

## A Digital Survey of Development in the Muslim World as in 2019

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### ABSTRACT

*A lot of research these days is going on the development of Muslims today in different academic institutions throughout the World. Many theses, books and research paper are being published but this article seeks to analyze the current developmental conditions of Muslims in a unique way. A digital comparative study has been commenced, especially of Muslims Majority Countries (MMCs) in comparison to some developed nations of the world in the fields of demographics, education, technology, economy, infrastructure and sports etc. The study will be helpful to figure out the current developmental status of the Muslim World today. World's 57.9% of children out of school (primary) are residing in only 19 MMCs. The children out of school in USA are 1,800,414 whereas in Pakistan they are 5,370,428 approximately three times of USA. Though, the population of USA is 1.6 times larger than of Pakistan.*

**Field of Research:** Muslim World, Education, Economy, Patents, Demographics

### 1. Introduction

The total world population is 7.068 billion according to United States Census Bureau (USCB) and to CIA World Fact Book (CIAWFB) 7,256,490,011<sup>1</sup> out of which Christian 31.4%, Muslim 23.2%, Hindu 15%, Buddhist 7.1%, Sikh 0.35%, Jewish 0.2%, Baha'i 0.11%, other religions 10.95%, non-religious 9.66%, atheists 2.01%.<sup>2</sup>

According to CIAWFB, the total population of Muslims in the World is 1.8 billion which is distributed unevenly in different countries of the World. Another study conducted by *Pew Research Center* released in January 2011 found that there are 1.8 billion Muslims around the World.<sup>3</sup> Around 74% Muslims are living in around fifty four countries as majorities, and 23% living as minorities in other developing countries and 3% living in developed regions like North America, Australia, Europe, New Zealand and Japan.<sup>4</sup> More than 60% of Muslim population is living in South and Southeast Asia and around 20% living in Middle East and rest in other

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parts of the world.<sup>5</sup> Among top ten countries, Indonesia has the largest Muslim population followed by Pakistan, India, Bangladesh, Egypt, Nigeria, Iran, Turkey, Algeria and Morocco respectively. If we compare the Muslim population with the Jewish one, that is 1.65 billion to 14 million then the ratio of Jews: Muslims will be 1:117 or the Muslim population is 117 times greater than of Jews or against every single Jew there are 117 Muslims. For every single Hindu there are two Muslims. For every Buddhist there are two Muslims etc.<sup>6</sup> Overall 74% of Muslim population lives as Majorities in MMCs and 26% living as minorities in other countries.<sup>7</sup>

Out of these 54 in 51 countries live in ‘Absolute Majority’ means they constitute more than 51% of population while in three countries they are the Muslims largest religious group but have 50 or less than 50% of population<sup>8</sup> these are considered as simply ‘Majority’. These three countries are Guinea Bissau, Cote D'ivoire and Tanzania. 53% of Muslim population is residing only in 6 countries namely Indonesia, Pakistan, India, Bangladesh, Nigeria and Turkey.<sup>9</sup>

These 54 countries cover 19.1% of land excluding oceans while China, USA and European Union cover 6.5%, 6.4% and 2.9% of land excluding oceans respectively. Kazakhstan has the largest land area and Indonesia have the largest Muslim population in the Muslim World.

**Table 1: Religion by number of Adherents and % of Land ruling over**

Religion	Adherents	% of land ruling over
Christianity	2.4 billion	58.68
Islam	1.8 billion	20.3
Secular/Nonreligious/Agnostic/Atheist	1.2 billion	-
Hinduism	1.15 billion	2.3
Chinese traditional religion	394 million	6.5
Buddhism	521 million	2.47
Judaism	14.5 million	0.013

Source: en.wikipedia.org<sup>10</sup>

**Table 2: Majority and Minority Ratio of Muslim Population in Numbers, 2019.**

As majority 74%	1,400,856,486
As minority 26%	492,192,819
Total Muslims	1,893,049,306

Source: www.cia.gov<sup>11</sup>

## 2. Education

Education plays a crucial role in all-round development of a nation or community. It puts the foundation of industrial and economic development. But the educational conditions of Muslims in the whole world are upsetting.

The definition of literacy is 'at the age 15 and over can read and write'. The average literacy of the world according to CIAWFB is 84.1%. In Males 88.6% are literate and in Females 79.7%.

Almost three-quarters of the world's 775 million illiterate adults are found in only ten countries (in descending order: India, China, Pakistan, Bangladesh, Nigeria, Ethiopia, Egypt, Brazil, Indonesia, and the Democratic Republic of the Congo); of all the illiterate adults in the world, It should be noted that out of these ten, six are MMCs and one is India which is the second largest Muslim populated country in the World. In which two-thirds are women; extremely low literacy rates are concentrated in South and West Asia and Sub-Saharan Africa. Similarly if we see other indicators such as in Pakistan 23 daily newspapers per 1000 citizens while in Singapore 460 per 1000 citizens.<sup>12</sup> In UK book titles per million is 2000 in Egypt book titles per million is only 17.<sup>13</sup>

The literacy rate of MMCs ranges between 28-90 %. Indonesia has the highest literacy- total: 90, male 94 female 86 whereas Nigeria has the lowest- total 28, male 42 and female 15. In addition 6 countries have less than 70% in total literacy. In total, Muslim world has the lowest rates of adult literacy correspond to the highest population growth rate in comparison to other religious groups.<sup>14</sup> The average literacy rate of the whole Muslim world is 72.5 % which is far below the world average that is 84.1%. The female literacy rate of the Muslim world is 66.8% while the World female literacy is 79%.<sup>15</sup> More than half of Muslims in the World means

53% of Muslim population has on an average 48% literacy, in which 58% males and 37% females.

World's 57.9% of children out of school (primary) are residing in only 19 MMCs. The children out of school in USA are 1,800,414 whereas in Pakistan they are 5,370,428 approximately three times of USA. Though, the population of USA is 1.6 times larger than of Pakistan.<sup>16</sup> In all of the MMCs the rate of female literacy is very low in comparison to males. While the literacy rate in USA is 99% in total as well as same in males and females.

The total numbers of Higher Education Institutions in 54 MMCs are 2621 while USA alone has 6500 (including 4200 colleges and universities and 2300 institutions that award vocational certificates), Brazil 1872, Philippines 1872 universities etc.

### 3. Libraries

As far as the size and number of libraries is concerned. National Library of Malaysia is probably the biggest library in the Muslim World, having more than 4.78 million units books and other printed materials of which 4.52 million are printed materials, 98,406 non-printed materials, 4,974 Malay Manuscript and 158,316 digital materials. Followed by King Saud University Library of KSA contains 1.1 million<sup>17</sup> volumes; Taksim Atatürk Library of Istanbul is the biggest library of Turkey, having more than 600,000 volumes<sup>18</sup> followed by Istanbul Technical University Library contains more than 500000 volumes.<sup>19</sup> The biggest library of Pakistan is Punjab University library which have more than 500,000 volumes<sup>20</sup> and National Library of Pakistan have 261,704 volumes<sup>21</sup> including Books, periodicals, magazines, manuscripts, microfiche etc.

