

وزارة التعليم العالي و البحث العلمي Ministry of Higher Education & Scientific Research



















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







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

















Clean

Water







Scientific research and innovation achieve the objectives of sustainable development





Continuous Development

Ideas

New visions

Innovations Intelligences Solutions









































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's Vision

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.





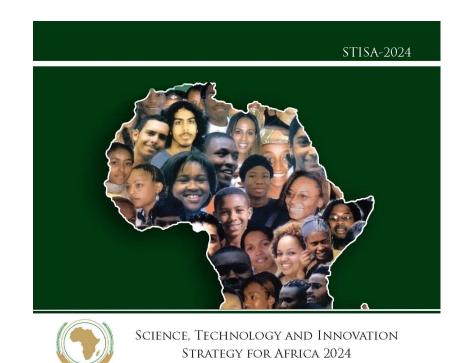






Africa's Agenda 2063 & STI 2024

- 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".

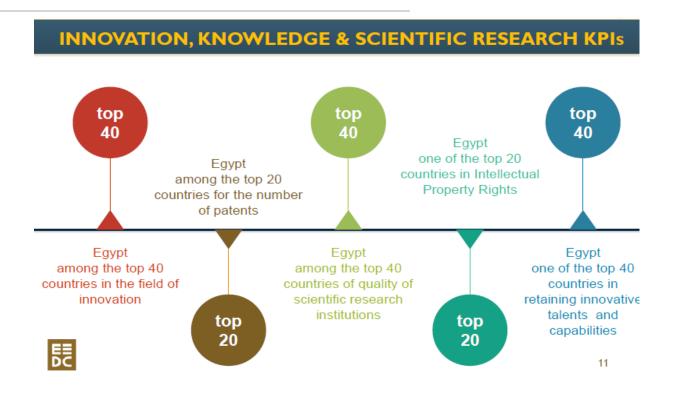




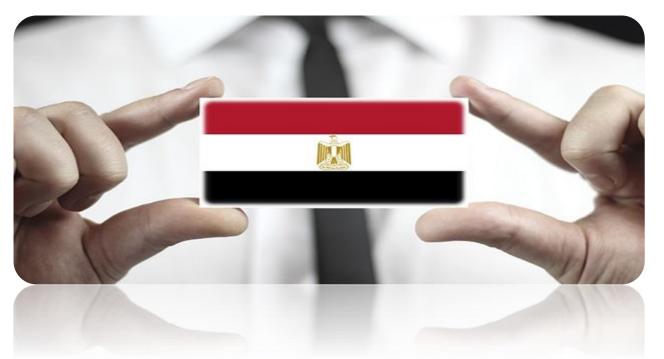
Sustainable Development Strategy: Egypt's vision 2030

The STI Pillar









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





& Scientific Research

Comprehensive STI Strategy

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Pillars

Effective Environment for Science, Technology and Innovation

- 1- legislations
- 2-Scientific Base
- 3-STI system
- 4-Basic & converging sciences
- 5-Link academia/Industry
- **6- International Cooperation**
- 7- Science & society
- 8- Capacity Building for human resources.

Knowledge and Technology Transfer

1-Health and well being 1

2- New & Renewable Energy

3- Water

4-Food and Agriculture

5-Environment

6- Applied Technologies

7- Strategic Industries(Textile, Pharmaceuticals, Electronics)

