Ministry of Higher Education and Scientific Research Strategy 4.0
“Scientific Research & innovation  and Sustainable Development Goals”

Prof. Dr. Yasser Refaat
Deputy Minister for Scientific Research
Sustainable Development

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Achieving Sustainable Development

- Environment Protection
- Societal Inclusion
- Economic Growth
Global Sustainable Development Goals (SDGs)

“There is no ‘Plan B’ because we do not have a ‘Planet B.’ We have to work and galvanize our action.”

*Ban Ki Moon*

This became the rationale behind the development of SDGs
SDGs and Future Generations

Better Tomorrow for our Future Generations
Wellbeing

- Scientific Research
- Education
- Employability
- Health
- Nutrition
- Environment
- Clean Water
Scientific research and innovation achieve the objectives of sustainable development
Scientific Research and Innovation in all sectors

Solutions for Clean Water
Resources for Clean Energy
Human wellbeing
Agriculture and Nutrition
Education Reform
Depollution Solutions
Egypt is one of the best 30 Economies globally by 2030

“Knowledge Based Economy”
Egypt Vision 2030 for STI

A creative and innovative society producing science, technology, and knowledge, within a comprehensive system ensuring the developmental value of knowledge and innovation and using their outputs to face challenges and meet national objectives.
Africa’s Agenda 2063 & STI 2024

• An integrated, prosperous and peaceful Africa, an Africa driven and managed by its own citizens.

• Recognize Science, Technology and Innovation (STI) as multi-functional tools and an enablers for achieving continental development goals.

• STISA mission is to “Accelerate Africa’s transition to an innovation-led, Knowledge-based Economy”.
Sustainable Development Strategy: Egypt's vision 2030

The STI Pillar

**INNOVATION, KNOWLEDGE & SCIENTIFIC RESEARCH KPIs**

- **top 40**
  - Egypt among the top 20 countries for the number of patents

- **top 40**
  - Egypt among the top 20 countries in Intellectual Property Rights

- **top 40**
  - Egypt one of the top 20 countries in retaining innovative talents and capabilities

- **top 20**
  - Egypt among the top 20 countries in the field of innovation

- **top 20**
  - Egypt among the top 40 countries of quality of scientific research institutions
Higher Education and Scientific Research
Strategy 4.0
Ministry of Higher Education and Scientific Research Strategy 4.0
Higher Education and Scientific Research for Sustainable Development

Crafting Personality

Scientific Research & Innovation

Education

Health

Society
## Comprehensive STI Strategy

<table>
<thead>
<tr>
<th>Tracks</th>
<th>Effective Environment for Science, Technology and Innovation</th>
<th>Knowledge and Technology Transfer</th>
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<tr>
<td>1- legislations</td>
<td>1- Health and well being</td>
<td>10- Emerging Technologies</td>
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<td>2- Scientific Base</td>
<td>2- New &amp; Renewable Energy</td>
<td>11- Education</td>
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<td>3- STI system</td>
<td>3- Water</td>
<td>12- Media</td>
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<td>4- Basic &amp; converging sciences</td>
<td>4- Food and Agriculture</td>
<td>13- Political sciences</td>
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<td>5- Link academia/Industry</td>
<td>5- Environment</td>
<td>14- Transportation</td>
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<td>6- International Cooperation</td>
<td>6- Applied Technologies</td>
<td>15- Social sciences and Humanities</td>
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<td>7- Science &amp; society</td>
<td>7- Strategic Industries (Textile, Pharmaceuticals, Electronics)</td>
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<td>8- Capacity Building for human resources.</td>
<td>8- Tourism</td>
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<td>9- ICT</td>
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**Fund, STI Policies, Follow Up, Monitoring and Impact Assessment**
استراتيجية البحث العلمي