Whereas, the largest library of the World is the Library of Congress of USA which has more than 38 million (38,000,000) books and other printed materials, 3.6 million recordings, 14 million photographs, 5.5 million maps, 8.1 million pieces of sheet music and 70 million manuscripts, 5,711 incunabula, and 122,810,430 items in the nonclassified (special) collections, more than 167,000,000 total items<sup>22</sup> followed by National Library of China 28980777 volumes, National Library Canada 26006054, Deutsche Bibliothek Germany 24487010, Boston Public Library 19090261, Russian State Library 17000000, Harvard University Library 16832952, New York Public Library 16342365, British Library 15500000 and National Diet library Japan 14304139 volumes.

- The sum total of all libraries located in MMCs is 251,342 whereas India alone has largest number of libraries in the world that are 337,016 followed by China, USA, Germany having 109673, 103539, 11418 numbers of libraries respectively.
- MMCs collectively have 75,578,894 library users whereas USA alone has 230,270,733 users followed by followed by UK, China, France having 38,432469, 15160109, 11870122 users respectively.
- The libraries of all MMCS collectively possess 576,669,201 volumes while Germany has the largest number of volumes in its libraries that are 3,765,041,717 followed by USA and China having 2,575,570,384 and 1,063,356,687 volumes respectively.<sup>23</sup>
- The total amount of expenditure made by all MMCs collectively on Libraries is \$ 932,139,672 whereas the expenditure of USA alone on the same is \$ 21,384,216,330 followed by UK, Germany and France that is \$ 4585212280, \$ 2791915929, \$ 1857796885 respectively.
- If we compare the strength of volumes of largest library of the Muslim World that is National Library of Malaysia (NLM) that has around 1,300,000 volumes with the Library of Congress (LoC) which have around 30,000,000 volumes. The NLM have 4.3% volumes of what LoC have or 23 NLMs could be made out of LoC.

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- The whole Muslim World have 1479 museums whereas USA have 14611 followed by Germany, France, U.K. which have 6377, 4829, 2881 museums respectively.<sup>24</sup>

Similarly 363 publishers are based in the whole Muslim World whereas USA have 4344 publishers followed by Germany, U.K., France, which have 1661, 1049, 608 publishers respectively.<sup>25</sup>

#### 4. Medical Schools

In MMCs Pakistan has the largest number of Medical Schools that are 90, followed by Bangladesh Iran Turkey and Indonesia having 62, 56, 51, 54 schools

respectively. Whereas, India has largest number of Medical Schools that are 273 followed by China, USA and Japan having 179, 172 and 83 schools respectively.<sup>26</sup>

### 5. Books translated

During the period 1980-85 per year 920 were translated into Spanish and 519 into Hungarian but during the same period only 4.4 books were translated per year into Arabic.<sup>27</sup>

### 6. Noble Prize Winning

As far as the winning of noble price is concerned, in the past 105 years, 14 million Jews won 206 Nobel prizes whilst 1.8 billion Muslims won only 12 Nobel prizes. While Jews were not allowed to go to university in Britain until 1826<sup>28</sup> and there was strict quota for Jews in Harvard University until Second World War.

### 7. Technology

#### Mobile makers

In technology at first we took mobile makers by country. Only six MMCs have mobile makers, one each. While South Korea has 4 and Taiwan have 8.<sup>29</sup>

#### Robotics

Robotics is a cutting edge technological field in which most of the developed countries making great attention and making ground breaking achievements. Humanoids are most advance type of robots but Turkey, Malaysia and Pakistan are only three MMCs which is developing Humanoids or other robots. All MMCs collectively developed 7 robots till today whereas USA developed 85 robots including Humanoids.<sup>30</sup>

#### Supercomputing

According to top 500 ranking list of June 2019 Top 500 supercomputers list, IBM Summit of Oak Ridge, U.S. is the fastest super computer in the World, having a speed of 148,600 Teraflops/second (quadrillions of calculations per second) followed by Sunway TaihuLight of Wuxi, China having a speed of 93014.6 Teraaflops.<sup>31</sup> But the first supercomputer of any MMC in the list is Makman-3 of Saudi Arabia which is on 103<sup>rd</sup> rank having a speed of 2322.5 Teraflops/second followed by Makman-2 on 108<sup>th</sup>. There are only two Supercomputers from MMCs in the list whereas China has 219 super computers in the list followed by USA 116, Japan 29, France 19, UK 18, Germany 14, Ireland 13, Canada 8 and rest of the World 149.<sup>32</sup> **Note:** The speed of the Supercomputers is given in Rmax unit.

### **Nanotechnology**

Nanotechnology is another emerging science use to study the manipulation of matter on an atomic, molecular, and super-molecular scale. One nanometer (nm) is one billionth, or  $10^{-9}$ , of a meter.<sup>33</sup> But the Muslim World has very little number of Nanotechnology Research Universities in comparison to others. There are only 17 universities in the whole Muslim World which offer research in nanotechnology while USA has 573 universities followed by U.K and Germany having 132 and 94 universities respectively, offering nanotechnology.<sup>34</sup>

### **Number of aircrafts**

According to globalfirepower.com 2019 fire-power index, in the Muslim World, Pakistan has the largest number of aircraft fleet that has 1,342 aircrafts followed by Egypt 1,092, Turkey 1,067, Saudi Arabia 848, UAE 541 and Iran 509. The whole Muslim world has 11,019 aircrafts collectively which were 9185 in 2015 while USA has 13,398 aircrafts.<sup>35</sup>

### **Aircrafts Engine Manufacturing**

Aviation is an important means of fast transportation today. For several purposes Aircrafts are used for transportation to farther destinations in a little time. In wars also the roll of Fighter Aircrafts is very important. All Leading Countries of the World have their own Aircraft Engine Manufacturing Industries and Aircraft Assembling Units. But among MMCs there are few countries having their own aircraft assembling units but till today no MMC having its own Aircraft Engine Manufacturing Company except Iran. All MMCs are dependent on other countries for purchasing Aircraft Engines even for their repairing and overhauling. Turkey and Egypt are two countries which have one or two aircraft repairing and overhauling units, but do not have Aircraft Engine Making Capability, whereas USA has 58 Aircraft Engine Makers followed by UK, Germany, France, Italy, Japan having 27, 18, 15, 11, 10 respectively.<sup>36</sup> It is quite interesting that on 17 December 1903, Wright Brothers of USA made first successful experiment of their flying machine which was the foundation of modern aircrafts after wards aircraft used extensively in World Wars as well as it is also the fastest mode of transportation and travel. Later in 2004 USA started using drone for war purpose in Pakistan, therefore it is said that the age of fighter planes is over and the age of drones started. The age of fighter planes came and gone but still after 101 years no MMCs developed its own Aircraft Engine Making Capability. Although, Iran developed some models of aircraft engines but they are of very basic type and not

sufficient for modern day needs therefore Iran still purchase aircraft engines from outside.

### **Aircraft Carriers**

There are 16 countries in the world having Aircraft Carriers but unfortunately there is no MMC among them. The countries which have their own aircraft carriers are USA, United Kingdom, Japan, France, Russia, Spain, Australia, Canada, Italy, India, Brazil, Argentina, China, Netherlands, Germany, Thailand.

### **Unmanned combat aerial vehicle**

Till today as of July 2019, only 7 MMCs have Unmanned Combat Aerial Vehicles namely Turkey, Pakistan, Azerbaijan, Egypt, Iran, Saudi Arabia, United Arab Emirates.