8- Tourism

9- ICT

10- Emerging

Technologies

11-Education

12-Media

13-Politcal sciences

14-Transportation

15-Social sciences

and Humanities

Tools

Fund, STI Policies, Follow Up, Monitoring and Impact Assessment





استراتيجية البحث العلمي



قضايا الدولة وخطط التنمية

> طلبات الوزرات

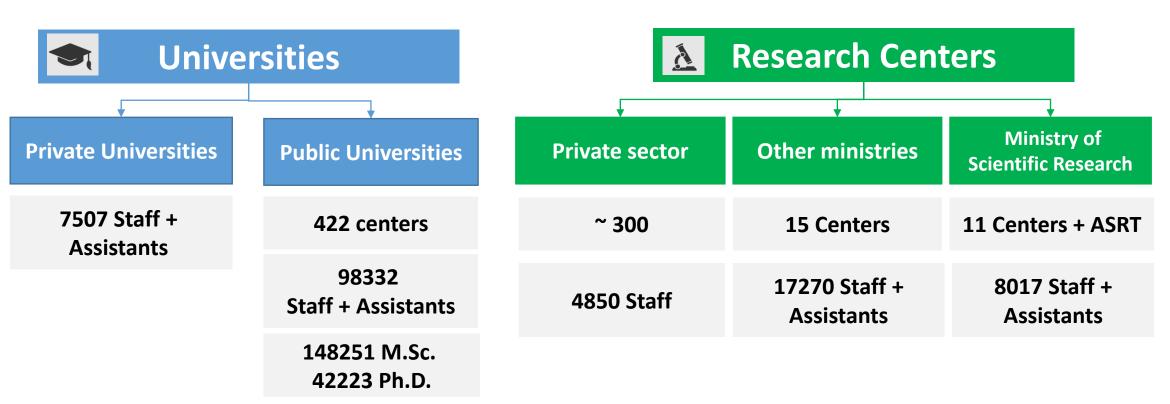
إحتياجات الصناعة والتطوير

زيادة النشر العلمي رفع ترتيب مصر في المتميز موشر الابتكار العالمي

تحسين المساهمة في حل قضايا الدولة والصناعة



Egypt: Facts & Figures



40% of time dedicated for research

Full time equivalent 100%

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

Egypt: Facts & Figures



htific Research

National Research Centre

National Institute of Oceanographic and Fisheries

Central Metallurgical Research and Development Institute

Theodor Bilharz Research Institute

Central Metallurgical Research and Development Institute

Research Institute of Ophthalmology

National Research Institute of Astronomy and Geophysics

National Institute of Standards

Central Metallurgical Research and Development Institute

National Authority for Remote Sensing and Space Science

City of Scientific Research and Technological Application

Research Centers
affiliated to the
Ministry of Scientific
Research

Egypt: Facts & Figures



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



Higher Education and Scientific Research Strategy 4.0

Egypt Seeks **Excellence** in Higher Education and Scientific Research

To be prepared for the

The Fourth Industrial Revolution 1st 2nd 3rd 4th Mechanization, water power, steam power Mass production, assembly line, electricity Computer and automation Cyber Physical Systems

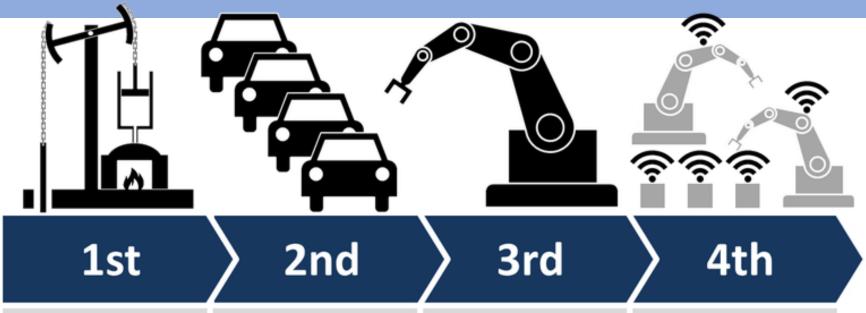
Source: by Christoph Roser at AllAboutLean.com)

Preventive examinations/ Robot-supported caregiving Extending healthy life expectancy/ Reducing the social cost Society 5.0 Stable supply of energy/ Gild emission reduction Automating the agricultural industry/ Optimal home delivery Increasing production of foodstuffs/ Reducing waste Source: www8.cao.go.jp



Universities and Labour Market needs

The Fourth Industrial Revolution



Mechanization, water power, steam power Mass production, assembly line, electricity

Computer and automation

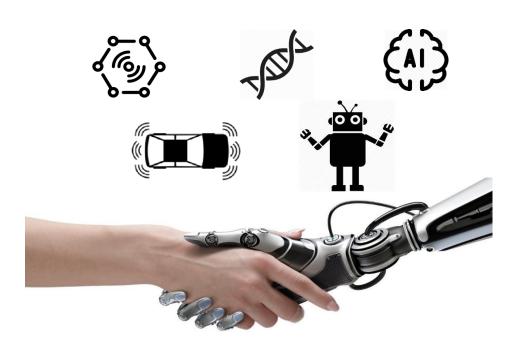
Cyber Physical Systems



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:

