen	1087	1079	11435	1955	10.52	48
23	Türkiye	75894	75202	1147498	288053	15.12	248
MENA Total		417404	414404	6624714	1563354	Average= 12.47	Average: 111.5
European Total		3117617	3080941	74354430	17538357	Average: 22.01	Average: 316.21
Percent of European performance		13.38	13.45	8.90	8.91		

Source: https://www.scimagojr.com/countryrank.php?area=3100

There are 417404 total documents published by the MENA region, which are even less than 437276 documents published by 7th global rank holder Great Britain. In total citations, the whole MENA region is far behind the total British total citations individually. Individually in the region, Iran, Türkiye, and Israel emerged in top positions with 20th, 23rd, and 25th global rankings. Saudi Arabia and Egypt perform back-to-back with fourth and fifth positions in the region and 37th and 38th global ranking. Despite its third ranking in total citations, Israel is on top with a considerable margin over other regional countries, while Iran and Türkiye gained second and third positions.

In citations per document, Israel also secures the top place with 26.66 while the top holder in the region Iran's citations per document are 14.25. Türkiye received 15.12 citations per document. Egypt and Saudi Arabia performed close to Türkiye and Iran with 14.05 and 16.06 individually. In the h index also, the story is the same with Israel domination with 369 h index while Türkiye is in the second position with 248. Saudi Arabia scored 222 while top-ranked Iran

gained a 217 h index score. In compression of Europe, MENA's performance on the total published document is 13.38 percent of Europe, whiles in total citations, its 8.90 percent (Table 28).

MENA Performance in Psychology Research: -

Psychology is a widely used applied science. Its expansion from social science to natural science indicates its broad scope. The study of human nature, behavior, mental health, well-being, and many collaborative studies of human activities are covered by psychological research. It covers the study from single human being psychology to industrial level psychology.

Table 29: Ranking of the Universities (Psychology) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
190	Mauritania	4	4	47	3	11.75	3
83	Morocco	294	284	5212	212	17.73	28
101	Algeria	149	145	1397	108	9.38	20
74	Tunisia	434	423	3623	556	8.35	31
139	Libya	29	29	302	14	10.41	9
58	Egypt	898	873	10789	1391	12.01	45
129	Sudan	48	48	524	27	10.92	14
63	Lebanon	783	750	18903	1463	24.14	65
66	Jordan	648	643	7561	930	11.67	45
99	Palestine	187	182	3337	412	17.84	34
14	Israel	19237	18641	522203	85220	27.15	244
131	Syria	44	44	1394	85	31.68	16
88	Iraq	262	258	3597	209	13.73	28
32	Iran	7411	7170	65227	17209	8.80	81
46	Saudi Arab	1692	1646	24957	2376	14.75	67
72	Kuwait	471	438	8974	1114	19.05	43
103	Bahrain	130	128	1446	72	11.12	20
75	Qatar	400	383	4780	426	11.95	31
54	UAE	1175	1138	16501	1593	14.04	59
87	Oman	271	263	3541	432	13.07	29
145	Yemen	28	28	482	11	17.21	10
20	Türkiye	10653	10453	137724	25540	12.93	123
MENA Total		45248	43971	842521	139403	Average: 14.98	Average: 47.5
European Total		516074	490292	12528948	2935702	18.74	150.28
Percent of European performance		8.76	8.96	6.72	4.74		

Source: https://www.scimagojr.com/countryrank.php?area=3200

There are 45248 total documents published by the whole MENA region, which are close to 48469 documents published by the global seventh rank holder, the Netherlands, individually. In individual performance in MENA, Israel is on top with 14th global rank, whereas Türkiye is in the second position with 20th global rank after Israel. Iran is far behind with the 32nd global rank. Saudi Arabia and Egypt gained fourth and fifth positions in the region with 46th and 58th

global ranks. In total citations also, Israel is on top with a huge margin over other countries. Israel received 522203 citations, while the second position holder in the region, Türkiye, received only 137724 citations. Third position holder Iran got only 65227 citations.

In citation per document, though, Syria is on 131 global rankings, but in the region, it is on top with 31.68, while top position holder Israel scores 27.15 citations per document. Second and third position holder Türkiye and Iran performed very poorly with 12.93 and 8.80 citations per document, respectively. Saudi Arabia and Egypt did relatively well, with 14.75 and 12.01 citations per document, respectively. As usual in the h index also, Israel is in the number one position with a 240 h index while Türkiye scored a 123 h index value. Other regional countries are far behind with a considerable margin. Mauritania performed lowest except for citations per document. In the compression of Europe, MENA performance is plunging. In the total document, its 8.76 percent of Europe, while in the total citation, its performance is only 6.72 percent of Europe (Table: 29).

3.3.25 MENA Performance in Social Science Research: -

Social sciences are considered intellectual backbone of any society. It's a very wide and diverse area of research. Many areas of knowledge and different disciplines work together in social science research.

Table 30: of the Universities Ranking (Social Science) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
185	Mauritania	48	46	306	17	6.38	9
75	Morocco	3284	3071	21722	3641	6.61	51
82	Algeria	2806	2732	12621	2577	4.50	43
71	Tunisia	3535	3377	24267	3775	6.86	59
136	Libya	348	341	2424	162	6.97	24
54	Egypt	8519	8187	70217	10307	8.24	86
117	Sudan	708	678	5721	488	8.08	33
72	Lebanon	3518	3368	43565	4685	12.38	83
59	Jordan	6700	6579	35792	5801	5.34	65
102	Palestine	1179	1134	8812	1109	7.47	42
21	Israel	44679	42825	719192	136283	16.10	244
128	Syria	472	422	5033	406	10.66	35
67	Iraq	4703	4621	11432	2847	2.43	43
34	Iran	28502	27589	189930	54905	6.66	110
50	Saudi Arab	11816	11370	93897	15248	7.95	94
87	Kuwait	2239	2193	19623	1776	8.76	53
104	Bahrain	1065	1038	6338	604	5.95	37
74	Qatar	3362	3165	29614	4242	8.81	58
53	UAE	8525	8135	66869	8584	7.84	85
85	Oman	2311	2213	16607	2368	7.19	50
126	Yemen	515	506	4612	349	8.96	28
18	Türkiye	50365	49002	416064	93992	8.26	165
MENA Total		189199	182592	1804658	354166	Average: 7.83	Average: 68.04
European Total		1646027	1547073	22167060	5425792	Average: 10.03	Average: 172.71

Percent of European performance		11.49	11.80	8.14	6.52		

Source: https://www.scimagojr.com/countryrank.php?area=3300

Around 189199 documents have been published in the whole the region, which is near to 190825 total documents individually published by globally fifth rank holder Germany. Individually in the region, Türkiye is on the top with 18th global rank, while Israel and Iran are in second and third positions with 21st and 34th global rank. In total citations, Israel is on top with 719192 while top position holder Türkiye is in the second position with 416064 total citations. Iran is also in the third position in total citations with 189930. Other regional countries performed low in compression than Israel and Türkiye. In citations per document also, Israel is on leading with 16.10 citations, while Türkiye and Iran received 8.26 and 6.66 citations per document, respectively. In h index also, Israel is far ahead of other countries in MENA. Israel has 244, while Türkiye and Iran received 165 and 110 h index values. In compression of Europe, MENA performance in total documents is only 11.49 while in total citations, its only 8.14 percent of Europe (Table: 30).

3.3.26 MENA Performance in Veterinary Research: -

Animals' health is essential, like human health. It is an integral part of the agricultural economy of every country, especially poor and developing countries. Therefore, increasing the production capacity and health improvement of animals is of vital importance for the local economy of any country. However, standard veterinary research is minimal because of its limited scope. Therefore, it needs policy orientation from the government.

Table 31: Ranking of the Universities (Veterinary) based on Research Publications (1996-2021)

Ranking	Country	Total Document	Citable Documents	Citations	Self Citation	Citation Per Documents	H Index
155	Mauritania	25	25	424	43	16.96	10
74	Morocco	497	492	6647	1001	13.37	39
66	Algeria	683	681	4766	1017	6.98	30
62	Tunisia	800	798	10338	2073	12.92	44
101	Libya	164	162	2656	91	16.20	22
20	Egypt	6684	6645	57524	14835	8.61	66
68	Sudan	668	661	7190	902	10.76	38
105	Lebanon	140	136	1290	176	9.21	19
65	Jordan	702	697	8360	836	11.91	38
128	Palestine	77	77	813	58	10.56	16
38	Israel	2484	2402	45963	6166	18.50	80
97	Syria	176	176	2213	165	12.57	25
43	Iraq	2189	2187	7037	2477	3.21	29
19	Iran	8711	8674	68981	23803	7.92	74
44	Saudi Arab	2097	2084	19286	4094	9.20	51
102	Kuwait	163	162	2091	203	12.83	24
159	Bahrain	23	21	293	19	12.74	8
116	Qatar	119	111	1154	71	9.70	19
69	UAE	608	595	7204	925	11.85	37
90	Oman	232	231	2897	309	12.49	27

124	Yemen	85	85	942	71	11.08	17
14	Türkiye	13806	13713	94012	30484	6.81	72
MENA Total		41133	40815	352081	89819	Average: 11.19	Average: 35.68
European Total		199147	188707	3090396	656907	Average: 14.28	Average: 78.71
Percent of European performance		20.65	21.62	11.39	13.67	-	-

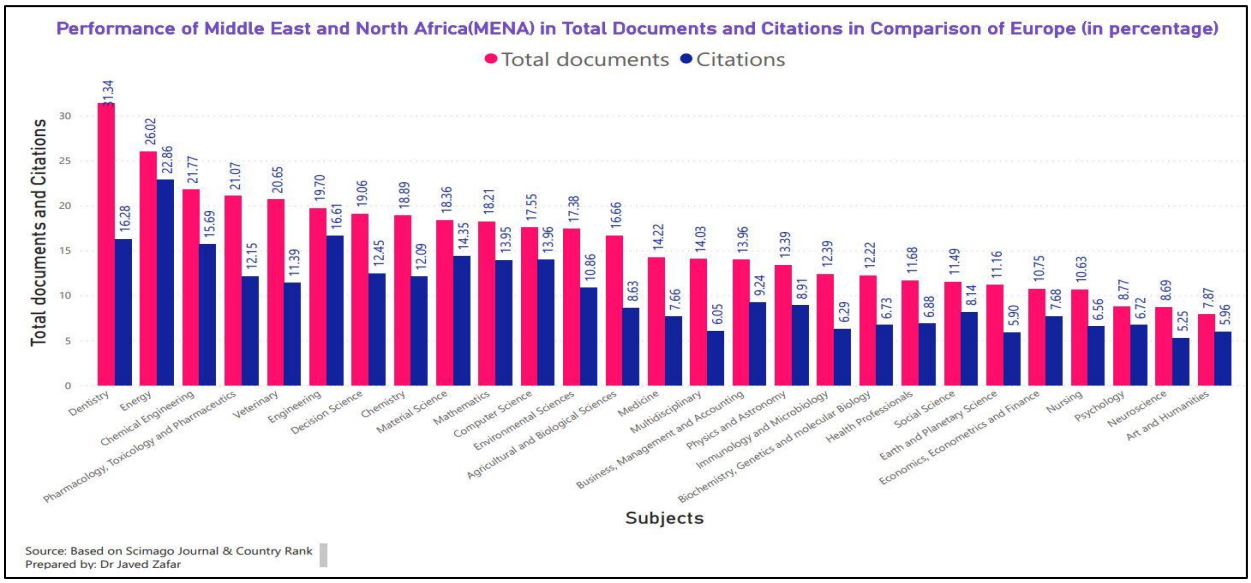
Source: https://www.scimagojr.com/countryrank.php?area=3400

There are 41133 total documents published by the whole MENA region, which are slightly more than 39973 documents published by the globally second rank holder, the United Kingdom. In total citations, the United Kingdom is far ahead of the whole region with 733984 in compression of MENA's total citations of 352081. Individually in the region, Türkiye is in the top with 14th global rank, while Iran and Egypt are in second and third position in the region with 19th and 20th global rank. Israel and Saudi Arabia performed closely with 38th and 44th global ranks. In total citations, Türkiye is on top with 94012 citations, while Iran is in the second position with 68981 citations. Egypt also received 57524 citations, whereas Saudi Arabia performed poorly with 19286 citations.