## **8. Military Strength**

Military strength play key role in international politics. In the table below Military strength of some Muslim countries is given then the total military strength of all MMCs is given and compared with the military strengths of other developed countries.

**Table 3: Military Strength in Numbers by June 2019 (.est)**

	<b>Active Military (est.)</b>	<b>Total Military personnel (est.)</b>	<b>Fit for service (est.)</b>
Pakistan	654,000	1,204,000	76,111,979
Iran	523,000	873,000	39,842,164
Egypt	440,000	920,000	36,075,104
Indonesia	400,000	800,000	108,620,545
Turkey	355,000	735,000	35,151,882
Rest 44 MMCs	2,363,000	-	-
<b>Total</b>	<b>4,735,000</b>	<b>8,023,750</b>	<b>603,740,994</b>
USA	1,281,900	2,141,900	119,664,970

Russia	1,013,628	3,586,128	46,658,907
China	2,183,000	2,693,000	621,105,706
India	1,362,500	3,462,500	494,249,390
France	205,000	388,635	23,818,487

**Source:** <https://www.globalfirepower.com/countries-listing.asp>

### 9. Observatories

Observatories are important tools in observing outer space and other heavenly bodies and helpful in continuing research in Astronomy which is a crucial field of research in the modern world. Muslims were the first who made observatories when they are unknown to the rest of the World. The first observatory was made under the patronage of AL-Mamun afterwards many observatories in different parts of Islamic World like In the 10th century, the Buwayhid dynasty encouraged the undertaking of extensive works in astronomy, such as the construction of a large-scale instrument with which observations were made in the year 950.<sup>37</sup> We know of this by recordings made in the zij of astronomers such as Ibn al-Alam. The great astronomer Abd Al-Rahman Al Sufi was patronised by prince Adud-odowleh, who systematically revised Ptolemy's catalogue of stars. Sharaf al-Daula also established a similar observatory in Baghdad. And reports by IbnYunus and al-Zarqall in Toledo and Cordoba indicate the use of sophisticated instruments for their time. It was Malik Shah I who established the first large observatory, probably in Isfahan. It was here where Omar Khayyám with many other collaborators constructed a zij and formulated the Persian Solar Calendar a.k.a. the jalali calendar. A modern version of this calendar is still in official use in Iran today. The most influential observatory was however founded by Hulegu Khan during the 13th century. Here, Nasir al-Din al-Tusi supervised its technical construction at Maragha.<sup>38</sup> The facility contained resting quarters for Hulagu Khan, as well as a library and mosque. Some of the top astronomers of the day gathered there, and from their collaboration resulted important modifications to the Ptolemaic system over a period of 50 years. In 1420, Prince Ulugh Beg, himself an astronomer and mathematician founded another large observatory in Samarkand, the remains of which were excavated in 1908 by a Russian team. And finally, Taqi al-Din Muhammad ibnMa'ruf founded a large observatory in Istanbul in 1577, which was on the same scale as those in Maragha and Samarkand.<sup>39</sup> The observatory was

short-lived however, as opponents of the observatory and prognostication from the heavens prevailed and the observatory was destroyed in 1580 (John Morris, 1976).<sup>40</sup>

Now a days astronomical observatories are mainly divided into four categories: space based, airborne, ground based and underground based. There are only 20 ground based observatories in the whole Muslim World whereas New York City alone has the same number of observatories. In total USA has 336 observatories and U.K has 35 etc.

There are several types of telescopes among them 11 types of telescopes are popular namely, Space observatory, Gravitational-wave detector, Resonant bars, Antimatter observatory, Airborne observatory, Radio observatory, Microwave observatory, Solar observatory, Neutrino detector, Cosmic-ray observatory and Ground-based observatory. Among these observatories ground based observatories are very common and relatively affordable. It is found that only seven MMCs have ground based observatories. MMCs have no other type of observatory at all, except Kazakhstan which has a Cosmic-ray observatory<sup>41</sup> but most probably it is the property of Russian Space Agency. In modern times space telescopes are most important tools to observe space clearly but no MMC have a space telescope yet. The countries which have space telescopes of their own are, USA, European Union, China, Japan, UK, Germany, France, Russia, Italy, Canada, India, South Korea and Netherlands.

#### 10. Space orbital launch systems

A space orbital launch system is also a very important indicator of country's technological advancement. All developed countries have their own space orbital launch systems but in MMCs only Iran has its own space orbital launch system. See the table below.

**Table 4: Number of space orbital launch systems (carrier rocket) by Country**

Country	Working	Retired	Proposed
Iran	2	-	-
Indonesia	-	-	2
Saudi Arabia	-	-	-

Turkey	-	-	-
Pakistan	-	-	-
USA	11	81	5

### Number of satellites by country

The Muslim World have 75 satellites in total whereas USA have 1238 satellites and China, Japan, France, India and Israel have 157, 131, 60, 57 and 12 satellites respectively.<sup>42</sup> In total there are 3905 satellites in the whole World. So, in terms of number of satellites, whole Muslim World has 1.9% of satellites out of the World.

### 11. Economy

Economy is the criteria of power in the modern World instead of military and weapons and it is also a major resource for technological advancement especially in space science because many times modern technology requires huge financial expenditure for example the cost of a space trip \$1.5 billion approximately<sup>43</sup> more than the GDP of 19 MMCs individually in 2014. Currently NASA is paying Russia more than \$60 million per seat to send astronauts into space (Jeremy Hsu, 2015).<sup>44</sup> It is estimated that by the end of 2010, NASA had spent more than \$192 billion on the fleet since its inception in 1971 (Jeremy Hsu, 2015).<sup>45</sup>

But the economic growth and GDPs of MMCs are also too low. According to World Bank, the sum total of the GDPs of all 54 MMCs of the year 2013 is \$ 6.74 trillion whereas the GDP of European Union in the same year was \$19.09 trillion, USA \$ 16.8 trillion, China \$ 9.24 trillion, Japan \$4.9 trillion, India \$1.87 trillion and Germany \$3.63 trillion. In the same year the GDP of whole world was \$ 74.8 trillion. It implies that out of the World, the share of the Muslim World was 9.01% whereas the share of European Union was 25.5%, USA 22.4% and China 12.3% etc. It should be noted that Muslim World has 1.3 billion population and 54 countries with 20.3 % of land area under its rule whereas EU has 28 countries with only 2.94 % of land area under its rule but the GDP of EU is nearly three times greater than the Muslim World.

**Table 5: GDP by Country according to 2018 estimate by World Economic Outlook Database (IMF Website)**

Country	GDP (PPP) 2018 in Trillions	GDP (PPP) 2013 in Trillions	% land area occupied in Km <sup>2</sup>
Indonesia	3.494	0.86	-
Turkey	2.292	0.82	-
Saudi Arabia	1.857	0.74	-
Islamic Republic of Iran	1.610	0.36	-
Egypt	1.296	-	-
Nigeria	1.168	-	-
Pakistan	1.141	-	-
Rest of MMCs	7.553	-	-
<b>MMCs Total</b>	<b>20.414</b>	<b>6.74</b>	<b>20.3</b>
China	25.270	9.2	6.5
United States	20.494	16.8	6.4
European Union	18.750	19.0	2.94
India	10.505	1.8	1.9

Source: IMF Website<sup>46</sup>

The sum of the GDPs of all MMCs is \$ 20.414 trillion whereas it was \$ 6.74 trillion in 2013.