قضايا الدولة وخطط التنمية

طلبات الوزارات

الاحتياجات الصناعية والتطوير

زيادة النشر العلمي المتميز

رفع ترتيب مصر في مؤشر الابتكار العالمي

تحسين المساهمة في حل قضايا الدولة والصناعة

قانون حوافز الابتكار

مراكز بحثية

جامعات

طاقة

صحة

مياه

زراعة

تعليم
More than 133,923 researchers, teaching staff members and assistants

40% of time dedicated for research

Full time equivalent 100%
Research Centers affiliated to the Ministry of Scientific Research
Research Centers of Other Ministries & Agencies

- Ministry of Military Production: Center of Scientific and Technological Excellence
- Ministry of Agricultural: Agricultural Research Center, Desert Research Center
- Ministry of Agricultural: National Telecommunications Institute
- Ministry of Education: National Center for Educational Research & Development
- Ministry of Electricity and Energy: Atomic Energy Authority, Nuclear Materials Authority
- Ministry of Health: General Organization for Teaching Hospitals and Institutes, National Organization for Drug Control & Research
- Ministry of Housing: Housing and Building Research Center
- Ministry of Investment: Tebbin Institute for Metallurgical Studies
- Ministry of Planning: National Planning Institute
- Ministry of Social Solidarity: National Center for Social and Criminological Research
- Ministry of Water Resources: National Water Research Center
- Ministry of Transportation: Transportation Research Institute
Egypt Seeks Excellence in Higher Education and Scientific Research

To be prepared for the

The Fourth Industrial Revolution

1st
- Mechanization, water power, steam power

2nd
- Mass production, assembly line, electricity

3rd
- Computer and automation

4th
- Cyber Physical Systems

Society 5.0

Source: by Christoph Roser at AllAboutLean.com

Source: www8.cao.go.jp
Universities and Labour Market needs

The Fourth Industrial Revolution

<table>
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<tr>
<td>Mechanization, water power, steam power</td>
<td>Mass production, assembly line, electricity</td>
<td>Computer and automation</td>
<td>Cyber Physical Systems</td>
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</tbody>
</table>
Main Areas for Fourth Industrial Revolution

We are on the brink of what the World Economic Forum calls the Fourth Industrial Revolution of the most important areas:

- Artificial intelligence
- 3D printing
- Mobile supercomputing
- Genome Editing
- Smart robots
- Self-driving cars
Society 5.0

Economic and social innovation by deepening of Society 5.0

Hunting society
- The birth of human beings: 13,000 BC

Agrarian society
- Development of irrigation techniques
- Firm establishment of settlements

Industrial society
- Invention of steam locomotives
- Start of mass production

Information society
- Invention of computers
- Start of information distribution

Super smart society

Source: Prepared based on materials from the Japan Business Federation (Keidanren)
A society in which people and objects are linked to create new value

A Society in which information is exchanged when needed

Society in capable of responding to the needs of different regions and environments

A society that expands human potential through automation

Source: CAO, Japan
Increase the number of higher Education Institutes

24 National Projects in Higher Education and Scientific Research

<table>
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<th>International Universities</th>
<th>Governmental Universities</th>
<th>IBCs</th>
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<td>1- El Glala University</td>
<td>8- Matrouh University.</td>
<td>15- Canadian Universities</td>
</tr>
<tr>
<td>2- Egyptian Science Academy</td>
<td>9- Luxor University.</td>
<td>16- European University</td>
</tr>
<tr>
<td>3- University of Alamein</td>
<td>10- Red Sea University.</td>
<td>17- American Complex</td>
</tr>
<tr>
<td>4- New Mansoura University</td>
<td>11- New Valley University.</td>
<td>18- Global University</td>
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<td>5- King Salman University</td>
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<td>19- Hungarian Universities</td>
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<tr>
<td>6- Egyptian Japanese University</td>
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<td>20- UK Universities</td>
</tr>
<tr>
<td>7- Zewil City for Science and Technology.</td>
<td></td>
<td>21- German University</td>
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<tr>
<td></td>
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<tr>
<td>Technological Universities</td>
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</tr>
<tr>
<td>12- New Cairo TU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13- Quesna TU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14- Beni Suief TU</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Research Centers

22- Egypt Space Agency
23- Electronics Research Institute
24- National Institute of Astronomical and Geophysical Research.
Future Jobs

Employment, skills and workforce strategy of the 4th industrial revolution

35% of jobs will disappear over the next 10 years.