In citations per document, Israel is on top with 18.50 citations while top rank holder Türkiye and Iran performed poorly with 6.81 and 7.92 citations per document. Despite its lower position in the ranking, Israel is on top of the h index with an 80 h index value. Iran and Türkiye performed closely with 74 and 72 h index scores, respectively. Egypt scores 66 whereas Saudi Arabia scores 51 h index. In compression of Europe, MENA performance in the total document is 20.65 percent of Europe, while in the total citation, it is only 11.39 percent (Table 31).

MENA performance is knowledge production mixed with some good and some poorest performance at THE global level. In the compression of Europe, it is very low in all categories. Mauritania is the lowest performer, while Iran, Türkiye, Israel, and Egypt perform well at the regional level, while at the global level, they are either average or poor. In the category of 'all subjects' rank, Türkiye is on top with 20th rank while Mauritania is at lowest with 173rd global rank. In compression of Europe, MENA performance is only 15.05% in entire documents and only 9.12% in citations. Iran and Israel also performed well with 21st and 25th global ranks. In other subject rankings, there is consistency in all MENA countries. Mauritania ranks 133rd highest in material science to lowest 191st in Art and humanities. Morocco performed between 47th highest in decision science and 83rd rank in psychology. Algeria ranked highest in energy with 43rd global rank while lowest in 108th in dentistry. Tunisia performed highest with 45th rank in computer science whereas 75th rank in multidisciplinary research.

Fig. 2: A comparison of Research Publications and Citations in MENA and Europe (1996-2021)



It is pretty interesting that three regional countries, Morocco, Algeria, and Tunisia, performed very close to each other and give the impression that they are following the same education and research policy. Their average ranking is between 60th to 80th. Libya is part of the North Africa region, but its performance is different, with the highest ranking 71st in dentistry and the lowest 139th in psychology. Libya's general global ranking in all subjects is near 100 and above. Egypt's performance is best in the North African region, with the 20th highest ranking in veterinary and 56th in three subjects' art and humanities, decision science, and economics. Sudan is continuing in a political crisis, with stagnation in society, its highest ranking of 68th in veterinary science and lowest 129th in psychology. Lebanon and Jordan performed close to each other, for Lebanon's highest global rank is 51st in nursing and lowest 105th in veterinary science. For Jordan, 47th is the highest rank in nursing and the lowest 77th in agriculture. Palestine is a unique country with a unique political, social and economic situation. Palestine's performance is continuing around a position in nearly all subjects, with the highest rank of 89th in material sciences and 139th in agriculture.

Israel is one of the top rankers with the highest 14th rank in psychology and lowest in energy with 46th global rank. Syria's performance is close to Palestine, with the highest 57th ranking in dentistry and lowest in the 128th social science. The highest ranking in dentistry is an exception because, in the maximum subject, its ranking is near and above 100. Though Iraq's political and economic situation is similar to Syria's but its performance is better than Syria with the highest ranking of 43rd in veterinary and 92nd in nursing. Iran is one of the top rankers and even top in many subjects. Iran's top performance is 14th in three subjects, chemistry, energy, and pharmacology, and its lowest ranking of 44th in art and humanities. Saudi Arabia is the wealthiest country in the region, and its performance is near to Egypt, with the highest rank of 24th in pharmacology and lowest 57th in art and humanities. Kuwait, with 10% of global reserves, performs very low, with 53rd highest ranking in dentistry and lowest 103rd in agriculture. Bahrain's performance in ranking can be counted near Palestine because near 100th

ranking in all subjects; its highest ranking is 82nd in decision-making science and 159th in veterinary science, which is the second lowest after Mauritania.

Qatar is one of the largest LNG suppliers in the world, but in the knowledge production ranking, it is low, with the highest ranking of 44th in the health profession and 116th lowest ranking in veterinary. UAE is also a wealthy and politically active country in the region, but in knowledge production, it is also poor, with the 42nd highest ranking in management and dentistry and the 80th lowest ranking in agriculture. In the global ranking, Oman is low, but in the region, it is average, with 68th global ranking in business management and 106th in dentistry. Yemen is facing civil war and political instability like Libya and Syria, so it's ranking also like these countries with 61st in dentistry and 133rd in health professionals. It's ranking of 66th in dentistry is unusual because its average ranking is near 90th. However, because data is between 1996-2021, many entries may be before civil wars.

Türkiye is one of the top rankers in the region, with Iran and Israel with the ninth highest rank in dentistry which is the highest in the region in any subject, while its lowest ranking is 29th in earth and planetary science. According to these patterns of performance, the MENA region can be divided into five groups in the first group, top ranker Türkiye, Iran, and Israel; in the second group, Egypt and Saudi Arabia; in the third group, Morocco, Algeria, Tunisia, UAE, Iraq and Jordan, and in fourth group Qatar, Lebanon, Kuwait and Oman and in fifth group Libya, Sudan, Palestine, Bahrain, Sudan, and Syria can be included. Mauritania is single in its type, with the lowest performance in the region and at one of at global levels.

Performance in total citations, citations per document and h index is also different form overall ranking. In compression of Europe MENA performance is different in different subjects. In all subjects' total documents MENA published 15.05 percent of Europe while in citations it only 9.12 percent. In h index it shows more poor performance (graph: 1). MENA's average h index is 251.5 while European h index is very high 685.92 (Table: 4). Dentistry is highest successful subject in total document with 31.34 percent of Europe while in total citations research in energy is 22.86% of Europe's total citations is most successful. Performance in Neuroscience and Humanities are lowest with 6.69 percent in total documents and 5.25 percent in total citations and 7.87 percent in total documents and 5.96 in total citations respectively (graph:2)

3.4 MENA Performance in Global Knowledge Index (GKI) 2021:

The global knowledge index prepared by United Nations Development Program (UNDP) is based on six critical variables to judge knowledge conditions and their relations with each other. It is based on Pre-university education with its relation and reference with knowledge capital and enabling educational environment; Technical and Vocational Education and Training (TVAT) with its relations and reference with the formation and professional training and features of the labor market; Higher Education with sub index of higher education inputs, and higher education outputs and quality; Research, Development, and Innovation (RDI) with relation and sub-index of research and development, innovation in production, and societal innovation; Information and Communication Technology(ICT) with ICT input and output; Economy with three sub index of Economic competitiveness, economic openness, and financing and value-added and Enabling

environment with sub-index, comprising three pillars: governance, socio-economic, and health and environment23. These sectors and variables are interconnected and influence each other's performance. Any variable or sector does not replace any other but supports analysis; it tries to incorporate all areas of social, political, and economic indicators to calculate knowledge performance from pre-university education to higher education and research development. Enabling environment is a unique indicator because it relates knowledge and innovation with governance and finance to analyze the condition in knowledge performance.

Table: Rank And Performance of MENA Countries in Global Knowledge Index

Country	Rank Over All	Global Knowledge Index Global Ave: 48.4 Top Ranker:71.5	Pre-University Education. Global Ave:60.8 Top Ranker Score:82.7	Technical And Vocational Education and Training Global Ave:51.2. Top Ranker Scoce:73.5	Higher Education. Global Ave:46.1 Top Ranker Score:71.3	Research, Development And Innovation Global Ave:31.4 Top Ranker Score: 57.2	Information And Communications Technology Global Ave: 43.3 Top Ranker Score: 74.3	Economy. Global Ave:52.9 Top Ranker Score:82.1	Enabling Environment Global Ave:55.5 Top Rank Score 88.4
Mauritania	147	29	33.7(141st)	36.1(140th)	20.7(154th)	18.4(141st)	23.9(133rd)	37.7(140th)	34.4(145th)
Morocco	101	43.5	57(98th)	50.1(79th)	30.7(142nd)	25.2(109th)	44.5(74th)	48(97th)	52.3(84th)
Algeria	111	40.3	66.2(78th)	44.7(108th)	38.6(11th)	17(145th)	32.8(106th)	38.9(136th)	45.2(117th)
Tunisia	83	47.2	70.5(61st)	47.5(92nd)	40.8(99th)	26.8(100th)	44.9(72nd)	48.8(91st)	53.4(78th)
Libya	---								
Egypt	53	52.3	67.2(72nd)	53.4(68th)	54.6(35th)	32.7 (58th)	50.0(57th)	56.7(56th)	51.2(88th)
Sudan	145	30.4	37.1(134th)	29.9(150th)	26.8(149th)	31.1 (70th)	17.7(151st)	38.9(137th)	32.2(151st)
Lebanon	92	44.8	47.6(116th)	47.6(89th)	56.7(31st)	35.5(49th)	36(98th)	48.8(92nd)	39.5(139th)
Jordan	103	42.5	55.3(105th)	43.9(112th)	35.9(125th)	27.5(95th)	37.6(92nd)	50.8(77th)	49(98th)
Palestine	106	42	66.8(75th)	47.1(94th)	37.5(117th)	27.7 (93rd)	25.5(124th)	46.6(103rd)	42.6(124th)
Israel	18	64.6	78.7(21st)	57.1(46th)	63.8(17th)	56.7 (3rd)	65.2(15th)	68.3(16th)	61.2(49th)
Syria	----								
Iraq	137	33	42.7(124th)	37.2(135th)	47.6(66th)	11.8(154th)	24.2(132nd)	33.4(149th)	34.2(146th)
Iran	104	42.4	57.2(98th)	55.2(54th)	33.1(137th)	33.1 (56th)	39(89th)	42.5(125th)	34.1(147th)
Saudi Arabia	40	58.6	72.2(52nd)	69.6(9th)	52.8(42nd)	36 (47th)	58.2(35th)	60(48th)	52.4(83rd)
Kuwait	48	54.5	68.6(66th)	67.6(12th)	41.7(94th)	23.3(117th)	62.7(21st)	63.5(35th)	53.7(75th)
Bahrain	55	52.2	68.4(68th)	51.8(76th)	45.4(76th)	27.6 (94th)	59.6(30th)	60.8(43rd)	51.1(91st)
Qatar	38	58.7	80.2(14th)	53.3(70th)	61.4(20th)	36.6(41st)	52.5(51st)	67.8(20th)	59.5(55th)
UAE	11	67.3	80.9(6th)	70.1(8th)	64(16th)	42(28th)	65.9(14th)	79.9(2nd)	69.3(27th)
Oman	52	52.3	74.4(41st)	66.6(16th)	38.6(110th)	28.9(82nd)	53(49th)	54.9(64th)	48.7(100th)
Yemen	150	26.6	32.5(143rd)	22.2(154th)	33.4(132nd)	29.9(79th)	22.1(142nd)	35.5(148th)	23(154th)
Türkiye	77	48.2	57.3(97th)	56.9(47th)	34(131st)	36.1(44th)	49.4(62nd)	53.6(67th)	50.9(92nd)
Total									

Source: https://www.undp.org/publications/global-knowledge-index-2021

In the knowledge index in the overall ranking, only five countries of MENA are in the top fifty countries, including Israel, Saudi Arabia, Kuwait, Qatar, and UAE. Mauritania is still in the lowest position on 147th in total 154 rankings. UAE performance is highest in the region with 11th global position while Israel is in the second position with 18th global rank. In different sectors, each country's performance is different. In higher education, UAE is on top with 16th position at the global level, while Israel and Qatar are second and third potion in the region and 17th and 20th position at the global level. Research, innovation, and development, there is a drastic change in ranking with Israel being on top with third global ranking while UAE is on the

[23] https://www.undp.org/publications/global-knowledge-index-2021

second position in the region with 28th global ranking. In the Knowledge index, Israel, UAE, and Saudi Arabia lead the region (Table: A).

3.5 MENA Performance in Intellectual Property and Innovations:

Intellectual property and innovation are an outcome of the quality of knowledge production in any country. Quality innovation is directly related to many socio-economic factors as well. Studies show that economy is not the only factor in quality innovation; many other factors also play a role. Data from different 'World Intellectual Property Indicators' indicate that many low or middle-income countries like Iran, India, and Russia perform well in compressing some high-income economies24. MENA is a diverse region in terms of geographical and socio-political perspectives but a region with substantial natural resources.