#### **Revenue of some large companies' vs GDP of some MMCs**

Even some large companies have greater revenue than the GDPs of some MMCs. The Table below shows the revenue of top five companies of the world. In last two columns the GDPs of some MMCs are displayed. The table shows that the yearly revenue of these companies is larger than the GDPs of MMCs in the adjacent

column. For example the revenue of Royal Dutch Shell is 481.7 \$ billion while the GDP of Nigeria is 450.5 \$ billion. Similarly we can see in other cases. Only top seven MMCs have their GDPs greater than the revenue of Royal Dutch Shell while the rest of 44 MMCs have GDPs lower than the revenue of Royal Dutch Shell.

**Table 6: Company revenues vs GDP of MMCs**

Company	Country	Revenue in \$ billion (2013)	GDP in \$ billion (2013)	MMC
RD Shell	Netherlands	481.7	450.5	Nigeria
Walmart	USA	469.2	305.5	Bangladesh
ExxonMobil	USA	449.9	274.5	Algeria
Sinopec	China	428.2	271.2	UAE
CNPC	China	408.6	232.3	Kazakhstan

### **Employment**

The employment conditions of some MMCs are also too worse. For instance 77% population of Burkina Faso is Unemployed. Similarly Turkmenistan has 60%, Djibouti 59%, Senegal 48%, Kosovo 45.3%, Yemen 35% etc. As far as poverty is concerned 80% population of Chad is living below poverty line. Similarly 70.2% population of Sierra Leone, 70% of Nigeria, 60% of Comoros etc, is living below poverty line.

### **Export**

The sum total of the Exports of all MMCs in 2013 was \$2.190 trillion while China alone exports the goods of worth \$2.021 trillion and USA \$1.612 trillion in the same year. It is to be noted that MMCs export mainly crude oil and raw materials whereas other countries like China and the western countries export finished goods and hi-tech equipment's.

### **Crude oil**

Crude oil is the most precious thing in the modern world and Gulf countries are the main exporters of it. As a whole MMCs producing 41% of oil in the World but

consuming only 15% whereas USA produce only 12% of oil but consuming 22%, similarly EU consuming 15%, China 11% Japan 5% etc. It is a general trend that the countries which consume more oil are attaining higher standard of development.

### **Population engage in agriculture**

If we analyze the data of CIAWFB 2015 it indicates that 60-65% of labor force residing in MMCs engage agriculture and other primary occupations whereas the percentages of agricultural labor force is too low in USA, Sweden, Luxembourg, Singapore, UK, Germany, Israel, Netherlands and France, that are 0.7, 1.1, 1.2, 1.3, 1.4, 1.6, 1.6, 2.3 and 2.9 engage in agriculture respectively. It is to be noted that there is inverse relationship between labor engage in agriculture and economic development. Higher the percentage of labor engages in agriculture lower the economic development and vice versa.

### **Population is involved in industrial production**

According to an unofficial source Hardly 16% of Muslim population is involved in industrial production, whereas for Christians this figure is 60%.

### **Wheat production**

In 2014 whole Muslim world produced 109,320 thousand metric tons (tmt) of wheat whereas EU produced 156,448tmt; China produced 126,000 tmt and USA 95,850 tmt and whole world produced 726,452 tmt in the same year.

### **Rice production**

In 2014 whole Muslim world produced 96,209 thousand metric tons (tmt) of rice whereas China produced 144,500 tmt, India produced 102,500 tmt, USA produced 7068 tmt and EU produced 1,881 tmt and whole world produced 474,596 tmt in the same year.

### **Container port traffic**

Container port traffic (CPT) also indicates the intensity of trade of a country by showing the frequency of container traffic in a country's port. In 2013 whole Muslim World have 15.3% share of CPT in the world where as China have 27.3% of CPT, EU have 16%, USA 6.9% etc.

### Major web servers

There is no major web server in the Muslim World; about 99.5% of Web servers are located in USA rest in UK and Australia. Apache is the biggest web server in the world used by 55.1 % of Websites.

**Table 7: Major web servers by Country**

Web Server	Share	Location
<u>Apache</u>	55.1%	USA
<u>Nginx</u>	27.3%	USA
<u>Microsoft-IIS</u>	12.2%	USA
<u>LiteSpeed</u>	2.3%	USA
<u>Google Servers</u>	1.4%	USA

**Source:** w3techs.com<sup>47</sup>

### Research and innovation

#### PhD production

PhDs produced by a country is an important indicator of the research standard of a country. The largest number of PhDs produced by a Muslim country is Tunisia which produced 1863 Doctorates in 2008<sup>48</sup> however the data of 2009 and 2010 is not available. In 2010 Turkey produced 884 PhDs while in the same year China produced 48,987<sup>49</sup> PhDs and USA produced 48,069 PhDs.<sup>50</sup> It is noteworthy that according to official information published on the website of the Chinese Ministry of Education, the country aimed to award 125,153 doctorates in 2011.<sup>51</sup> However the data of 2011 and 2012 is not available. But it is obvious that MMCs are far behind in producing Doctorates than other leading countries both on quantitative and qualitative levels.

It was found that only 13 MMCs out of 51 are producing PHDs. The numbers of all PHDs produced by MMCs collectively is 5933 in 2010 whereas Finland alone produced 7,722 PHDs in the same year. The productions of China and USA are extremely high. China produced 48,987 PHDs in 2010 and USA produced 49,096 in the same year. China, USA, Finland, Iceland, Denmark are those countries

which produced individually more PHDs than the MMCs produced collectively. This is on quantity level and on quality level one can observe in subject wise rankings.

### **Scientific and technical journal articles**

Production of Scientific Journals is another major indicator of the research standard of a community. According to the latest data of World Bank, Turkey is the largest producer of scientific Journal articles in the Muslim World. In 2012 it produced 8,328 articles followed by Iran, Egypt, Saudi Arabia, Malaysia and Pakistan which produced 8176, 2515, 2092, 1491, and 1268 articles respectively. In the same year USA produced 208,601 articles followed by China, Japan, Germany and France which produced 89894, 47106, 46259, 46035, and 31686 articles respectively. While in the same year the Muslim World produced 29,624 articles collectively and 808,954 articles produced in the whole World. It is to be noted that USA, China, Japan, Germany and France produced more articles individually than the collective production of the whole Muslim World. Moreover Turkey which is the largest producer in the Muslim World produced 1% of the World and whole Muslim World produced 3.6% of the World. Whereas USA alone produced 25.7% articles of the World.

### **Muslim faculties in World's top Universities**

In QS World University Ranking 2014 MIT ranked first and Harvard University secured second position. We took both universities as sample of our study. In both Universities the number of Muslim faculties is too low as compare to the people of other faiths like Christians, Jews and Hindus etc. For example in MIT out of 1894 faculties only 36 (1.9%) identified as Muslims, 74 (3.9%) as Hindus and 435 (22.9%) as Jews etc.

In Harvard University only six schools are selected to study namely Harvard Business School, Engineering, Education, Dental, Design and Divinity. These six schools have collectively 1090 faculties out of which 25 (2%) identified as Muslims, 48 (4.4%) as Hindus and 124 (11.3%) as Jews. It should be noted that the number of Jews may be more because it is difficult to differentiate between the Christian and Jewish names.