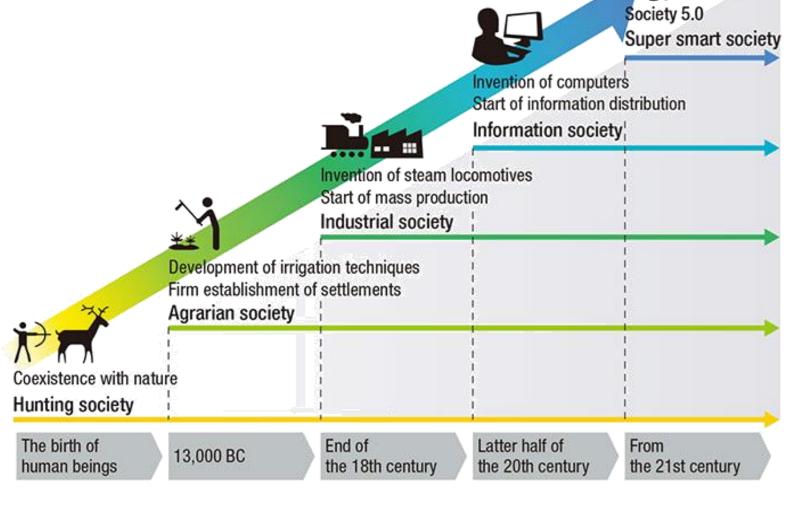
- Artificial intelligence
- 3D printing
- Mobile supercomputing
- Genome Editing
- Smart robots
- Self-driving cars





Society 5.0





Economic and social innovation by deepening of Society 5.0

> Source: Prepared based on materials from the Japan Business Federation (Keidanren)





INTERNET OF THINGS

A society in which people and objects are linked to create new value



ARTIFICIAL INTELLIGENCE

A Society in which information is exchanged when needed



INNOVATION

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



ROBOTICS

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

International Universities

- 1- El Glala University
- 2- Egyptian Science Academy
- 3- University of Alamein
- 4- New Mansoura University
- 5- King Salman University
- **6- Egyptian Japanese University**
- 7- Zewil City for Science and Technology.

Governmental Universities

- 8- Matrouh University.
- 9- Luxor University.
- 10- Red Sea University.
- 11- New Valley University.

Technological Universities

- 12- New Cairo TU
- 13- Quesna TU
- 14- Beni Suief TU

IBCs

- 15- Canadian Universities
- 16- European University
- **17- American Complex**
- 18- Global University
- 19- Hungarian Universities
- **20- UK Universities**
- 21- German University

Research Centers

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

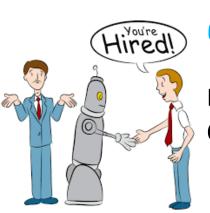


Future Jobs

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.





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Ministry of Higher Education and Scientific Research and SDGs

















13 CLIMATE ACTION





















Ministry of Higher Education and Scientific Research Ensuring quality life long learning for all

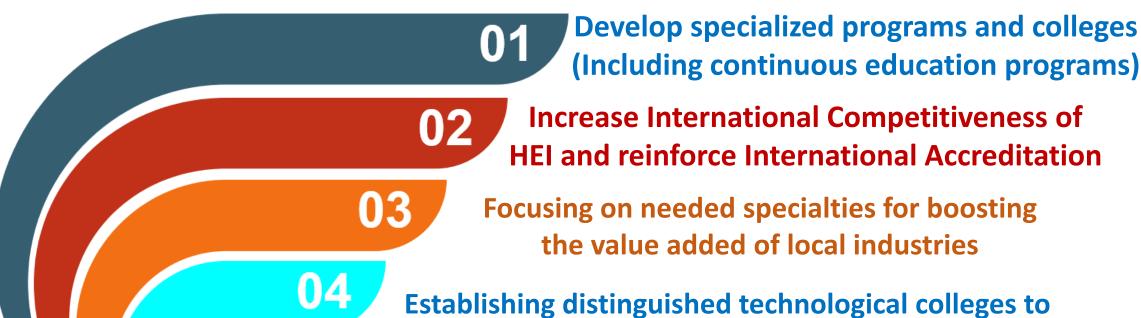


Higher Education Reform

Higher

Education

System



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

Ministry of Higher Education and Scientific Research 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