Table 32: Total IP Filing Activities by Origin in the MENA Region in 2020

Origin/Country	Patents	Marks	Designs
Mauritania	N. A	N. A	N. A
Morocco	68	46	24
Algeria	81	57	41
Tunisia	N. A	N. A	N. A
Libya	N. A	N. A	N. A
Egypt (b, c)	46	115	64
Sudan	83	106	71
Lebanon	N. A	N. A	N. A
Jordan	99	87	78
Palestine	N. A	N. A	N. A
Israel	15	54	31
Syria	97	62	59
Iraq	55	116	115
Iran	21	3	12
Saudi Arabia	24	45	57
Kuwait	N. A	N. A	N. A
Bahrain	N. A	N. A	N. A
Qatar	79	89	107
UAE	51	48	82
Oman (a)	118	66	108
Yemen	108	78	93
Türkiye	23	10	6

Source: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf

MENA's performance in intellectual property is poor because data from 7 countries are unavailable, and even available data is not completed. It shows that MENA's presence in intellectual property, especially in the Middle East, is incompatible. Table 32 data shows the performance in three areas of IP, global ranking in patents registrations, trademark registration, and copyright in designs. In 139 countries ranking, MENA countries perform differently in

[24] https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf

different areas. In the patient ranking, Israel is on top with 15th global rank, while Iran and Türkiye gained second and third positions in the region with 21st and 23rd global rankings. Saudi Arabia is positioned 4th in the region with 24th global rank. Oman performed lowest in the region with 118th global rank. Data of seven countries, Mauritania, Tunisia, Libya, Lebanon, Palestine, Kuwait, and Bahrain are unavailable. In trademark registration, Iran is on top with a third global rank, while Türkiye is in the second position in the region with a 10th global rank. Saudi Arabia and Israel have third and fourth positions in the region, but at the global level, their ranks are low, with 45th and 54th, respectively. Egypt performs lowest with 115th global rank. In design copyright, Türkiye is on top with the sixth global rank, while Iran is in the second position with the 12th global rank. Finally, Morocco and Israel perform relatively low in the region, with 24th and 31st global rank.

3.6 MENA Countries Ranking of total (resident) IP filing activity by origin, 2020

Countries fill the applications in their respective country's patent or regional office and in the international office to register their intellectual product. Therefore, it is crucial that any country quickly fill the application in their respective office. Maximum, nearly 70 percent of applications come from residential filling.[25]

Table 33: Countries Ranking (Total Resident) in IP Filing Activities by Origin, 2020

Origin/Country	Patents	Marks	Designs
Mauritania	NA	NA	NA
Morocco	61	41	20
Algeria	62	47	31
Tunisia	NA	NA	NA
Libya	NA	NA	NA
Egypt (b, c)	NA	NA	NA
Sudan	63	96	63
Lebanon	NA	NA	NA
Jordan	NA	NA	NA
Palestine	NA	NA	NA
Israel	27	70	43
Syria	76	58	53
Iraq	NA	NA	NA
Iran	11	3	11
Saudi Arabia	25	40	49
Kuwait	NA	NA	NA
Bahrain	NA	NA	NA
Qatar	NA	NA	NA
UAE	78	62	85
Oman (a)	NA	60	98
Yemen	84	72	82
Türkiye	14	7	4

Source: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf

In residential IP filing, 12 out of 22 countries' activity data is unavailable. In available data of 10 countries in patent applications, Iran and Türkiye are on top with 11th and 14th global rank. Saudi Arabia and Israel are in third and fourth positions in the region, with 25th and 27th

[25] ibid

global ranks. In trademark also Iran and Türkiye are leading with third and seventh global rank respectively while Saudi Arabia is on the third position with 40th global rank. In design patent registration, Türkiye is on top with the fourth global rank, while Iran is in the second position with the 11th global rank.

3.7 MENA Countries performance in Patent applications by office and origin 2020

Patent application quantity is an essential indicator of knowledge outcome and the creation of intellectual property. In the report by 'World Intellectual Property Indicator 2021', out of the top five performers from 1883 to 2020, no country from the MNEA region exists. Of the five top performers, U.S and Japan are the only countries filling up to 1960; South Korea entered only after 1960, while the European Patent Office entered in the 1980s. China, which is currently a top performer, entered very late, only after 1980[26]. In the top 20 offices that granted patents in 2020, only one country, Israel from MENA, is listed with 4668 patents as the lowest performer. Only two countries, Iran and Türkiye from MENA, are included in the top 20 offices to receive patents from abroad. Iran office received a total of 12030 applications, including the maximum form itself from Iran with 11,396 applications. Türkiye office received a total of 8158 applications, including 7,956 from other or unknown sources. Interestingly, Türkiye is not on the list of top 20 applicants (as origin). Israel is the top performer in MENA as the origin of application, with 14068 applications in various patent offices, including 8,234 applications in the USA[27].

No university and PRO (public research organization) are also from MENA as an applicant in a different technology area. All universities are from China, Fence, Germany, South Korea, Japan, and the USA[28]. There is also not any country in the top 10 origin form MENA in published patents applications by different technology fields during 2017-19[29]. Because of global warming and climate change, energy-related research is on top priority in advance research. During the last 15 years, different research organizations, especially various automobile and energy-related industries, have invested huge money in patents in energy-related technology. Despite being directly affected by new technology in energy, MENA is not anywhere in energy-related patents. All top 10 energy-related technology applicants are out from the MENA region. Japan, the Republic of Korea, Germany, and the U.S, dominate the list.

Because of global warming and climate change, energy-related research is on top priority in advance research. During the last 15 years, different research organizations, especially various automobile and energy-related industries, have invested huge money in patents in energy-related technology. Despite being directly affected by new technology in energy, MENA is not anywhere in energy-related patents. All top 10 energy-related technology applicants are out from the MENA region. Japan, the Republic of Korea, Germany, and the U.S, dominate the list.

In terms of quantity, data of MENA Patent applications by office and origin, 2020, is incomplete. Complete data from 13 out of 22 countries is not available. In available data, the

[26] Ibid (page:32)
[27] Ibid (page:35,36)
[28] Ibid (page:41)
[29] Ibid (page:43)

region's performance is very low compared to other leading countries. Even lower and middle-income countries are far ahead. In total, applications by office, Iran is on top with 12,030, including 11,396 resident and 634 non-resident applications. Türkiye and Israel are in second and third position with a slight difference. Türkiye submitted 8,158 applications, including 7,920 resident and 238 non-resident applications. Israel submitted 8,123 including 1,642 resident and 6,481 non-resident applications. In Israel's applications, the share of non-resident applications is more compression of Iran and Türkiye (Table: 34). Saudi Arabia is in the fourth position in the region with 3,568 total applications, including 1,294 resident and 2,274 non-resident applications. Morocco and Egypt also perform relatively well in the region. Morocco filled 2,688 total applications, including 250 resident and 2,438 non-resident applications. Egypt filled 2,207 total applications, including 978 resident and 1,229 non-resident applications.

The regional patent office of gulf states' GCC Patent Office' filled 2,343 total applications, including 894 resident and 1,449 non-resident applications. Other data from GCC Patent' Office' is missing or not available. There are 44860 total applications filled by the whole MENA region, which are even very low in compression to other leading countries' performance individually (Table: 34). the Republic of Korea, with an area of 120,540 km² and a population of 25.78 million, filled 226,759 total applications with 180,477 residents and 46,282 non-resident applications.

To count applications in different regional office, a new concept was designed with the name of Equivalent applications by origin. According to World Intellectual Property Indicators, "Equivalent applications by origin are Applications at regional offices are equivalent to multiple applications, one in each of the member states of those offices. To calculate the number of equivalent applications for the Benelux Office for Intellectual Property (BOIP), the Eurasian Patent Organization (EAPO), the African Intellectual Property Organization (OAPI), the Patent Office of the Cooperation Council for the Arab States of the Gulf (GCC Patent Office) and the European Union Intellectual Property Office (EUIPO), each application is multiplied by the corresponding number of member states. For European Patent Office (EPO) and African Regional Intellectual Property Organization (ARIPO) data, each application is counted as one application abroad if the applicant does not reside in a member state or as one resident application and one application abroad if the applicant resides in a member state. The equivalent application concept is used for reporting data by origin"[30]. In the category of 'Equivalent applications by 'origin,' data of MENA is incomplete, but in available data, Israel is on top with 16,219 applications, while Iran and Türkiye are in second and third positions with 11,550 and 10,110 applications, respectively. On the other hand, Saudi Arabia filled 9,782 applications in that category.

Table 34: Patent applications by office and origin in the MENA Region, 2020

Country Name	Application By Office			Equivalent Applications by Origin	Pct International Applications		Pct National Phase Entry	
	Total	Resident	Non-Resident	Total (A)	Receiving Office	Origin	Office	Origin
Mauritania	N. A	N. A	NA.	20	N. A	0	N. A	---

[30] https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf (Page:224)

Morocco	2,688	250	2,438	340	34	42	2,029	79
Algeria	710	163	547	173	13	14	541	1
Tunisia	257	---	----	23	3	4	---	11
Libya	-----	----	---	3	0	3	---	1
Egypt	2,207	978	1,229	1,187	38	46	1,199	48
Sudan	160	153	7	163	4	6	3	6
Lebanon	--	--	--	84	N. A	2	---	27
Jordan	337	36	301	75	11	20	244	19
Palestine	N. A	N. A	N. A	N. A	N. A	N. A	N. A	N. A
Israel	8,123	1,642	6,481	16,219	1,377	1,948	6,908	8,004
Syria	92	76	16	82	0	2	16	6
Iraq	733	635	98	646	N.A.	0	---	---
Iran	12,030	11,396	634	11,550	48	283	N.A.	48
Saudi Arabia	3,568	1,294	2,274	9,782	22	956	2,451	2,139
Kuwait	---	----	---	97	N.A.	13	---	3
Bahrain	264	7	257	37	0	2	256	3
Qatar	685	81	604	210	15	23	610	39
UAE	1,908	39	1,869	836	N.A.	86	1,803	344
Oman	529	--	---	41	10	11	---	5
Yemen	68	60	8	63	N.A.	0	---	---
Türkiye	8,158	7,920	238	10,110	1,666	1,705	265	1,657
GCC Patent Office	2,343	894	1,449	N.A.	N. A	N.A.	--	N.A.
Total	44860	25624	18450	51741	3241	5166	16325	12440

Source: based on World Intellectual Property Indicator 2020 page 62-66: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf
(a)Equivalent applications by origin data are incomplete because some offices do not report by origin

Performance of other regional countries is low, with very few applications. There are only 51741 documents filled by the whole MENA region in Equivalent applications by origin, while the Republic of Korea individually filled 260,610 applications in that category[31]. Applications in Patent Cooperation Treaty (PCT) are not counted as and grant of patent. All the applications which are sent for the process of PCT must be already filled in the respective country or regional patent office. PCT procedure is only to standardize the application, which can be helpful to accept or reject the application in their separate national or regional office. This application is also called an international Patent Application though there is nothing like an international patent. In MENA PCT international applications, the whole region submitted 3241 applications in receiving office while the origin received 5166 total applications.

Israel applied for 1,377 applications in receiving office while in origin, and it sent 1,948 applications, while Türkiye applied 1,666 applications in receiving office and 1,705 applications in the origin office. Other regional countries sent very few applications for this process. In PCT national phase entry, again, Israel sent maximum applications from the region, with 6,908 applications in receiving office and 8,004 applications in the office of origin. Saudi Arabia and UAE also show their interest in this process. Saudi Arabia applied for 2,451application in receiving office and 2,139 applications in origin. UAE applied for 1,803 in receiving office while 344 applications were in the origin office. Türkiye applied only for 265 applications in receiving office while 1,657 applications were in origin. MENA region applied for 16325 applications in receiving office for PCT national phase entry while 12440 applications in the origin office

[31] https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf (Page:65)

(Table:34). Other regional countries sent a small number of applications, or data is not available for some countries.