### **Patents and trademarks**

Registration of patents and trademarks is also an important indicator of research and innovation. According to World Bank, in 2012 Malaysia and Turkey were the top two registrants of patents which registered 6940 and 4666 number of patents

respectively. The Whole Muslim World registered 27134 patents in the same year and 2182968 patents registered in the entire World. In the same year USA registered 542815 numbers of patents.<sup>52</sup> If we analyze the data Malaysia which is the largest producer in the Muslim World produced 0.3 % patents of the World and whole Muslim world produced 1.24 % of the World. Whereas USA produced 24.8% patents of the World. In other words whole Muslim World produced 4.9% of what USA produced. Similar trend found in other fields of innovations.

According to U.S. Patent and Trademark Office, during the period 01/01/1977-12/31/2013 whole Muslim World has been granted 5102 patents (uspto.gov, 2014)<sup>53</sup> out of which Malaysia, Saudi Arabia, Turkey, Indonesia, Kuwait, Egypt, Iran and UAE registered 2152, 855, 509, 297, 283, 200, 139 and 138 patents granted respectively whereas in the same period 2715390 patents were granted to USA followed by Japan, Germany, Taiwan, South Korea, U.K., France, Canada and Italy which were granted 958971, 330280, 137867, 127992, 125906, 125737, 108720 and 56025 patents respectively.<sup>54</sup> And 5087834 patents were granted to the whole World. It implies that whole Muslim World has been granted 0.18% out of USA and 0.1% out of the World.

### **Patent applications filed**

Broadly there are three types of patents namely utility patent, design patents and plant patents. The first utility was patent registered in USA in 1836 and first design patent registered in 1843 and first plant patent in 1931. If we analyze the data of patents filed during the period of 1965-2013, Malaysia filed most number of patent applications among MMCs that were 4679, followed by Saudi Arabia, Turkey, Kuwait, Egypt, UAE, Iran, Indonesia and Pakistan which filed 2626, 1455, 626, 616, 564, 482, 415 and 241 patents respectively and whole Muslim World filed 12945 applications of patents. In the same period USA filed 5848950 applications followed by Japan, Germany, South Korea, UK, Taiwan and Switzerland which filled 1740410, 670577, 302067, 299148, 287664, 108582 patents applications respectively, whereas 10628263 applications were filed, from the whole World. It implies that whole Muslim world filed 0.12% of patents applications out of the whole World and 0.22% out of USA.

If we study the number of patents granted to Universities. During the period of Jan 01, 1969 - Dec 31, 1999 17 patents were granted to the Universities located in MMCs out of which Turkey, Egypt, Malaysia, and Lebanon received 5, 5, 4 and 3 patents respectively whereas in the same period the Universities in USA received 29415 patents followed by Canada, Germany, Japan and Israel which received 48,

47, 47 and 42 patents respectively and 29858 patents distributed in the whole World including the above. It implies the Universities in MMCs collectively received 0.05% patents out of the World while Universities of USA received 98.5% patents.<sup>55</sup>

From 1790-2013, 17206117 number of patent application were filed in USA out of which 9321541 were granted to US residents and 2,977,517 were granted to foreign residents.<sup>56</sup>

**Table 8: Utility (invention) Patents filed during the period of 1965-2013**

Country of Origin	2013	Total
Malaysia	506	4679
Saudi Arabia	649	2626
Turkey	203	1455
Kuwait	116	626
Egypt	80	616
UAE	135	564
Iran	32	482
Indonesia	37	415
Pakistan	48	241
Average per MMC	35	239
Muslim World	1936	12945
Share of Muslim World	0.3 %	0.1%
U.S.A	287,831	5,848,950
EU	54,070	1,271,177

Japan	84,967	1,740,410
Germany	30,551	670,577
South Korea	33,499	302,067
United Kingdom	12,807	299,148
Taiwan	21,262	287,664
Switzerland	4,747	108,582
Netherlands	4,467	91,805
Sweden	4,509	88,476
Israel	7,237	74,544
India	6,600	38,596
World	571,612	10,628,263

**Source:** U.S. Patent and Trademark Office<sup>57</sup>

### **Automotive production**

Only 11 MMCs out of 54 are producing their own vehicles to some extent. In 2018 these all 11 MMCs Produced collectively 5,619,691 vehicles while their production in 2013 was 4,429,094. In 2013 only 6 MMCs were producing vehicles. In 2018 China Produced 27,809,196, USA 11,314,705, India 5174645 and South Korea 4,028,834 etc. And total World production is 95,706,293. It means that the share of MMCs in Total World Production of Vehicles is only 5.87%. Among MMCs Turkey is the largest producer of vehicles produced 1,550,150 which constitutes 1.6 % of the World production whereas South Korea produced 4.2% of the World production which means 2.6 times more than Turkey. However the population of Turkey is 1.6 times more than population of South Korea.

**Table 9: Numbers of Automotive Produced in 2017 & 2018**

<b>UNITS</b>	<b>2017</b>	<b>2018</b>
Turkey	1,695,731	1,550,150
Indonesia	1,218,106	1,343,714
Iran	1,515,396	1,095,526
Malaysia	501,700	565,000
Morocco	341,802	402,085
Pakistan	250,800	269,700
Uzbekistan	140,247	220,667
Algeria	60,606	70,597
EGYPT	36,000	69,007
Kazakhstan	19,071	31,545
Tunisia	1,900	1,700
<b>MMCs Total</b>	<b>5,781,359</b>	<b>5,619,691</b>
China	29,015,434	27,809,196
<b>Europe</b>	<b>21,634,30</b>	<b>21,333,651</b>
USA	11,189,985	11,314,705
Japan	9,690,674	9,728,528
India	4,792,231	5,174,645
South Korea	4,114,913	4,028,834
UK	1,749,385	1,604,328

Germany *** as of 2016, Cars only	5,645,584	5,120,409
Russia	1,551,909	1,767,674
<b>Total World</b>	<b>96,746,802</b>	<b>95,706,293</b>

**Source:** International Organization of Motor Vehicle Manufacturers<sup>58</sup>

### Space Science

Space Science is called the Queen of all science. But here also the performance of the Muslim World is not up to global standards. For instance, Yuri Alekseyevich Gagarin of USSR was the first human to journey into outer space, when his Vostok spacecraft completed an orbit of the Earth on 12 April 1961 and in 1969 Neil Armstrong was the first human to step on the Moon, but even after 53 years no MMC has its own spacecraft.

### Space travel

As far as space travel is concerned. There are 9 Muslims so far travelled to space whereas 487 Christians (The figure of Christians may contain some Atheists because it is hard to recognize by names because name pattern of the both are same), 14 Jews, 4 Hindus and more than 20 of other faiths including Buddhists etc, travelled in the space. It is a strange fact that the population of Muslims is 117 times larger than Jews but the number of Muslim Astronauts is smaller than Jews.

### Muslim Scientists in NASA

Now the representation of Muslims in NASA is studied. NASA is a leading Space Research Institute in the world having several Research Centers and Facilities and thousands of staff including Astronauts. But so far only four staff members of NASA are identified as Muslim Scientists on prestigious positions who are mentioned below (*please inform us if anyone knows about any other Muslim NASA Scientist*).