47% of jobs will disappear over the next 25 years as a result of technological development and participatory economy.
Ministry of Higher Education and Scientific Research and SDGs
Ministry of Higher Education and Scientific Research
Ensuring quality life long learning for all

Higher Education Reform

01. Develop specialized programs and colleges (Including continuous education programs)

02. Increase International Competitiveness of HEI and reinforce International Accreditation
Focusing on needed specialties for boosting the value added of local industries

04. Establishing distinguished technological colleges to meet the national and international needs of the technical education

Higher Education System
Ensuring quality life long learning for all

Technological and Applied Education

Preparing qualified and trained technical calibers and availing technological education for all

8 Technological Universities

10 Applied Universities

Law for the Establishment of Technological Universities

Accessibility to Technological Education

New Specializations

On the job training

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Ministry of Higher Education and Scientific Research and Quality Education

New Smart Universities

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Smart New Universities

Al-Alamein University

Al-Alamein University

Academy of Science

Al-Alamein University

Galala University

King Salman University
Ministry of Higher Education and Scientific Research and Health

University Hospitals contribution in the Health Care System

Serving 20,000,000 Patients annually

Ensure healthy lives and promote well-being for all at all ages
Ministry of Higher Education and Scientific Research and Water Issues

Water Desalination

- Development of a mobile reverse osmosis desalination plant and solar energy as an energy source in cooperation with the Desert Research Center.
- Development of a low cost innovative water desalination technologies.

50 Million Egyptian Pounds funding 14 Initiatives and Projects

Ensure availability and sustainable management of water and sanitation for all
Establishment a solar power plant for electricity generation and desalination

Solar Energy Concentrations and Water Desalination Project (MATS) at City of Scientific Research and Technological Applications:
- R&D Services
- 5 Mega Watt solar energy
- 1 Mega watt electrical energy
- 250 cubic meter of desalinated water

Ensure access to affordable, reliable, sustainable and modern energy for all
Ministry of Higher Education and Scientific Research and Energy Issues

Innovative Projects in New and Renewed Energy funded by EU

- Biodiesel production from algae (National Research Centre)
- Development of High-Efficiency Vertical Axis Wind Turbine for Off-Grid Applications (BUE)

Ensure access to affordable, reliable, sustainable and modern energy for all
Ministry of Higher Education and Scientific Research and Economic Growth

Funding research addressing national industries needs

Attract International Students

Support International Partnerships

Upskilling of youth for national and international labor market

Capacity building programs

Support and Co-fund Innovative and Applied Research Projects

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Egypt Initiatives to support Innovation and Entrepreneurship

cooperation protocol for activating “Fekretak Sherketak” initiative among the University Students with the Ministry of Investment

- The protocol provided for the development of a start-up program in various sector, including information technology.

- This initiative aimed to support youth and qualifying university students for labor market and to open the door for investing in entrepreneurship and SMEs
Egypt Initiatives to support Innovation and Entrepreneurship

EG-KTAs: Egypt Knowledge and Technology Alliances

10 partners including at least one participant from Universities, Research Institutions, NGOs, local authorities and at least 3 participants from the Industrial sector.

With Budget Up to **10 Million** EGP per alliance for a period of maximum 3 years

Source: Academy of Scientific Research and Technology
Alliance Partners

1. ERI
2. Cairo University
3. AUC
4. Zweil City
5. STCE
6. EPRI

1. AOIE
2. Benha Factory
3. Elkaraphy group
4. Elmaasara for Engineering industry

Creating an enabling environment for Industry Localization and knowledge Production
Ministry of Higher Education and Scientific Research and Industry and Innovation

Creating an enabling environment for Industry Localization and knowledge Production

Alliance Products on the Way of Production

- Electricity smart meter
- Electricity Holding Company Order
- PV Solar system 10KW
- Eltahrir Museum Measurements of E-pulse system (Data Base)
Egypt Initiatives to support Innovation and Entrepreneurship

EG-KTAs: Egypt Knowledge and Technology Alliances

Provide funding graduation projects for students of the final years of applied faculties up to 75 thousand.