GCC Patent Office also did not provide any data in that category. In compression to other leading countries, a minimal number of applications is sent for PCT procedure while only Korea individually sent a big number of applications. For PCT international application for receiving office, Korea applied for 19,766 applications, while for origin, it sent 20,060 applications. For PCT national phase entry Republic of Korea applied 38,078 applications in receiving office, whereas in the origin office, it applied 34,531 applications.

3.8 MENA Performance in Patent grants by office and origin, and patents in force, 2020

After the application process, the patent grant process began. Offices accept or reject the patents. In the MENA region, applications are already very low in quantity in compression of other developing and developed nations, but in patent grants, it is a poorer performance from MENA. Data from many countries of the region is totally missing, incomplete, or confusing in some instances. MENA countries filled 44511 applications, but only 14594 patents were granted, with a success rate of 32.78%. It is very low from the global percentage of 48.58%. It shows that MNEA success rate is below the average total success rate. Individually, some countries' success may be confused with a high rate in percentage, but in quantity, it is very low or sometimes near zero. Though in 'total application', some countries perform well because of low quantity, it is not very significant at the regional level. For example, Jordan's success rate is 99.10, with 334 grants in 337 applications. With a large number of applications, Israel's success rate is 57.46%, with 4,668 patents in 8,123applications.

Table 35: Patent Grants by Office and Origin in 2020

Amount of Grant/Total and (Percentage)

Country Name	Total	Grants By Office	Grants By Office	Equivalent Grant by Origin	In Force by Office
		Resident	Non-Resident	Total (A)	Total
Mauritania	N. A	N. A	N. A	N. A	N. A
Morocco	400/2,688 (14.88%)	89/250 (35.6%)	311/2,438 (12.75%)	143/340 (42.05%)	10,192
Algeria	421/ 710 (59.29%)	49/163 (30.06%)	372/547 (68.00%)	49/173 (28.32%)	---
Tunisia	----	---	---	10/23 (43.47%)	---
Libya	--	---	--	--	----
Egypt	495/2,207 (22.42%)	65/978 (6.64%)	430/1,229 (34.98%)	115/1,187 (9.68%)	5,655
Sudan	117/160 (73.12%)	114/153 (74.50%)	3/7 (42.85%)	114/163 (69.93%)	---
Lebanon	-----	---	---	23/84 (27.38%)	---
Jordan	334/337 (99.10%)	8/36 (22.22%)	326/301(*)	42/75(56%)	694
Palestine	---	---	---	---	----
Israel	4,668/8,123 (57.46%)	862/1,642 (52.49%)	3,806/6,481 (58.72%)	8,672/16,219 (53.46%)	35,096
Syria	----	----	--	2/82 (2.43%)	65
Iraq	404/733 (55.11%)	384/635 (60.47%)	20/98 (20.40%)	385/646 (59.59%)	3,546
Iran	3,660/12,030 (30.42%)	3,294/11,396 (28.90%)	366/634 (57.72%)	3,444/11,550 (29.81%)	38,642
Saudi Arabia	705/3,568 (19.75%)	107/1,294 (8.26%)	598/2,274 (26.29%)	2,819/9,782 (28.81%)	4,175

Kuwait	-----	-----	---	80/97 (82.47%)	---
Bahrain	34/264 (12.87%)	0/7 (0%)	34/257 (13.22%)	9/37 (24.32%)	131
Qatar	4/685 (0.58%)	2/81 (2.46%)	2/604 (0.33%)	47/210 (22.38%)	205
UAE	506/1,908 (26.51%)	3/39(7.69%)	503/1,869 (26.91%)	295/836(35.28%)	2,416
Oman	11/529 (2.07%)	---	---	25/41 (60.97%)	529
Yemen	19/68(27.94%)	5/60 (8.33%)	14/8 (*)	6/63 (9.52%)	----
Türkiye	2,063/8,158 (25.28%)	1,929/7,920 (24.35%)	134/238(56.30%)	3,244/10,110 (32.08%)	88,753
Patent Office of the GCC	753/2,343(32.13%)	199/894 (22.25)	554/1,449 (38.23%)	n.a.	7,771
Total	**14594/44511 (32.78%)**	**7110/25624 (27.74%)**	**7473/18450(40.50%)**	**19524/51800 (37.69%)**	**197870**

Source: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf

Türkiye and Iran's performance is low in granted patents. Türkiye applied 8,158 applications but only received 2,063 patents with a 25.28% success rate. Iran filed 12,030 patent applications, and only 3,660 patents were granted, with 30.42% success. Saudi Arabia's success rate is only 19.75%, while UAE succeeds in receiving 26.51% of patents against the 1,908 applications. GCC patents office submitted 2,343 applications and received only 753 patents, with a 32.78% success rate. The rate of success in resident and non-resident applications in different countries (Table: 35). There are 197870 patents in force in the MENA region up to 2020, which is even less than 20% of South Korea's patents in force. Individually in the region, Türkiye is leading with 88,753 patents in force while Iran and Israel are far behind with second and Third positions with 38,642 and 35,096 patents in force respectively. Morocco's performance is relatively good in the region with 10,192 patents in force while Egypt and Saudi Arabia perform very poorly with only 5,655 and 4,175 patents in force. There are only 7,771 patents in force by the GCC patents office. Data from some countries like Jordan and Yemen is misleading or incomplete.

3.9 Patent office procedural performance of MENA, 2020

Procedural data or performance is crucial because it shows the promptness of the patent office of any country. It also discusses the percentages of accepted and rejected or abandoned applications. Time in the patent application process is also essential in grating patents. MENA's performance is very diverse in this regard.

Table: 36-Patent Office Procedural Performance in the MENA Region, 2020

Country Name	Total Applications Processed	Granted	Rejected	Withdrawn Or Abandoned	Number Of Examiners (Fte)	First Office Action (Months)	Final Office Decision (Months)
Mauritania	N. A	N. A	N. A	N. A	N. A	N. A	N. A
Morocco	595	403	153	39	13.0	4.2	14.0
Algeria	---	322	427	--	6.0	11.0	15.0
Tunisia	---	---	---	---	---	---	----
Libya	---	-----	----	----	----	-----	----
Egypt	1,024	525	109	390	100.0	18.0	27.0
Sudan	388	116	12	260	8.0	---	2.0
Lebanon	---	----	----	----	----	----	-----

Jordan	---	334	306	---	6.0	12.0	24.0
Palestine	----	---	---	----	---	----	----
Israel	7,719	4,669	13	3,037	118.0	27.5	42.0
Syria	53	35	13	5	5.0	3.0	12.0
Iraq	---	---	---	---	---	--	--
Iran	11,631	2,090	1,102	8,439	13.0	1.5	7.0
Saudi Arabia	3,126	931	709	1,486	32.0	34.0	12.5
Kuwait							
Bahrain	----	34	---	8.0	5.0	4.0	12.0
Qatar	---	44	---	19	4.0	6.0	24.0
UAE	---	506	---	17	24.0	35.1	---
Oman	----	----	----	----	----	----	-----
Yemen	----	----	----	----	----	---	-----
Türkiye	6,232	2,746	608	2,878	193.0	2.8	27.9
Patent Office of the GCC	824	753	64	7	33.0	9.2	24.6

Source: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf (Page-71)

In procedural data, information about many countries is either incomplete or unavailable. Iran is on top in rejected and abandoned applications, with 82.03 percent of total applications processed. Sudan's performance is also high in rejected and abandoned category, with 70.10 percentages of processed applications. Saudi Arabia's percentage of rejected and abandoned applications is high, at 70.21 percent. Israel's rage of rejection and abandoned is relatively low, at 39.51 percent. Turkish application rejections and the abandoned percentage is nearly fifty percent, with 55.93 percent. The GCC office has the lowest rejections and abandoned applications, with 8.61 percentages. Incomplete and unavailable data indicate MENA's less seriousness toward the intellectual property procedural system.

3.10 Trademark Patents:

Trademark is the symbol of a company or industrial house; as the business grows or the confidence of people grows in the company, the value of the trademark also grows. It shows the success of a nation as well. There is a global competition for trademark registration.

Table37: Trademark Applications by Office and Origin in the MENA Region, 2020

	Application by Office			**Application Class Count by Origin**	**Equivalent Application Class Count by Origin**	**Madrid International Applications**	
Country Name	**Total**	**Resident**	**Non-resident**	**Total (a)**	**Total (a)**	**Origin (f)**	**Designated Madrid member**
Mauritania	--	--	---	132	1,813	---	N.A.
Morocco	30,169	18,481	11,688	20,007	26,841	99	3,492
Algeria	20,115	12,350	7,765	12,557	13,513	15	2,461
Tunisia	--	--	---	591	3,150	22	2,295
Libya	--	---	---	46	100	---	N.A.
Egypt	---	---	----	785	2,699	13	4,097
Sudan	4,367	1,414	2,953	1,469	1,469	1	1,070
Lebanon	---	---	---	747	3,390	---	N.A.
Jordan	6,156	2,753	3,403	3,778	5,707	---	N.A.
Palestine	---	---	--	---	---	---	----

Israel	21,795	4,696	17,099	13,305	44,092	400	5,243
Syria	13,762	8,189	5,573	8,860	11,322	7	905
Iraq	--	--	---	759	1,110	1	N.A.
Iran	541,750	526,399	15,351	527,401	528,311	17	2,654
Saudi Arabia	30,184	20,287	9,897	22,297	25,126	---	N.A.
Kuwait	--	---	---	847	2,351	1	N.A.
Bahrain	9,869	363	9,506	622	1,243	2	1,572
Qatar	7,153	1,282	5,871	3,373	5,826	3	N.A.
UAE	18,620	6,415	12,205	16,102	40,329	19	N.A.
Oman	12,578	7,918	4,660	8,436	9,288	5	1,825
Yemen	6,094	4,564	1,530	4,888	5,055	--	N.A.
Türkiye	363,708	331,480	32,228	355,635	425,486	1,871	9,182
Total	1086320	946591	139729	1002637	1,158,221	2476	34796

Source: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf (Page:116-20)

In trademark registration performance, data of many MAENA countries are either not available or incomplete. Total 1086320 applications filled by whole MENA region. Significant shares are contributed by Iran and Türkiye, with 541,750 and 363,708, respectively. Morocco applied 30,169 applications, while Algeria applied for 20,115 applications. In trademark registration, Israel is far behind in the region with 21,795 applications (Table: 37). Major applications were filled in the resident category with nearly 85% of all applications. Israel, Bahrain, Qatar, and UAE filled more non-resident applications in compression of resident applications.

Table 38: Trademark Registrations by Office and Origin, and Trademarks in Force, 2020

Name	**Registration Class Count By Office**			**Registration Class Count By Origin**	**Equivalent Registration Class Count By Origin**	**Madrid International Registrations**	**In Force By Office**
	Total	**Resident**	**Non-resident**	**Total (a)**	**Total (a)**	**Origin (f)**	**Total**
Mauritania	----	--	--	--	--	--	---
Morocco	27,259	14,858	12,401	15,768	20,401	59	---
Algeria	17,734	7,916	9,818	8,030	8,454	16	36,485
Tunisia	--	--	---	573	3,195	22	----
Libya	--	---	---	59	194	--	----
Egypt	--	---	--	656	2,328	14	---
Sudan	3,017	389	2,628	484	484	1	20,455
Lebanon	--	--	---	638	2,545	1	---
Jordan	5,414	2,090	3,324	2,803	4,610	---	---
Palestine	---	--	--	--	-	--	---
Israel	22,284	3,519	18,765	10,728	40,350	346	143,695
Syria	6,253	3,314	2,939	3,749	5,722	9	---
Iraq	--	--	---	591	753	1	----
Iran	128,566	120,876	7,690	121,651	122,682	14	301,540
Saudi Arabia	17,535	8,944	8,591	10,795	14,134	---	----
Kuwait	--	--	--	820	2,200	---	---
Bahrain	12,279	225	12,054	497	1,042	2	75,539
Qatar	7,289	673	6,616	2,220	4,084	2	32,463
UAE	16,781	4,941	11,840	12,573	35,117	17	284,299
Oman	6,710	2,006	4,704	2,299	2,675	--	---
Yemen	4,320	3,056	1,264	3,276	3,383	--	---
Türkiye	220,878	187,733	33,145	210,774	276,662	1,114	1,220,050

Total	496,319	360540 (72.64)	135779 (27.35)	408984	551015	1618	2114526

Source: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf (Page: 121-125)

Region applied for total 496,319 applications including 360540 (72.64) resident and 135779 (27.35) non-residents. In the compression of Europe, it is only slightly more than the total application filled by France and Britain combined. Türkiye and Iran share the largest part of applications, with 220,878 or 44% of total applications by the whole region, while Iran applied for 128,566 or 25.90% of the total. Morocco's performance is relatively good, with 27,259 applications. Israel and Saudi Arabia filled for 22,284 and 17,535 applications, respectively (Table: 38). According to the world intellectual property indicator report 2021, there are 2114526 trademarks in force in the MENA region. Türkiye, Iran, UAE, and Israel are the biggest contributors to trademarks in force (Table: 38).