**Farouk El-Baz:** Farouk El-Baz (born January 2, 1938) is an Egyptian American scientist who worked with NASA to assist in the planning of scientific exploration of the Moon, including the selection of landing sites for the Apollo missions and the training of astronauts in lunar observations and photography.<sup>59</sup>

**Dr. Hashima Hasan:** She is the James Webb Space Telescope Program Scientist and the Education and Public Outreach Lead for Astrophysics. In her role as Program Scientist, Dr. Hasan is responsible for monitoring and managing the science program for the Webb Telescope. She makes sure that its mission remains possible and true to NASA strategic objectives. Dr. Hasan has been the program scientist for many of NASA missions, such as the Wide-field Infrared Survey Explorer, Gravity and Extreme Magnetism SMEX (GEMS), Stratospheric Observatory for Infrared Astronomy, Hubble Space Telescope, Explorer Program and more.<sup>60</sup>

**Dr. Tahani Amer:** She is an Egypt born scientist currently working in NASA's wind tunnels to conduct pressure and thermal sensitive paint experiments for NASA's Aeronautic Research efforts.<sup>61</sup> Dr. Amer has invented and patented a system to measure the thermal conductivity of a thin film. This measurement is used in the thermal modeling of several techniques for determining boundary layer transition location on models being tested in wind tunnels.

**Dr. Waleed Abdalati:** He is currently working as the principal adviser to NASA Administrator Charles Bolden on NASA science programs, strategic planning and the evaluation of related investments, since 2011<sup>62</sup>.

**Others:**

- Shadia Habbal
- Bobak Ferdowsi
- Ismail Akbay

**First Satellite rocket launch**

Iran is the first and only country among MMCs which launched its first satellite rocket on 02 February 2009 whereas Soviet Union was the first country which launched its first satellite on 4<sup>th</sup> October 1957 followed by USA which launched on 1 February 1958. Today many countries have satellite launching capabilities like, France, Japan, China, United Kingdom, European Space Agency, India, Israel, Ukraine, and North Korea.

**Media**

Media is a powerful tool of public persuasion and opinion making in the modern world. But the share of Muslims in media is too little. It is found that, the maximum number of TV news channels in a MMC is 10 while UK has 20 news channels and

USA has 1601 channels.<sup>63</sup> The maximum numbers of national newspapers is 14 and 13 in Afghanistan and Algeria respectively whereas UK has 22 national newspapers and USA has 24. In terms of local newspapers the figures are too surprising. Turkey has the maximum numbers of local newspapers among MMCs that are 91 on contrary UK has 652 local newspapers and 9712 local newspapers are in USA.<sup>64</sup> Majority of MMCs depend on foreign media services. Chad, Turkmenistan and Western Sahara have no national newspapers at all whereas 10 MMCs are those which have only one national newspaper each. No MMC has its own multinational newspaper while UK has 4 and USA has 12 multinational newspapers.

As far as foreign media services in MMCs are concerned. Several foreign media services are working in MMCs and most of them are based in the West like as BBC and CNN. BBC broadcasts in around 200 countries and in 27 languages and CNN operates in around 32 countries among them 11 are MMCs. Similarly PANAPRESS, JeuneAfrique, Fergana, Economist, Fox News, CNBC are among several foreign media services which operate in many MMCs. Whereas MMCs have no or very little foreign media services.<sup>65</sup> In addition the foreign media services of Muslim countries operate only in some neighboring MMCs. There is no foreign media service like news TV channel or newspaper which telecasts its news in non-Muslim countries, except Al Jazeera which is the only Muslim media service which operate in few non-Muslim countries also.

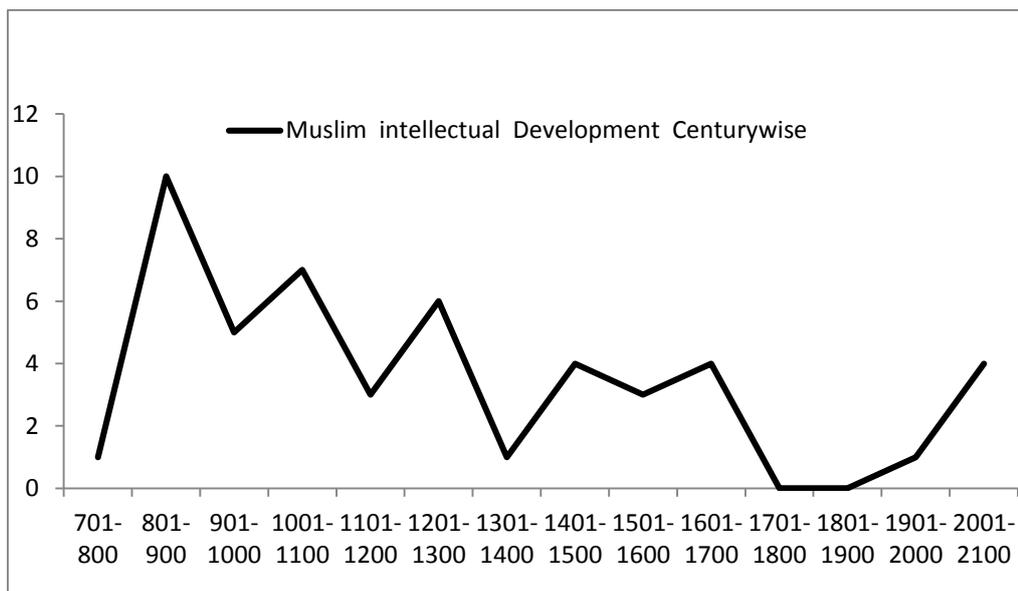
In USA there are 25 nationwide and around 1600 local news channels but none of them run by a Muslim.<sup>66</sup> There are around 18 religious channels run by different faiths most of them run by Christians and Jews but there is only one Islamic channel 'Peace TV' on local level. Similarly there are 24 national and 9712 local newspapers in USA<sup>67</sup> but it is hard to find any newspaper of Muslims. Similar conditions prevail in other countries of the World. The share of Muslims in world media is nominal and calls for a special attention. Similarly Google, Youtube, Facebook, Twitter, Yahoo, MSN, Amazon, Wikipedia etc., are major websites by traffic but the Muslim World have no such website.

### **Top 10 International Media Corporations**

In top 100 International Media Corporations none of them is based in any MMC.<sup>68</sup> Out of 100, 42 are based in USA, 9 in Japan, 7 in China, 4 in Germany, 4 in France, 2 in UK etc.

**12. Not so far among Muslims**

There are several fields and sectors in which there is no Muslim representation so far. Here some of these are mentioned. Such as Computer manufacturing, Computer Software and Programming, Antivirus production, Aircraft Engine Manufacturing except Iran, Aircraft carrier, Space telescope, Airborne observatory, Resonant bars, Antimatter observatory, Radio observatory, Microwave observatory, Solar observatory, Neutrino detector, Spacecraft, Space Station, Satellite launching vehicle, Nuclear Power plant except Pakistan and Iran, UAV (Unmanned Aerial Vehicle) such as Drone Defense System, Multinational news channel except Al Jazeera, Multinational Newspaper, Multinational Automobile Manufacturer, Multinational Cell Phone Manufacturer. Though some MMCs have Mobile and Automobile manufacturer but their supplies are confined to their own markets or to some neighboring MMCs. And there are several other fields left which are not mentioned here. If one makes research on the topic, the list of ‘not so far among Muslims’ it will be too long.