Fields that the program support
- Furniture- Decoration
- Dairy production
- Textile
- Green Technology
- Food industry
- Handcraft
- Programming
- Internet of things
- Disabled Programs
- Robotics
- Cartoon films productions
- Waste recycling
- Water and Energy
- Logistics
- Petrochemical industry
- Chemical industry
- Adaptive marine farming
Ministry of Higher Education and Scientific Research and Industry and Innovation

Creating an enabling environment for Industry Localization and knowledge Production

Egypt Initiatives to support Innovation and Entrepreneurship

Joint Collaborative Efforts of Egyptians Expatriates & Scientific Organizations Towards tackling R&D challenges

JESOR initiatives is aiming at establishing solid and sustainable bridges of cooperation between Egyptians, outside and inside Egypt.

- 1 million Egyptian Pound for each project.
- Database for Egyptian scientists abroad
Egypt Initiatives to support Innovation and Entrepreneurship

Technology Transfer Offices

42 technology transfer office

30 Million Egyptian Pounds

Source: Academy of Scientific Research and Technology
Egypt Initiatives to support Innovation and Entrepreneurship

National Program for Technological Specialized Incubators “INTILAC”

- Seed fund up to 200,000 L.E
- Incubation/Acceleration
- Hands-on Training
- Prototype Financing
- Technology Validation
- Technical & Advisory Support
- Networking with Ecosystem
- Seed Funding for Technology Commercialization

Source: Academy of Scientific Research and Technology
National Incubators Program (INTILAC)

- Alexandria with Icealex (General)
- Damietta with Damietta Univ. (Furniture & Dairies)
- Suez with Suez Univ. (Logistics & Fishery)
- Tanta with NRC (Textile)
- Cairo:
  - With Ebni (IOT)
  - With Gesr (General)
  - With CIT (VR & AR)
  - With ERI (IT)
  - With Technology & Innovation Center (Design, leather and Jewelry)
  - With Nile University (General)
  - With Nahdet Masr (Education)
  - With Gafi (General)
- Suhag:
  - With Gafi (General)
  - With GIZ (Agribusiness)
- Qena:
  - With Azhar Univ. (General)
- Asuit:
  - With Asuit Uni. (General)
- New Valley:
  - With Agricultural Research Center (Hand Crafts)

No. of Startups

- Intilac Sohag
- Intilac Cairo
- Intilac Ebni
- Intilac Gesr

Startups

- Internet of Things (IOT)
- Bio-medical
- Agribusiness
- Engineering
- Augmented Reality (AR) & Virtual Reality (VR)
- Hand Crafts
Ministry of Higher Education and Scientific Research and Industry and Innovation

Creating an enabling environment for Industry Localization and knowledge Production

Upgrading Scientific Research Infrastructure

500 Million Egyptian Pounds

- Establishing central labs
- International Accreditation
- Establishing Centre of Excellences and Research Networks
- Establishing cloud computing centers, data analysis and big data centers
- Establishing digital libraries
- International Publishing
Ministry of Higher Education and Scientific Research and Industry and Innovation

Creating an enabling environment for Industry Localization and knowledge Production

- Establishing 31 Centre of Excellences addressing 14 subject
- Upgrading Scientific Research Infrastructure
  - Establishing 56 Central lab with total budget 250 million Egyptian Pounds
  - 37 Labs received International accreditation
Ministry of Higher Education and Scientific Research and Industry and Innovation

Creating an enabling environment for Industry Localization and knowledge Production

Upgrading Scientific Research Infrastructure

- Pharmaceutical & Fermentation Industries Development Centre “PFIDC” at City of Scientific Research and Technological Applications (SRTA)
- Central Labs Network and Centre of Excellence in Medicine at the National Research Centre (NRC)
- Centre for Image processing and Satellite Laboratory.
- Industrial Pilot Plants for Biotechnology and Genetic Engineering
Ministry of Higher Education and Scientific Research and Industry and Innovation