Table 39: Trademark Office Procedural Data of the MENA Region, 2020

Country Name	Total Applications Processed	Registered	Partial Rejections	Total Rejections	Withdrawn Or Abandoned	Applications Pending	Number Of Examiners (Fte) First Office A	First Office Action (Days)	Final Office Decision (Days)
Mauritania	--- N. A	-----	----	----	---	---	---	---	---
Morocco	5,872	5,597 (95.31%)	---	126	149	--	12	31	137
Algeria	6,462	5,567(86.14%)	----	884	11	6,898	16	300	365
Tunisia	--- N. A	---	---	---	---	---	1	--	--
Libya	--- N. A	---	--	--	--	--	---	--	---
Egypt	--- N. A	--	--	---	---	--	--	--	---
Sudan	1,585	711(44.85%)	---	191	683	451	30	10	15
Lebanon	--- N. A	--	--	--	-	--	---	--	--
Jordan	--- N. A	---	---	--	---	---	---	---	--
Palestine	--- N. A	----	---	---	--	--	---	---	---
Israel	7,553	6,618(87.62%)	---	----	935	4,927	17	107	220
Syria	--- N. A	---	---	---	--	--	--	--	---
Iraq	--- N. A	---	---	---	---	---	--	-	---
Iran	93,785	30,858 (32.90%)	----	62,737	190	4,242	27	32.5	58.8
Saudi Arabia	21,919	17,726 (80.87%)	---	191	4,002	---	9	---	-----
Kuwait	--- N. A	---	--	---	---	---	---	---	----
Bahrain	11,387	8,809 (77.36%)	---	137	2,441	1,152	---	---	101
Qatar	7,071	6,882 (97.32%)	---	151	38	82	8	30	90
UAE	--- N. A	---	---	---	---	---	--	--	--
Oman	3,961	3,876(97.85%)	---	--	45	---	6	---	10
Yemen	--- N. A	--	--	--	--	--	--	---	--
Türkiye	128,317	98,782 (76.98%)	---	7,888	21,647	192,654	116	13	52
Total	287912	185426 (64%)							

Source: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf (126-28)

Trademark official procedural data is incomplete for many countries, while complete data is available only for a few countries (Table: 39). According to the world intellectual property indicator report 2021, the maximum applications submitted were registered in the office.

Morocco, Qatar, and Bahrain's performance are very high, with more than 95%. Türkiye submitted the highest number of applications, with 76.98% registered. Iran's performance is low, with 32.90% of registration. Rejections are low in the region except in Iran. In totality, MENA success 64% in the registration of applications after the process.

3.11 Industrial Design:

The industrial design gives a product a unique identity (in compression of other products) because of its physical appearance, functionality, and manufacturability. It also shows how an industrial design is different and competent with different industrial products. Unfortunately, in industrial design patents or registration, data of MENA is incomplete either entirely or partially. Only complete data from five countries are available in 17 out of 22 countries' total application registration data. According to data (Table:40), there were 72955 applications submitted by the whole MENA, which is near 71,834, with total applications from only two European countries (France and Germany). Individually Türkiye is on top with 47,653 applications with a share of 64.31% of total MENA.

Table 40: Industrial Design Applications by Office and Origin in the MENA Region, 2020

	Registration Design Count by Office			**Application Design Count By Origin**	**Equivalent Application Design Count By Origin**	**Hague International Application Design Count**	
Country Name	**Total**	**Resident**	**Non-Resident**	**Total (A)**	**Total (A)**	**Origin (C)**	**Designated Hague Member**
Mauritania	--	--	--	---	--	--	--
Morocco	3,908	2,863	1,045	2,920	3,061	8	912
Algeria	1,472	1,207	265	1,207	1,207	---	N.A..
Tunisia	---	---	---	106	133	----	707
Libya	---	---	--	--	--	--	---
Egypt	--	--	--	364	1,012	24	736
Sudan	250	243	7	244	244	---	N.A..
Lebanon	--	--	--	10	174	---	N.A..
Jordan	89	74	15	167	534	7	N.A..
Palestine	---	--	--	--	--	--	---
Israel	1,762	746	1,016	2,345	12,969	101	634
Syria	574	447	127	449	449	--	80
Iraq	--	--	--	15	15	--	N.A..
Iran	14,984	14,896	88	14,921	14,948	--	N.A..
Saudi Arabia	948	537	411	567	648	--	N.A..
Kuwait	---	--	--	6	6	---	N.A..
Bahrain	73	13	60	16	70	--	N.A..
Qatar	---	--	---	24	429	---	N.A..
UAE	686	52	634	144	624	2	N.A...
Oman	492	20	472	21	21	1	473
Yemen	64	58	6	59	59	---	N.A..
Türkiye	47,653	42,073	5,580	44,326	62,469	530	4,688
Total	72955	63229 (86.66%)	9726 (13.33%)	67911	99072	673	8230

Source: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf (161-64)

A significant share of applications is from the resident category, with 86.66%. Iran and Morocco are in second and third position in the region, with 14,984 and 3,908 applications. Other regional countries submitted very few applications.

Table 41: Industrial Design Registrations by Office and Origin, and Registrations in Force, 2020

	Registration Design Count by Office			Registration Design Count by Origin	Equivalent Registration Design Count by Origin	Hague International Registration Design Count	In Force by Office
Country Name	**Total**	**Resident**	**Non-Resident**	**Total (a)**	**Total (a)**	**Origin (c)**	**Total**
Mauritania	---	--	---	---	---	--	---
Morocco	4,203	2,834	1,369	2,936	3,089	21	---
Algeria	863	646	217	655	671	---	1,659
Tunisia	----	---	---	48	102	--	--
Libya	---	---	----	---	--	--	---
Egypt	--	---	--	361	1,009	24	---
Sudan	196	185	11	189	189	--	---
Lebanon	--	--	--	14	151	---	---
Jordan	97	55	42	126	493	7	1,015
Palestine	--	--	--	--	-	--	--
Israel	1,662	514	1,148	1,920	12,373	81	219,148
Syria	317	209	108	220	220	----	555
Iraq	---	--	--	3	3	---	----
Iran	4,454	4,426	28	4,444	4,471	---	41,509
Saudi Arabia	778	362	416	395	395	---	4,357
Kuwait	--	---	---	8	8	---	----
Bahrain	71	14	57	16	70	---	699
Qatar	--	---	--	17	179	---	---
UAE	1,210	65	1,145	165	516	9	4,237
Oman	492	19	473	19	19	---	58
Yemen	18	15	3	15	15	---	89
Türkiye	44,903	38,206	6,697	40,382	59,089	570	145,656
Total	59264	47550	11714	51933	83062	712	418982

Source: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf (165-68)

The whole region registered 59264 applications. The whole region's performance is even far behind 79,252, the total registration of three European countries, France, Germany, and the United Kingdom. Data from many countries are either not available or incomplete. In total, 59264 applications, the Turkish share is the biggest, with 75.76% of total available data. In available data at the regional level, Türkiye, Morocco, and Iran performed closely with 4,203 and 4,454 registrations, respectively. Surprisingly Israel is far behind in application submission and registration, but by 2020 in design or patents in force in industrial design, it is on top with 219,148 designs in force, while the top ranker in application and gating registration is on second with 145,656 industrial designs in force. Iran is also among the top application submission and registration, but till 2020 there are only 41,509 industrial designs in force (Table 41).

Table 42: Industrial Design Office Procedural Data of the MENA Region, 2020

Country Name	Total Applications Processed	Registered	Rejected	Withdrawn Or Abandoned	Applications Pending	Number Of Examiners (Fte)	First Office Action From Filing Date (Days)	Final Office Decision From Filing Date (Days)
Mauritania								
Morocco								
Algeria	489	252	237	--	---	2.0	7.0	180.0
Tunisia	--	--	---	--	--	1.0		
Libya	---	---	---	---	---	---	---	----
Egypt	----	---	---	---	---	---	---	--
Sudan	249	114	5	130	---	8.0	---	30.0
Lebanon	---	---	--	--	-	--	--	--
Jordan	107	97	10	--	31	1.0	15.0	120.0
Palestine	---	--	--	---	--	--	--	--
Israel	2,657	1,222	1,435	--	166	5.0	197.0	269.0
Syria								
Iraq								
Iran	14,896	4,437	8,282	2,177	---	7.0	22.0	32.0
Saudi Arabia	2,165	778	191	1,196	496	2.0	---	---
Kuwait	---	--	---	--	---	---	--	--
Bahrain	---	--	--	--	---	---	---	---
Qatar	----	---	---	---	---	---	---	---
UAE	1,214	1,210	2	2	1,226	6.0	240.5	240.5
Oman	---	---	---	---	---	---	---	---
Yemen	---	---	---	---	---	---	---	---
Türkiye	9,692	8,736	892	64	---	14.0	45.0	45.0
Total	31469	16846	11054	3569				

Source: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf (169-71)

Like other data, procedural data is also incomplete. According to available data total, 31469 applications of MENA were processed, including the top rank of Iran and Türkiye, with 14,896 and 9,692 applications processed, respectively. Israel and Saudi Arabia ranked third and fourth in processed applications, with 2,657 and 2,165 applications. In total, 31469 processed applications, only 16846 applications were registered with a 53.53% success rate; in registered applications, Türkiye is on top in processed applications behind Iran. The Turkish success rate is 90.13%, while Iran's success rate is 29.78% (Table: 42).

4. Discussion

It is indicated from the above (from table 1-41) performance of knowledge production that MENA is very low in quality and quantity. Poor performance in knowledge production creates serious security threats in all dimensions, including the military and the economy. To solve all crises, including their political and social, the region collectively and individually depends on outside powers or the so-called international community led by the U.S or Europe. In response, they intervene and divide the region according to their agenda. Region collectively and countries of region individually wants to reduce their dependency on outsiders but lack political, economic, and military ability and will they are failing and even sinking more in these quagmires. Some countries are doing better individually, but they are still far behind top-ranked

knowledge producers. Moreover, the region is not only facing military invasion from outsiders but also facing serious internal violence in different forms.

To reduce the dependency, MENA has to take different measures but most important is to be independent in knowledge production quantitatively and qualitatively. Data (from table 1-41) show that the gap between MENA and other rival regions is so vast that in a traditional way or with the current speed, it is impossible to fill the gap and become independent in the near future. Furthermore, even the government decides to focus on that issue, and it will not compete with its main rivals or the West because the problem is not only management but also philosophical and ideological. The MENA region is predominately Muslim, including its birthplace with substantial natural resources. Moreover, the main question is why region or muslin societies have failed to produce quantitatively and qualitatively enough knowledge that can risk continuing dependency on others and possible collapse**.**

4.1 Sociology of Knowledge Production and the MENA Region

In the dictionary term, Sociology is the systematic study of society and social interaction, and Sociology is the systematic study of all those aspects of life designated by the adjective "social." These aspects of social life never occur; they are organized processes (Smith, Dorothy 1999)**.** Acquiring knowledge is also a social process which is influence by different social, political and economic interactions and conditions.