**Prepared by:** Dr. Zubair Zafar Khan

**Conclusion**

The literary and developmental conditions of all MMCs are too undermining. In every aspect of development the performance of MMCs is substandard weather it is Literacy, Economy, Science, Technology, Media and Sports etc. After observing

the above study it is clear that the developmental conditions of MMCs are very different from others. Not a single country meets the global standards of development in the crucial fields. Today Muslims are the second majority of the world and ruling over 54 countries. The community that owns more than 80% oil reserves, but unfortunately far behind in education. There are about 2802 universities located in 54 MMCs whereas USA has more than 6500 universities and higher education institutions.

98% of population in Christian countries completed primary education but only 50% population in Muslim countries completed primary education. 40% population in Christian countries attended universities while in Muslim countries a dismal 2% population attended universities. In Western world 98% people complete their primary education and 40% go to universities, whereas in the Muslim world only 50% people complete primary education and 2% go to universities. In UK, 2000 books are published for every one million people, whereas in Egypt, the number is only 20. Educational level of the common Arabs is also too low. As of 1982, Arab world produced 40 book titles per million habitants which is far below the world average 162 titles per million. Another report reveals; the Arab world translates about 330 books annually, one-fifth of the number that Greeks translate every year. As per United Nations 'Arab Human Development Report', half of Arab women are illiterate. In total, 60% of Arab Muslims are illiterate. Almost half of the universities concentrate on teaching Islamic education and Islamic sciences. Fifteen percent of the Arab workforce is unemployed. Only 1% of the Arab population has a personal computer, and only 0.5 % uses the Internet. These all facts indicate the lack of education in Muslims. Similar conditions are prevailing in other fields of development also, like technology, economy etc.

Other most important point which could be derived from the above information is that presently Muslims are a dependent nation. Though most of the Muslim countries got freedom from colonial powers but still they have to depend on them in technology and manufacturing. From needle to aircraft they are importing from other countries except petroleum, dates and ZamZam water. Middle East is the biggest importer of expensive products in the world but one can hardly find any manufacturing facility of those products there. And for this plight, Muslims are responsible themselves therefore; it calls for an immediate attention and purposeful steps from the Muslims community. Especially governments of MMCs could play major role in it. Without Higher Education and Research Muslims cannot make desired progress in the Modern World.

## References and End Notes

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- <sup>1</sup> Country Comparison to the World, <https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html> (accessed 22/03/2015) (accessed 22/03/2015)
- <sup>2</sup> List of religious populations, [http://en.wikipedia.org/wiki/List\\_of\\_religious\\_populations#Hindus](http://en.wikipedia.org/wiki/List_of_religious_populations#Hindus) (accessed 25/03/2013)
- <sup>3</sup> Islam by country, [http://en.wikipedia.org/wiki/Islam\\_by\\_country](http://en.wikipedia.org/wiki/Islam_by_country) (accessed 24/03/2013)
- <sup>4</sup> The Future of the Global Muslim Population, (27/01/2011), available on: <http://www.pewforum.org/The-Future-of-the-Global-Muslim-Population.aspx> (accessed 26/03/2013)
- <sup>5</sup> Ibid.
- <sup>6</sup> Country Comparison to the World, <https://www.cia.gov/library/publications/the-world-factbook/geos/us.html> (accessed on 21/02/2015)
- <sup>7</sup> Global Religious Landscape, <http://www.pewforum.org/global-religious-landscape-exec.aspx> (accessed on 22/03/2013)
- <sup>8</sup> Country Comparison to the World, <https://www.cia.gov/library/publications/the-world-factbook/fields/2119.html> (accessed on 22/03/2013)
- <sup>9</sup> Ibid.
- <sup>10</sup> List of sovereign states and dependencies by area, [https://en.wikipedia.org/wiki/List\\_of\\_religious\\_populations#cite\\_note-Global\\_Christianity-3](https://en.wikipedia.org/wiki/List_of_religious_populations#cite_note-Global_Christianity-3) (accessed on 09/07/2019).
- <sup>11</sup> <https://www.cia.gov/library/publications/the-world-factbook/geos/us.html> (accessed on 21/02/2015).
- <sup>12</sup> Country Comparison to the World, <https://www.cia.gov/library/publications/the-world-factbook/fields/2119.html> (accessed on 22/03/2013)
- <sup>13</sup> Country Comparison to the World, <https://www.cia.gov/library/publications/the-world-factbook/fields/2119.html> (accessed on 22/03/2013).
- <sup>14</sup> Spengler, **The demographics of radical Islam**, (23/08/2005), available at [http://www.atimes.com/atimes/Front\\_Page/GH23Aa01.html](http://www.atimes.com/atimes/Front_Page/GH23Aa01.html) (accessed 24/03/2013)
- <sup>15</sup> Country Comparison to the World, <https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html> (accessed on 22/03/2013)
- <sup>16</sup> Out-of-school children of primary school age, male (number), <http://data.worldbank.org/indicator/SE.PRM.UNER.MA> & <http://data.worldbank.org/indicator/SE.PRM.UNER.FE> (accessed on 08/06/2014)
- <sup>17</sup> Libraries and Museums, [http://www.countriesquest.com/middle\\_east/saudi\\_arabia/population/libraries\\_and\\_museums.htm](http://www.countriesquest.com/middle_east/saudi_arabia/population/libraries_and_museums.htm) (accessed on 16/08/2014)
- <sup>18</sup> Taksim Atatürk Library, [http://www.tasyapi.com.tr/english/news\\_ataturk\\_library.htm](http://www.tasyapi.com.tr/english/news_ataturk_library.htm) (accessed on 11/08/2014)
- <sup>19</sup> Istanbul Technical University Library, <http://www.librarytechnology.org/libraries.pl?Institution=Istanbul%20Technical%20University> (accessed on 11/08/2014)
- <sup>20</sup> <http://paksentinel.com/pakistans-largest-library-punjab-university-library/8/> (accessed on 11/08/2014)