Creating an enabling environment for Industry Localization and knowledge Production

Scientific Research Infrastructure

- Genetic Engineering and Biotechnology Research Institute “GEBRI”
- Advanced Technology and New Materials Research Institute “ATNMRI”
- Environment and Natural Materials Research Institute “ENMRI”
- Informatics Research Institute “IRI”
- Arid Lands Cultivation Research Institute “ALCRI”
- Pharmaceutical & Fermentation Industries Development Centre “PFIDC”
- Technology Capabilities Development Center “TCDC”
Ministry of Higher Education and Scientific Research and Industry and Innovation

Upgrading Scientific Research Infrastructure

Creating an enabling environment for Industry Localization and knowledge Production

Electronics Research Institute
Scientific City for Microelectronics, information technology and new and renewable energy

600 Million Egyptian Pounds
Production of high quality spare parts for power plants

Manufacture of a double-decker train

Production of Ammonia injection device

Self extinguishing device

Petrochemicals and non-conventional oil recovery to ensure recovery of 30-40% of the remaining ODS.

Manufacturing a complete unit for the manufacture of floating fish feed to suit the requirements of the Egyptian environment

84 Million Egyptian Pounds for 33 Initiatives and Projects

✓ Production of high quality spare parts for power plants
✓ Manufacture of a double-decker train
✓ Production of Ammonia injection device
Manufacturing Electrical Vehicle with solar cells in collaboration with the ministry of environment
Reinforce Local Manufacturing

Designing and Manufacturing of e-bicycle
Take urgent action to combat climate change and its impacts

Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Strengthen the means of implementation and revitalize the global partnership for sustainable development
Production of knowledge, transfer and localization of technology to contribute to economic and societal development

Agriculture and Food Sectors

- 100 Million Egyptian Pounds to fund Mega projects in collaboration of the Agriculture Research Centre to increase the productivity of important crops

- Increase in the productivity of wheat from an average of 18.5 Ardab per feddan to an average of 24.5 Ardab per feddan

- Development of Plastic Silos

- Local manufacture of vehicle for the transportation and weight of agricultural crops

- The production of hybrid rice strains is characterized by increased productivity and reduced water supply

Applied and Basic Research

- 540 Million Egyptian Pounds for over 620 projects
Emerging Economies University Rankings 2019: results announced

Malaysia and Egypt are making rapid higher education progress, largely because of improvements in citation impact.

January 15, 2019

By Ellis Botswell
Twitter: @EllisBotswell
Research Output of Emerging Economies “2018”

Egypt and Pakistan had highest rise in research output in 2018

Global production of scientific papers hit an all-time high this year, estimates show, with emerging economies rising fastest.
Emerging Economies with the largest increases in research output in 2018

<table>
<thead>
<tr>
<th>Country</th>
<th>Publication output growth (%)</th>
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<tbody>
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<td>Pakistan</td>
<td>20</td>
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<tr>
<td>Egypt</td>
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<tr>
<td>Mainland China</td>
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<td>Hong Kong</td>
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<td>India</td>
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<tr>
<td>Brazil</td>
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<tr>
<td>Mexico</td>
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<tr>
<td>Iran</td>
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<td>Poland</td>
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<tr>
<td>South Africa</td>
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Global production of scientific papers hit an all-time high this year, estimates show, with emerging economies rising fastest.
Facts & Figures: Egyptian Universities Ranking (Africa)
Nanotechnology
Nanotechnology

Field Weighted Citation
#48

Citations Count
#27

Research Output
#23

Total Ranked Countries: 100

Scholarly Research Output: 266 of 20,705
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<tr>
<th>Countries &amp; territories</th>
<th>Scholarly Output</th>
<th>Views Count</th>
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</table>
Egypt: Facts & Figures

Egypt’s R&D Expenditure

What happened in 2009?