The sociology of knowledge production examines the relationship between knowledge production and society or social system with its different contexts, structure, and conditions. There are many approaches to sociological analysis with a critical overview. Sociological analysis tries to define sociological phenomenon and order with different references and backgrounds like the economy, religion, knowledge, etc. However, there are some critics of these for not defining a complete pattern and system, but each approach defines and solves some issues. A whole noise-free approach depends on how each society perceives life and its meaning. Vice versa, there is a debate 'about where meaning comes from. And what is its relation with society and its structure? There are many contradictory claims regarding this. Sometimes other issues like deep poverty and continued violence also play an impotent role in creating perception about life, society, and its structure.

In his history study, Arnold Toynbee proved that the rise and fall of civilization's continued instability and violence pressure the society not to maintain traditional order, which has failed and transformed into a comfortable one(Toynbee, 1889- 1975). Defining an ideally structured and balanced society is always challenging for philosophers and theorists. The functional approach claim that society is complex in structure but purposeful and interconnected through different institutions like Family, religion, economy, education, international order, globalization, and media. This is an organic and mechanical approach to society. Society is more than the sum of all its parts, and every part of society is working to serve the whole purpose and to fulfill the need of individuals as well (Ashley Crossman, 2020). According to functionalism, any society may be in order, stable, and can achieve defined goals only if all parts of society function appropriately, and if any institution and part do not work according to the whole, it will

die away[32]. In other words, it may be a cause of disability and dysfunction of the whole body and death for a long time.

Dysfunctionality and incoherence of one part or institution will create a crisis in the whole. Though many experts criticize this interpretation of society as it talks only at the macro level. But this approach may shed some light on the MENA knowledge production situation and problem. Many parts or institutions are not in coherence, and there is a contradiction in many parts' functions. Political order or system, religion, and individual are in clash and confusion at different levels and become the cause of failure in knowledge production. The current political situation or order and tribal social system indicate this. For the last two decades region, especially north Africa, is suffering from grave political violence[33]. The religious role is vital in MENA society and religious discourse; though not so harsh towards modern education, its compatibility with modern education and technology is not still part of religious discourse. Moreover, many issues like democracy, people's participation in the political process, and culture are still in status confusion.

At the micro level, social actors, through their interactions, play an essential role in shaping society and meaning. Blumer (1969), the founder of symbolic interaction, explained that the mind and ego are social constructs and are directly related to meaning. Symbolic interactionism acknowledges meaning as the central point of human behavior and action. Meaning is created through people interaction. People interaction may be through many channels and mass media. Meaning, language, and symbols are the core of symbolic interaction[34], and people in daily life interact through language and symbols and create meaning (Korgen & White, 2008). Whatever social product is, it is the outcome of people's interaction through language and symbols. The knowledge production status in MENA indicates that knowledge is not central to people's interaction, language, and symbols. It may be because of various reasons, including regime control and uselessness of knowledge in people's life. This approach is close to discourse domination. As post-modernists argued that discourse created and defined the social reality and truth, and there is a power-discourse relationship (Foucault. Michel 1969). According to inductive logic drawn by data (table: 4-41) that knowledge is not part of regime priority and people interaction.

There is a difference between the sociology of knowledge and the sociology of knowledge production. In the sociology of knowledge, social conditions or produced knowledge (whatever idea is produced or constructed) are discussed, while the 'sociology of knowledge production' talk about the social condition of knowledge production. The sociology of knowledge focuses on idea and value, while the sociology of knowledge production focuses on the quantity of knowledge production. There are two dimensions of sociology of knowledge production one is the value of the intellectual output of any knowledge production; the second is their attitude towards the knowledge, negatively or positively, or sociology of knowledge production at the operation level. The study of value or ideological interpretation of produced knowledge output is essential, but in MENA is more important to find out the social structure, social order, or

[32] https://www.thoughtco.com/functionalist-perspective-3026625

[33] https://www.oecd.org/about/secretary-general/the-evolution-of-violence-across-north-and-west-africa-february-2020.htm

[34] https://reader.elsevier.com/reader/sd/pii/S1877042809001633?token=7CFBAC54B9A70230EDD02307EAB23C0CFCF17AA00B17556D87070C11957B729E4D5E703B2BE81841C92C4F7EE028747E&originRegion=eu-west-1&originCreation=20220904150106

sociology of knowledge production quantitatively and competitively or competitively at the operation level of sociology of knowledge is more important. In other words, to study the sociological structure and reasons 'why societies are success and fail to produce knowledge at a competent level.' MENA region is very far behind in quantity and quality of knowledge production even though they have failed to produce technological knowledge that is considered value natural and has no direct connection between ideology and political structure. During the cold war, the USSR competed with the liberal West in scientific and technological knowledge despite the opposite ideology and governance system. In the contemporary world, China is competing or even in some areas of knowledge, beating the West despite different ideology.

In sociology of knowledge production, main question is that, is there any structure, Condition and system of society that supports knowledge production quantitatively and qualitatively or its only matter of political and economic determination. In knowledge production, a political institution is only one aspect, religious institution, family, economic structure and conditions, basic infrastructure, gender, social class, urbanization, employment availability and many other social factors also play essential roles in knowledge production. According to experts methodologically, it is challenging to theorize the sociology of knowledge production because historical pattern of knowledge production is very contradictory (Gurukkal, Rjan,2019). There is a discontinuity in the historical process ok knowledge production geographically. In the past, civilizations and societies were pioneering, and the founder of many knowledge systems later became very backward in knowledge. Different ideological groups interpret the justification and structure of knowledge production differently. In Marxist ideas, historical materialism plays a fundamental role.

Marxists define society and knowledge through base and superstructure. Their basic argument is that the base controls the superstructure and who controls the base control the superstructure. Mode of production is in the base, while all human activity, including art, family, culture, religion, philosophy, education, law, and media, is part of the superstructure. Marx explained mode of production as "In the social production of their means of existence, men enter into definite, necessary relations which are independent of their will, productive relationships which correspond to a definite stage of development of their material productive forces. The aggregate of those productive relationships constitutes the economic structure of the society, the real basis on which a juridical and political superstructure arises and to which definite forms of social consciousness correspond. The mode of production of the material means of existence conditions the whole process of social, political, and intellectual life" (Marx. Karl,1883). According to Marxist theory material conditions control and shape the consciousness. Consciousness plays the most critical role in human decisions, including knowledge. Therefore, to control consciousness, control of the material condition is compulsory. While in liberal idea choice of an individual play foundational role, and state's role is to open, provide and protect the individual choice of knowledge.

The liberal idea also has transformed into a hybrid model of knowledge production as capitalistic state intervention is deep with individual choice simultaneously. Traditional and religious societies have different hybrid models and approaches as with people's choice and state requirements, they also prioritize defending the tradition and dominant religions' ideas. Therefore

the epistemological approach to every idea also plays an important role in the quantity and quality of knowledge production.

MENA societies are hybrid societies, and abstract parts of many social and political structures can be found. Civil wars are going on in some countries like Yemen, Syria, and Libya; therefore, there is no social and political order, and some warlords and dictators govern the regime. Monarchs govern the whole Middle East. Although there is no communist or socialist system, the major part of the mode of production is controlled by royals, and there is no participation of people in choice and liberty of knowledge production of the country. The validity of knowledge is an essential part of the process of knowledge production (Hamilton. Peter,1974). For a long, time, many western sciences were prohibited or suspected in traditional and religious societies. In the Islamic world, knowledge was divided into divine and worldly, and heavenly knowledge was conceptualized and introduced narrowly.

Many areas of social sciences and sciences were considered against religious belief, so they were not allowed or promoted; later, without any substantial alternative, these sciences are now slowly making progress in these societies. Because the creative minority (ruling class) had transformed into a powerful minority, they feared that new ideas could instigate anti-regime feelings, so they suppressed new ideas through religious class and questioned the validity and morality. There are many debates that in history with the same Islamic belief and Ideas, these MENA societies created tremendous knowledge and led the world in knowledge production qualitatively and quantitatively, but why have these same societies failed in modern times, and why have same religious beliefs and ideas are not helping or failed to produce knowledge? The weather change in the approach of religious beliefs and ideas, or social and political situations and conditions are changed?

A Survey of literature on knowledge production by Islamic societies suggests a change in religious ideas (not belief) which affect the attitude of Muslims toward knowledge. During the modern time, many religious rulings or Fatwas can be found which are against the seeking of scientific knowledge or but during the golden era of knowledge production or in the medieval period, the attitude of Muslims was different, and it directly impacted the quality and quantity of knowledge production. One of the most influential philosophers Muhammad Ibn Rushd, also known as Averroes, stated, "Anyone who studies anatomy will increase his faith in the omnipotence and oneness of God the Almighty,"[35] this shows the approaches and attitude of Muslim society toward the knowledge.

Vico (1668–1744 CE), an Italian historian and philosopher, discussed 'cultural traits' as resonance for knowledge production of any society, especially in the idea of knowledge or ideological aspect of knowledge. In cultural traits, he included thoughts, ideas, norms, myths, religious beliefs, rites, rituals, institutions, and actions of any society to produce knowledge as a cognitive product of the mind (Gurukkal, Rjan,2019). According to some experts, Auguste Comte and Karl Marx, funders of modern sociology, were influenced by Vico's ideas and thoughts. Critical theorists discuss a cultural base of society instead of an economic base. Therefore it is not only controlling the mode of production but controlling or influencing the cultural setting that is more important to control the different social processes, including politics.

[35] https://www.famousscientists.org/ibn-rushd/

However, because critical theorist accepts the basic notion of Marx's interpretation of history and reject religion therefor, all component of critical theory cannot interpret MENA perfectly, but it gives another dimension, ' social and culture,' as a condition in the sociology of knowledge.

Historically during the medieval period, MENA was enjoying power in political, social, and economic domains, and the west was on receiving end. However, the era of colonialism not only changed society internally and externally but also divided societies ideologically. It divided societies at a fundamental level; therefore, many discourses and interpretations emerged about life, society, and its purpose, and it impacted MENA's sociology of knowledge and knowledge production. During the colonial period, MENA societies rejected (or considered it against the Islamic belief) all new knowledge or modern knowledge without sufficient testing and measures. To defend their religion, tradition, and culture, they locked themselves in a nutshell instead launch knowledge offenses aggressively. Colonial sociology played a vital role in MENA's knowledge behavior qualitatively and quantitatively. Approach and attitude toward knowledge of any society and people institution relations are important factors to understanding the second dimension of sociology of knowledge production or sociology of knowledge production at the operation level.

What is the perfect social formation for knowledge production at the operation level? Furthermore, what is missing in MENA in that social formation? Many Leading and Marxist sociologists and sociologists of knowledge production, including Louis Althusser, Balibar, Barry Hindess, Paul Q. Hirst, Maurice Godelier, Nicos Poulantzas, argued that not only economic determination of a combination of three factors social, political, and intellectual is essential in knowledge production (Gurukkal, Rjan, 2019). Many theorists, especially liberals, criticized this approach and gave priority to individual choice, liberty, and market forces. Economy and politics are co-related and influence each other many countries in MENA politics are controlled by tribes' clans; therefore, economy and resources are controlled by large and influential tribes and clans. Sectarian division like Shiite and Sunni is also an essential part of MNEA social and political events.

In MENA base or mode of production is controlled by prominent and influential tribes and clans, and because these institutions have old and incompetent, therefore clash is everywhere in the region. Sometimes small and less powerful tribes face human rights problems and cannot get justice, so tribal and ethnic violence erupts. In the absence of proper justice and a legal system, outside powers involve and create the situation of conflicts and civil war. Many clashes and conflicts in MENA are actually power struggles between different tribes, clans, and ethnicities. In available data of global index of 'Rule of Law', MENA countries performed very low. Only UAE is in the top 40 countries with 37th rank globally[36] . Wealth inequality is not directly co-related with knowledge production in low- and medium-income countries, but it is crucial. In World Bank data, only UAE is in the top 10 lowest wealth inequality countries with a 26 Gini index value. According to the Gini index value, 0 shows perfect equality, while 100 shows perfect inequality. According to World Bank data MENA, performance is average with between 26 to 41.9 Gini Coefficients. US Gini coefficient value is 41.4, which is near the Turkish 41.9 Gini Coefficients[37]. Gini Coefficients of Maximum European countries that are top in knowledge

[36] https://worldjusticeproject.org/rule-of-law-index/global
[37] https://worldpopulationreview.com/country-rankings/wealth-inequality-by-country

production are near MENA countries. It indicates that state policy, funding, and other facilities are more important in knowledge production.