- 
- <sup>21</sup> National Library of Pakistan, <http://www.nlp.gov.pk/resources.html> (accessed on 11/08/2014)
- <sup>22</sup> [https://en.wikipedia.org/wiki/Library\\_of\\_Congress](https://en.wikipedia.org/wiki/Library_of_Congress) (accessed on 11/07/2019)
- <sup>23</sup> Quantifying the entire library universe, <http://oclc.org/global-library-statistics.en.html> (accessed on 08/06/2013 & 15/08/2014)
- <sup>24</sup> Ibid.
- <sup>25</sup> Ibid.
- <sup>26</sup> Foundation of Advancement of International Medical Education and Research, <https://imed.faimer.org/> and [wikipedia.org](https://en.wikipedia.org/) (accessed on 03/06/2014)
- <sup>27</sup> Arab Human Development Report 2003, [www.arab-hdr.org/publications/other/ahdr/ahdr2003e.pdf](http://www.arab-hdr.org/publications/other/ahdr/ahdr2003e.pdf) (accessed on 08/06/2014)
- <sup>28</sup> Derek Taylor, After 206 Nobel prizes, it's time for the big question, 09/07/2019. <https://blogs.timesofisrael.com/after-206-nobel-prizes-its-time-for-the-big-question/>
- <sup>29</sup> List of mobile phone makers by Country, [http://en.wikipedia.org/wiki/List\\_of\\_mobile\\_phone\\_makers\\_by\\_country](http://en.wikipedia.org/wiki/List_of_mobile_phone_makers_by_country) (accessed on 08/06/2012)
- <sup>30</sup> Robots by Country, [http://en.wikipedia.org/wiki/Category:Robots\\_by\\_country](http://en.wikipedia.org/wiki/Category:Robots_by_country) (accessed on 08/06/2012)
- <sup>31</sup> <https://www.top500.org/list/2019/06/?page=1> (accessed on 09/07/2019)
- <sup>32</sup> <https://www.statista.com/statistics/264445/number-of-supercomputers-worldwide-by-country/> (accessed on 09/07/2019)
- <sup>33</sup> Nanotechnology, <http://en.wikipedia.org/wiki/Nanotechnology> (accessed on 31/08/2014)
- <sup>34</sup> Nanotechnology Research Laboratories, [http://www.nanowerk.com/nanotechnology/research/research\\_c.php](http://www.nanowerk.com/nanotechnology/research/research_c.php) (accessed on 08/06/2014)
- <sup>35</sup> <https://www.globalfirepower.com/countries-listing.asp> (accessed on 10/07/2019)
- <sup>36</sup> List of aircraft engine manufacturers, [http://en.wikipedia.org/wiki/List\\_of\\_aircraft\\_engine\\_manufacturers](http://en.wikipedia.org/wiki/List_of_aircraft_engine_manufacturers) (accessed on 24/03/2013)
- <sup>37</sup> Astronomy in the medieval Islamic world, [http://en.wikipedia.org/wiki/Astronomy\\_in\\_the\\_medieval\\_Islamic\\_world](http://en.wikipedia.org/wiki/Astronomy_in_the_medieval_Islamic_world) (accessed on 21/02/2015)
- <sup>38</sup> Ibid.
- <sup>39</sup> Ibid.
- <sup>40</sup> John Morris Roberts, *The History of the World*, 1976, Oxford University Press, pp. 264–74, ISBN 978-0-19-521043-9
- <sup>41</sup> List of space agencies, [http://en.wikipedia.org/wiki/List\\_of\\_space\\_agencies](http://en.wikipedia.org/wiki/List_of_space_agencies) (accessed on 26/03/2013)
- <sup>42</sup> Satellites by Countries and Organizations, <http://www.n2yo.com/satellites/?c=&t=country> (accessed on 05/03/14)
- [http://en.wikipedia.org/wiki/List\\_of\\_orbital\\_launch\\_systems](http://en.wikipedia.org/wiki/List_of_orbital_launch_systems) (accessed on 12/05/2014)
- <sup>43</sup> Jeremy Hsu, Total Cost of NASA's Space Shuttle Program: Nearly \$200 Billion, <http://www.space.com/11358-nasa-space-shuttle-program-cost-30-years.html> (accessed on 27/04/2015)
- <sup>44</sup> Jeremy Hsu, Total Cost of NASA's Space Shuttle Program: Nearly \$200 Billion, <http://www.space.com/11358-nasa-space-shuttle-program-cost-30-years.html> (accessed on 27/04/2015)

- 
- <sup>45</sup> Ibid.
- <sup>46</sup> <http://tiny.cc/tisl9y> (12/07/2019)
- <sup>47</sup> Usage of web servers for websites, [http://w3techs.com/technologies/overview/web\\_server/all](http://w3techs.com/technologies/overview/web_server/all) (accessed on 18/02/2016)
- <sup>48</sup> Researchers in R&D (per million people), <http://data.worldbank.org/indicator/SP.POP.SCIE.RD.P6> (accessed on 09/06/2014)
- <sup>49</sup> The country aimed to award 125,153 doctorates in 2011, <http://blog.inomics.com/chinese-phds-vs-us-phds/> (accessed on 21/02/2015)
- <sup>50</sup> Anastasia Sharova, Chinese PhDs vs US PhDs, Posted: Jan 13, 2013, <http://blog.inomics.com/chinese-phds-vs-us-phds/> (accessed on 21/02/2015)
- <sup>51</sup> Ibid.
- <sup>52</sup> World Development Indicators: Science and technology, <http://wdi.worldbank.org/table/5.13> (accessed on 21/02/2015)
- <sup>53</sup> U.S. Patent and Trademark Office, Patent Technology Monitoring Team (PTMT), [http://www.uspto.gov/web/offices/ac/ido/oeip/taf/inv\\_utl\\_stcx.htm](http://www.uspto.gov/web/offices/ac/ido/oeip/taf/inv_utl_stcx.htm) (accessed on 03/02/2014)
- <sup>54</sup> U.S. Patent and Trademark Office, Patent Technology Monitoring Team (PTMT), [http://www.uspto.gov/web/offices/ac/ido/oeip/taf/inv\\_utl\\_stcx.htm](http://www.uspto.gov/web/offices/ac/ido/oeip/taf/inv_utl_stcx.htm) (accessed on 03/02/2014); [http://www.uspto.gov/web/offices/ac/ido/oeip/taf/inv\\_utl\\_stcx.htm](http://www.uspto.gov/web/offices/ac/ido/oeip/taf/inv_utl_stcx.htm) (accessed on 03/02/2014)
- <sup>55</sup> Technology Assessment and Forecast Report, <http://www.uspto.gov/web/offices/ac/ido/oeip/taf/data/univ.pdf> (accessed on 27/02/2015)
- <sup>56</sup> Technology Assessment and Forecast Report, [http://www.uspto.gov/web/offices/ac/ido/oeip/taf/data/h\\_counts.htm](http://www.uspto.gov/web/offices/ac/ido/oeip/taf/data/h_counts.htm) (accessed 27/02/2015)
- <sup>57</sup> Number of Utility Patent Applications Filed in the United States, [http://www.uspto.gov/web/offices/ac/ido/oeip/taf/appl\\_yr.htm](http://www.uspto.gov/web/offices/ac/ido/oeip/taf/appl_yr.htm) (accessed 24/02/2015)
- <sup>58</sup> <http://www.oica.net/category/production-statistics/2018-statistics/> (accessed 12/07/2019)
- <sup>59</sup> [http://en.wikipedia.org/wiki/Farouk\\_El-Baz](http://en.wikipedia.org/wiki/Farouk_El-Baz) (accessed 21/03/2013)
- <sup>60</sup> Meet HashimaHasan: James Webb Space Telescope Program Scientist for Operations, available at: <http://www.jwst.nasa.gov/meet-hasan.html> (accessed 22/03/2013)
- <sup>61</sup> TahaniAmer, <http://women.nasa.gov/tahani-amer/> (accessed on 06/09/2014)
- <sup>62</sup> WaleedAbdalati, NASA Chief Scientist, [http://www.nasa.gov/about/highlights/abdlati\\_bio.html](http://www.nasa.gov/about/highlights/abdlati_bio.html) (accessed on 06/09/2014)
- <sup>63</sup> All Countries Newspapers and News Media- Countries and Regional, <http://www.abyznewslinks.com/allco.htm> (accessed on 09/06/2014)
- <sup>64</sup> Ibid.
- <sup>65</sup> Ibid.
- <sup>66</sup> Ibid.
- <sup>67</sup> Ibid.
- <sup>68</sup> Media Data Base - International Media Corporations 2015, <http://www.mediadb.eu/en.html> (accessed on 30/04/2015)