Investment in R&D increased starting from 2009

Sources: World Bank
NUMBER OF PUBLISHED RESEARCH IN INTERNATIONALLY CITED INDEXED JOURNALS
(1925-2017) IS 218,300 PAPERS
Egypt: Facts & Figures


Scholarly output
107,448

Authors
84,722

Citation Count
563,934

Citation per article
5.2
Egypt: Facts & Figures


Field weighted Citation Index

1.00
Egypt: Facts & Figures


Topics Prominence

- COMP: Computer Science
- MATH: Mathematics
- PHYS: Physics and Astronomy
- CHEM: Chemistry
- CENG: Chemical Engineering
- MATE: Materials Science
- ENGI: Engineering
- ENER: Energy
- ENV: Environmental Science
- EART: Earth and Planetary Sciences
- AGRI: Agricultural and Biological Sciences
- BIOC: Biochemistry, Genetics and Molecular Biology
- IMM: Immunology and Microbiology
- VET: Veterinary

- MEDI: Medicine
- PHAR: Pharmacology, Toxicology and Pharmaceutics
- HEAL: Health Professions
- NURS: Nursing
- DENT: Dentistry
- NEUR: Neuroscience
- ARTS: Arts and Humanities
- PSYC: Psychology
- SOCI: Social Sciences
- BUSI: Business, Management and Accounting
- ECON: Economics, Econometrics and Finance
- DECI: Decision Sciences
- MULT: Multidisciplinary
Water Desalination

Field Weighted Citation
#29

Citations Count
#13

Research Output
#8

Total Ranked Countries: 100

Scholarly Research Output: 408 of 10,282
Water Desalination

Total Value of Research Output

Total 100 Countries & Regions in this research area: by Research Output

1. China
2. United States
3. South Korea
4. Iran
5. India
6. Saudi Arabia
7. Egypt
8. United Arab Emirates

x-axis: Publication Year
y-axis: Scholarly Output
Types of publications included: all.

--- incomlete year

SciVal
Electric Vehicles
Electric Vehicles

Field Weighted Citation
#34

Citations Count
#35

Research Output
#41

Total Ranked Countries: 100

Scholarly Research Output: 133 of 39,706
Electric Vehicles

Total Value of Research Output

Total 100 Countries & Regions in this research area: by Research Output

1. China
2. United States
3. Germany
4. Japan
5. South Korea
6. Taiwan
7. Singapore
8. Egypt

<table>
<thead>
<tr>
<th>x-axis: Publication Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>y-axis: Scholarly Output (total value)</td>
</tr>
</tbody>
</table>

Types of publications included: all.
Smart Agriculture

Field Weighted Citation
#76

Research Output
#58

Citations Count
#83

Total Ranked Countries: 100
Starting Year of Publication: 2017
Total Value of Research Output

Smart Agriculture

Total 100 Countries & Regions in this research area: by Research Output

1. India
2. United States
3. China
4. Italy
5. United Kingdom
6. Germany
7. France
8. Japan
9. Taiwan
10. Egypt
11. Israel

Publication Year

Scholarly Output

Types of publications included: all.
Collaboration between Egypt- African States
Collaboration between Egypt- Africa States

African Students in Egyptian Higher Education

6820 African students studying in Egypt since 2014
On-going projects in collaboration between Egypt- African States

African Young Scientists Prizes, 3 prizes each worth 15 thousand USD provided through the Academy of Scientific research and Technology (ASRT)

African Young Researchers grants, 5 grants each worth 13 thousand USD provided through the Academy of Scientific research and Technology and Bibliotheca Alexandrina
On-going projects in collaboration between Egypt- African States

The Academy of Scientific research and Technology (ASRT) in cooperation with Theodor Bilharz Research Institute (TBRI) and The African Network for Drugs and Diagnostics Innovation (ANDI) offer capacity building in the field of Infectious diseases, drug diagnostic and innovation. That is $15,000 USD per year for around 10 researchers from different African states.
“If you want to go fast, go alone. If you want to go far, go together”

African Proverb