Political debate and the environment are crucial for knowledge production because it affects the policy and priority of any society. It also provides an alternative if any policy fails. MENA's political system is based on monarchs, military generals, tribal chiefs, and some influential individuals. Open and free public participation is poor. Only a few countries (like Türkiye) are open and liberal for political debate and discussion.

According to the Economist's democracy index survey (based on Electoral Process and pluralism, functioning of government, Political participation, Political Culture, and Civil liberties), all countries' performance is average or poor.

Some countries are good in the overall ranking and functioning of the government but very poor in Political culture and Civil liberties. Electoral process and pluralism is also essential indicator where the region's countries' performance is poor.[38]. Many indexes may be biased and unreliable, but MENA political system indicates poor participation of people in political processes and policy decisions. If western style democracy is not a choice or viable option, many other alternatives may be found to create an ecology and environment of people's political expression and participation. So it is not only an economic indicator that is the foundation or base of society, but political participation, social structure, and cohesion are also essential parts of the base for knowledge production. MENA region is fragile in social and political indicators, and its impact can be seen in knowledge production performance.

According to E. Terray (1935), the political and ideological superstructure is an essential part of social character or social formation. For intellectual growth, academic freedom, political neutrality, or support is a must. MENA is facing political insecurity and instability, so intellectuals' growth is affected, and many independent intellectuals fled from the region or are in jail[39].

Gurukkal Rjan (2019) discussed a unique idea of many uneven combinations of social formation and, consequently, several uneven sets of forces of production for each mode of production and, as a result, many knowledge scenarios. Every class structure has its idea and perception of knowledge requirement and production—any idea of knowledge and its production results from discourses of decades in relative society. The formation of any society results from many historical and contemporary social forces and many parallel social forces and processes still working simultaneously. The basic idea about things and world view about life, society, the world, and the universe play a vital role in social formation, knowledge requirement, and, subsequently, knowledge production. Contemporary MENA societies result from several uneven sets of forces of production from ancient Rome to medieval Islam and from colonial to modern Muslim society. Each historical process still exists and shapes MENA's societies in minor or major ways. In the lack of any social, political, and ideological consensus, societies are in a clash at different levels, and sometimes it reflects violence. Therefore, there is a need for consensus and unification on political, social, and ideological ideas in MENA.

[38] https://www.eiu.com/n/campaigns/democracy-index-2021/#mktoForm_anchor
[39] https://www.scholarsatrisk.org/academic-freedom-monitoring-project-index/

Social formation in Islamic society faith (Eman) is in base or structure, and it influences the superstructure and defines the consciousness of people. However, it did not control the whole mode of production but impacted it deeply. Discourse is an essential tool for shaping consciousness and opinion. Eman or faith and its dimensions and implications are also influenced and shaped by different discourses. The political, social, and economic situation also influence the discourse about faith and different component. During the total collapse of MENA society in the colonial period and the influence of modernity, religious discourse about knowledge was divided, and it is still divided; therefore, at least two knowledge and education systems existed, and both have contradictory claims and targets. This situation creates an environment against knowledge at various levels, from ideas to operations. So, there are four levels of MENA society at the idea of religion or faith level, which is divided at the operational level (fiqh), social order based on tribes and clans, so there is a clash and unending power struggle, politics is based on monarchs, military dictators, and powerful and corrupt individuals. At the economic level, it is poor or fragile. Division at all levels fails the society at the level of knowledge production and threating security at all levels. Relations between people and knowledge as an institution are not defined and clear in MENA society.

4.2 Progress and failure of Self-determination and knowledge production:

Arnold J. Toynbee (1889- 1975) discussed why society failed to produce knowledge in the form "what are the rules of civilizations development, collapse and disintegrate" in his magma opus "The Study of History." He tried to find symptoms of collapsed civilizations and reasons. Not creating competitive technology is the reason for the fall or collapse. After a lengthy analysis, he found that not progressing in knowledge and technology is not a reason for the collapse, but this is the result of a fall or collapse. Knowledge production and civilizational progress are not co-related. Toynbee examined, "There is no co-relation between technological advancement and progress of civilization. This is clear from all those examples where technology has progressed, but civilization has stagnated (Toynbee, 1889- 1975)". He argued that progress in self-determination is the main criterion of civilizational progress. "In other words, the criterion of growth is progress towards self-determination; and progress towards self-determination is a prosaic formula for describing the miracle by which Life enters into its Kingdom (Toynbee, 1889- 1975)", and self-determined society progresses in knowledge and technology.

It means if any society is failed to produce knowledge in high quantity and quality, it has fallen or is toward falling. So, investigating the reasons for the 'not producing knowledge is not beneficial directly' but finding the reasons or symptoms of the fall will be more helpful in understanding and solving the problem. So, it is crucial to find out the disease in that society which is failed to produce competent knowledge. Toynbee discussed in detail what are the main reasons and symptoms of collapse and later what the consequences are, including failing to produce knowledge and technology. For different reasons, he pointed out the main reason, "failure of self-determination," as its opposite, "progress in self-determination," was one of the main reasons for civilizational development. He argued that failure of self-determination is a cause of the fall of any society and later consequently failed to produce knowledge and technology. In light of this argument, it can be said if failure of self-determination can be

prevented or restoration of self-determination is possible, any society can be transformed into a knowledge community and society.

Philosophically, the progress of self-determination is a vast area of knowledge in the discussion. But here, background Toynbee indicates some points to measure 'progress in self-determination'. He pointed out that the development of new and sophisticated techniques and controlling human and geographical environment is not a criterion of progress though the progress of self-determination can be measured and described by a 'law of progressive simplification.'If any society is following that law may be labeled a self-determined society, or it can be said that self-determination is being progressed.

Through the 'law of progressive simplification', society tries to make Life simple and accessible in the physical and spiritual domains. Toynbee argued that the simplification of Life could not be described in a simple manner, but "Perhaps simplification is not quite an accurate, or at least not altogether an adequate, term for describing these changes. Simplification is a negative word and connotes omission and elimination, whereas what has happened in each of these cases is not a diminution but an enhancement of practical efficiency or of aesthetic satisfaction or of intellectual grasp. The result is not a loss but a gain; and this gain is the outcome of a process of simplification because the process liberates forces that have been imprisoned in a more material medium and thereby sets them free to work in a more etherial medium with a greater potency" and suggest "Perhaps we shall be describing the process in a more illuminating way if we call it, not simplification but etherialization" (Toynbee, 1889-1975). To make life simple in the physical and spiritual domain with its excellency, accuracy, competency, and energy is etherealization. The criterion of progress in self-determination is facing successful internal challenges, which are spiritual and moral.

Self-expression is another criterion. Toynbee also examined that any society faced many challenges back-to-back and emerged victorious and that victory expresses in self-articulation or self-determination "We conclude that a given series of successful responses to successive challenges is to be interpreted as a manifestation of growth if, as the series proceeds, the action tends to shift from the field of an external environment, physical or human, to the for interieur of the growing personality or civilization. In so far as this grows and continues to grow, it has to reckon less and less with challenges delivered by external forces and demanding responses on an outer battlefield, and more and more with challenges that are presented by itself to itself in an inner arena. Growth means that the growing personality or civilization tends to become its own environment and its own challenger and its own field of action. In other words, the criterion of growth is progress towards self-determination; and progress towards self-determination is a prosaic formula for describing the miracle by which Life enters into its Kingdom" (Toynbee, 1889- 1975). Finally, self-expression and self-articulation is a fundamental feature of a self-determined society.

Vice versa, If any society is failing or declining, it means it has failed to face some challenges, mainly internal challenges that evolved after facing some challenges successfully. Internal challenges are mainly moral and spiritual "*there is no doubt that it is a moral challenge rather than a physical challenge that confronts our own society to-day*" **(**Toynbee, 1889- 1975).

In inverse, 'loss of self-determination is the ultimate criterion of breakdown; and it is a conclusion which should not surprise us. The question is, what are the main reasons a progressive society fails, loses its self-determination, and takes the risk of failure and collapse?

Many symptoms can be observed in a society that is facing the failure of 'self-determination. ‘If society has not any unique worldview and purpose in life other than its rival or enemy is prone to fall. This society has become a shadow of other cultures and lifestyles; therefore, has lost its originality and, as a result, will assimilate into others. This character of society manifests in the 'failure of self-determination' Another.' indicator is that if society is involved in worshiping blind technology or has lost the human touch, it also faces the danger of fall. Moral and spiritual downfall makes society dependent on only physical resources of life in the longer term; this becomes the cause of failure of self-determination.

If the Political leadership of society which is called the creative minority, has turned into a powerful minority and rules by power, dictation, and authority, create a situation of the separation between leaders and people and this situation become the cause of failure of self-determination and self-articulations. "Secession of the led from the leaders may be regarded as a loss of harmony between the parts which make up the whole ensemble of the society. In any whole consisting of parts, a loss of harmony between the parts is paid for by the whole in a corresponding loss of self-determination. This loss of self-determination is the ultimate criterion of breakdown; and it is a conclusion which should not surprise us, seeing that it is the inverse of the conclusion, reached in an earlier part of this Study, that progress towards self-determination is the criterion of growth" (Toynbee, 1889- 1975). A society that is governed by mechanical discipline rather than self and internal motivation is also likely to lose its ability of self-determination. Society creates many institutions like Parliament, kingship, and university to face the challenges. However, meanwhile, these institutions lost their relevance and failed to face the new challenges and accommodate the new social condition and aspirations of people, consequently creating the risk of failure of self-articulation in many ways.

4.3 Status of Progress and Failure of Self-determination and Knowledge Security of MENA

In light of the above discussion, there is a need to examine the current status of 'self-determination in the MENA region. The data on knowledge production (from tables 1-41) indicates a lower level of self-determination and self-articulation. The separation between political leaders (creative minority) and people is an important symbol to measure self-determination and self-articulation. To study the current political system, style and status can give a clue to the relationship between people and political leaders, whether they are creative minority or have transformed into powerful minority (ruled by other means). Rule-based and Free and fair participation of people in the political process indicates people's self-determination and self-articulation. If the political process is not rule-based and does not run according to people's choices, it means society is failing to protect its self-determination, and it will negatively impact its ability to produce knowledge qualitatively and quantitatively. There are many variables to judge the political process and its liberty. Regime type, governance system, and performance indicate the people's choice and trust. Political history also shows an internal and external level of political liberty, self-expression, and society's determination.

Table: 43- Regime System and Governance Performances of MENA Region

Country	Govt. System	Military Coups and Attempts Since Independence (Years)	Voice And Accountability 1996-2020	Political Stability and Absence of Terrorism 1996-2020	Government Effectiveness1996-2020	Regulatory Quality	Rule Of Law 1996-2020	Control On Corruption 1996-2020	Corruption Index Rank	Hunger Index Out Of 116 In 2021	Press Freedom
Morocco	CM	1971,72	36.50-30.43	39.89-35.38	55.19-52.88	51.63-48.56	59.30-50.96	53.23-42.79	86	43rd	136
Algeria	PrD	1961, 65, 92	14.50-18.36	5.23-17.45	13.11-33.36	20.11-9.13	12.56-21.63	33.33-28.37	104	31st	146
Tunisia	PR	1987	31.00-57.00	55.32-24.6	62.84-43.75	60-87-39.42	41.21-58.17	35.48-52.40	69	22nd	73rd
Libya	TG	1969,2013, 14 (civil war)	09.50-11.59	18.62-02.36	20.77-01.92	3.80-0.96	14.57-01.44	20.43-02.88	173	NA	165
Egypt	PrD/ MD	1952, 53, 2014	22.00-07.73	27.66-11.32	36.07-32.21	53.26-25.48	51.76-39.90	38.71-22.60	117	56	166
Sudan	TG	1958, 69,71, 77, 85,89.90, 2004, 12, 19, 21	02.50-09.66	1.06-05.66	15.58-05.77	08.70-04.33	02.01-12.98	06.99-06.73	174	95	159
Lebanon	PD	1958	39.00-32.85	23.40-08.02	51.37-11.54	34.78-28.85	42.21-19.23	31.18-12.02	149	48	107
Palestine	PrD	---	NA	NA	NA	NA	NA	NA	NA	NA	NA
Israel	PrD	----	60.00-60.60	12.77-18.40	75.96-83.17	83.15-87.02	88.44-82.21	88.17-70.67	35	NA	86
Jordan	PCM	1957	42.00-27.54	46.81-35.81	56.83-57.21	55.43-60.10	60.80-59.13	55.38-59.62	60	38	129
Syria	PrD/ DT	1949,54,61, 63,66	11.00-01.45	34.57-00.00	21.86-02.88	14.67-03.37	33.17-0.96	19.89-0.48	178	ND But after 115	173
Iraq	PD	1936, 41,63,66	00.00-20.77	04.79-01.42	00.55-09.62	01.09-08.65	05.03-03.85	00.54-09.13	10	86	163
Iran	PrD/ CT	1953	19.50-08.21	36.17-07.55	32.79-14.90	07.07-06.73	19.60-20.19	37.63-14.42	149	35	174
Kuwait	CM	----	41.50-29.95	52.66-54.72	59.02-45.67	64.13-62.50	67.34-63.46	70.43-53.85	78	1-18	105
Saudi Arabia	CM	---	9.00-05.31	40.96-22.64	49.18-58.65	41.30-61.54	56.28-60.10	51.08-62.98	52nd	35	170
Qatar	CM	---	26.50-14.01-	57.98-68.40	70.49-78.37	61.96-71.96	49.29-82.69	54.84-77.88	30	NA	128
Bahrain	CM	--	25.50-09.18	36.70-25.47	77.05-68.27	74.46-73.08	50.75-67.31	63.98-53.37	78	NA	168
UAE	CM	--	37.00-16.43	78.19-66.04	77.05-87.98	71.74-82.69	68.84-79.33	57.53-83.17	21	NA	131
Oman	CM	----	26.00-16.91	75.00-57.55	65.57-58.17	58.70-66.83	66.33-71.63	67.74-62.02	49	55	133
Yemen	CW	1948,55, 1962,74, 2015, 18	27.50-04.35	9.57-00.94-	31.69-00.48	32.07-03.85	9.05-03.37	27.42-01.92	176	115	169
Türkiye	PrD	1960,62, 63,69,71,80 , 2016	45.50-23.67	10.64-11.79	55.74-52.40	59.24-51.92	47.24-40.38	51.61-44.23	86	1-18	153
Mauritania	PrD	1978,79.80, 81,84,2003, 05,08	33.50-24.64	59.04-19.81	53.01-21.15	35.87-20.67	35.68-03.29	34.41-23.08	140	85	94

Source: Source: http://info.worldbank.org/governance/wgi/Home/Reports
For hunger Index: https://www.globalhungerindex.org/ranking.html
For corruption index: https://www.transparency.org/en/cpi/2020

Constitutional monarchy, CM; Presidential democracy, PrD; Parliamentary republic, PR; Transitional government, TG; Military dictatorship, MD; Parliamentary democracy, PD; Parliamentary constitutional monarchy, PCM; Dictatorship, DT; Constitutional Theocracy, CT; Civil war, CW

Since the state's formation and independence, the whole region has been facing enormous political and social violence, military coups, dictatorial monarchs, and a theocratic political and governance system. The region is divided into two parts, North Africa and the Middle East, and both regions have different political systems and histories, but in both, people's participation is denied or not ideal. Only Türkiye can be called an open democracy. Historically and current political system is textbook evidence of powerful minorities and separated proletariats. North Africa is suffering huge political violence40 While an absolute monarch governs the Middle East, and in both regions, political self-determination is highly affected.

Mauritania is a small country with a population of five million and huge natural resource reserves and has faced eight military coups and attempts since its independence in 1960. Every country in the region has faced military coups or is ruled by monarchs. People cannot set political agendas in both political situations, including education policy. This political situation affects the performance of the government very negatively. Many indicators of good governance show the poor situation of the MENA region (Table: 43). Voice and accountability are essential indicators of good governance, and people participation is meager and declined in the compression of 1996. Political stability is relatively high in some Middle Eastern countries, but it is highly affected in North Africa Region. According to World Bank data, 'Rule of Law' is also very average, and in some countries, it is declining in compression of 1996.

Corruption restricts people's choices, and participation in democracy is relatively low and directly related to the poor rule of law. In some Middle Eastern counties, corruption is relatively controlled, but in North Africa is high, and as the political and economic situation is not ideal, it is increasing. The hunger level of any society decides the choice of people. Data of some Middle Eastern countries are not available, but in available data, the situation is poor in the hunger index. Press freedom is a symbol of people and social freedom and reflects on society and regime relations. The current press freedom situation indicates that social voices are suppressed, and there is a huge drift between people and the regime. This situation of regime system and governance performances of MENA Region specifies that social self-determination is toward failure.

In the absence of a creative minority and people's self-expression, society discipline will be mechanical, not self-motivated; therefore, people's choice of knowledge production will be controlled. In the giving data of knowledge production (Table: 6), Iran's performance is very well, and in some areas, it is on top, but in performance in 'Art and Humanities,' Iran is far behind in compression of Israel and Türkiye because Türkiye and Israel are more open socially and politically. The same situation is with Saudi Arabia and Egypt, in some subjects, particularly science, both countries performed well but in 'Art and Humanities' they are also far behind. Some countries perform well in science-related subjects because the government gives priority and invests huge money. However, in social science and humanities, people are not interested because social science and humanity need a politically and socially liberal environment to criticize government and society. The poor performance in art and humanities indicate low level of self-determination and articulation and drift and separation between people and ruling class (political leaders who have transformed from creative minority to powerful minority).

[40] https://www.oecd.org/about/secretary-general/the-evolution-of-violence-across-north-and-west-africa-february-2020.htm

The cultural aspect of society is also essential to measuring self-determination if any society that follows another culture or culture of a rival has a low level of self-determination. Because it makes a society shadow another and shows that it can never be self-determined, like Russia and China, both countries are following western culture in their political and social life; therefore, sooner or later, they will be defeated in the civilizational arena. Only powerful political minority is resisting, which will fail to protect their people's and society's self-determination. Even their political opposition in their county is not so unique and original, which can clearly differentiate in social, political, and economic life at institutional level. Cultural diversity data of MENA is not available; therefore, it cannot be proved what the status of the cultural situation of the region is. However, the region is predominantly Muslim populated, and a majority of the population follows Muslim culture with some local and western combinations. Many political parties which focus on Islamic principles are also active and influential especially in North Africa. Türkiye and Iraq are resisting western influence very effectively, but because of weakness in other variables and some historical reasons not successful so much but provide an alternative paradigm. Because of its independence in the cultural domain, the MENA region is showing some self-determination, and its impact can be observed in knowledge production at various levels.

The clash between old institutions and new political, social, and economic conditions is also one of the reasons for the failure of self-determination. This clash is very wide and visible in the current political and social scenario. The maximum government, dictatorial or monarch, and even open democracies are failing because the western type of democracy is also a medieval institution, so it fails to address new social and political aspirations. Most of the MENA population is followers of Islam, and there is always mistrust between Western styles of democracy. In the modern period, when democracy has already been an old institution and because of monarchies and dictators, people try to find a solution in western democracy. Still, they fail because of the incompatibility of democracy to accommodate MENA's people's political, social, and religious ambitions. This clash is becoming the reason for the failure of self-determination.

Conclusion:

There are many debates on definition and components of security. According to experts of security is still underdeveloped idea. Military security, economic security, societal security, and environmental security are the main components of national and regional security. However, knowledge security is foundation of all types of security; it is directly related to all. If any country fails to produced enough knowledge that can make him independent in all components of security is prone to fall or parasite in security affairs. MENA is vast region with a predominantly Muslim population and culture and is currently and historically engaged with Europe very profoundly.

MENA is currently facing acute security and stability crises in all security domains. Many countries are facing foreign invasion and internal political and social collapse. The situation of failing and falling is because it is weak in fundamental or core security, "knowledge security". Knowledge security comes from the quality and quantity of knowledge production, and the MENA region's performance is abysmal. In terms of university ranking, production in 27 major

subjects, intellectual property and innovation, and knowledge index, it is not only feeble but very far behind its former colonial master, main competitor, and invader 'Europe.'

Usually, there is an assumption that poverty is the cause of poor education, but it is the opposite; poor education is a cause of poverty and corruption, and poor governance is the leading cause of poor education. Some states of MENA are inferior but have enormous natural resources, like Sudan and Mauritania, and some are very rich, like UAE, Saudi Arabia, and Qatar, but all failed to produce world-class universities. There is no single university in the region in the rank of 1-100, and there are only two universities up to the rank of 300. MENA's performance in the Global Knowledge Index, knowledge production in 27 main subjects, and intellectual property and innovation show that MENA is very far behind in knowledge production and therefore facing a knowledge security crisis and is dependent on all types of security, including military, societal and economic. Bad governance, corruption, violence, and many other factors play a role in knowledge insecurity, but these are the result of Failure and not the cause.

In historical analysis, Arnold Toynbee argued that if any civilization and society is failed to produce knowledge and technology, it is because that civilization and society have collapsed toward collapse and failing. The fall is the result of collapse, not the reason. This fall comes because of 'Failure of self Determination.' Poor Self-determination is the result of genuine or creative political leadership which is called 'creative minority' converted into a powerful minority or authoritarian leadership, political, social institute failed to address or fulfill people's socials and political aspirations, and there is a cultural confusion and clash of superiority and inferiority in people. All these indicators are visible in MENA at different levels. In philosophical analysis, Failure of self-determination is the main reason for knowledge insecurity of MENA.

In sociological analysis with a functional approach and with inductive reasoning, all parts of society and state are not in harmony and coherence; therefore, society is divided and directionless, and these all become the reasons for different social, economic, and political crises and society is fail at knowledge production level. In symbolic interaction analysis, language, symbols used in daily life interaction, and the meaning of different things and life are essential to shaping everything, including knowledge. MENA's performance in different subjects specifies that knowledge is not essential part of institutions and people's language and symbols of interactions and meaning of life and many other things. Knowledge is not on priority and the center of interaction and meaning, so MENA society is insecure at the knowledge production level in all domains.

The Marxist approach is based on base and superstructure, and knowledge production with its quantity, quality, value, and meaning depend on base. The base is controlled by those who control the mode of production. MENA's mode of production is controlled by the authoritative political and elite class; therefore, they decide on knowledge production. Because of corruption and other political and social reasons, it is not their priority, so the region is facing knowledge insecurity. Critical analyses indicate that intellectuals and cultural practices are not enough to support knowledge production. In religious practice, knowledge is divided into worldly and divine, and there is an ambiguity in the behavior of religious leaders and people about modern knowledge. This situation slows knowledge production and affects knowledge security.

There is a clash and unending power struggle, politics is based on monarchs, military dictators, and powerful and corrupt individuals. At the economic level, it is poor or fragile. Division at all levels fails the society at the level of knowledge production and threating security at all levels. Relations between people and knowledge as an institution are not defined and clear in MENA society consequently knowledge security at great risk in MENA region. And, because knowledge insecurity, region is suffering or prone to great failure at all other domain of security.

There is a need to restore the 'self-determination' of people and society at all level including social, political, and religious. To stop the division of society, there is a dire need for harmony and coherence in all parts of society. Knowledge should be part of daily life's discourse, language, and symbols. Meaning of life and other social values should be attached to knowledge centrality. All intellectual traditions, including religion, should focus on knowledge unification and end knowledge's duality.

At the regional level, there is a need for collective initiatives because any single country cannot assure or enhance the knowledge security of the region, even itself because they depend on foreign support. Therefore, cooperation may be designed at governmental and non-governmental levels with the existing institution, and many other new institutions may be launched.

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