Law for the Establishment of Technological Universities

Accessibility to Technological Education

10 Applied Universities

New Specializations

On the job training

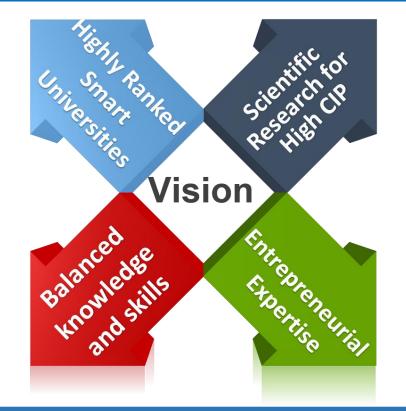


Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all





New Smart Universities







Smart New Universities

















Ministry of Higher Education and Scientific Research and Health University Hospitals contribution in the Health Care System

Serving 20,000,000 Patients annually





Ministry of Higher Education and Scientific Research and Water Issues



Water Desalination

50 Million Egyptian Pounds funding 14 Initiatives and Projects

✓ 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>



Ministry of Higher Education and Scientific Research and Energy Issues



€25 Million EU Funded Grant

- ✓ 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



Creating an enabling environment for Industry Localization and knowledge Production

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







Creating an enabling environment for Industry Localization and knowledge Production

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





Creating an enabling environment for Industry Localization and knowledge Production

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





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)





Creating an enabling environment for Industry Localization and knowledge Production

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







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





Creating an enabling environment for Industry Localization and knowledge Production

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



Creating an enabling environment for Industry Localization and knowledge Production

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



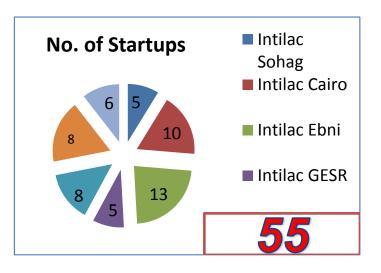
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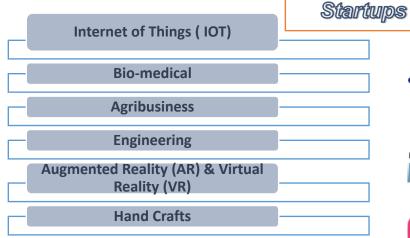
National Incubators Program (INTILAC)

- Alexandria with Icealex (General)
- Damietta with Damietta Unv. (Furniture & Dairies)
- Suez with Suez Unv. (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 Unv. (General)
- Asuit : -With Asuit Uni. (General)
- New Valley With Agricultural Research Center (Hand Crafts)































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





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





Creating an enabling environment for Industry Localization and knowledge Production

Upgrading Scientific Research Infrastructure

Egyptian Space Agency

Establishing and International Research and Therapeutic Centre for Stem Cells and Tissue Culture

Establishing a new astronomical observatory

- 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







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"







Creating an enabling environment for Industry Localization and knowledge Production

Upgrading Scientific Research Infrastructure

Electronics Research Institute

Scientific City for Microelectronics,
information technology and new
and renewable energy







Creating an enabling environment for Industry Localization and knowledge Production

84 Million Egyptian Pounds for **33** Initiatives and Projects

- ✓ 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

- ✓ Production of high quality spare parts for power plants
- ✓ Manufacture of a double-decker train
- ✓ Production of Ammonia injection device





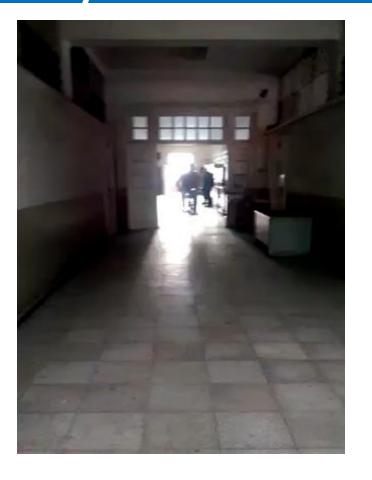




Manufacturing Electrical Vehicle with solar cells in collaboration with the ministry of environment







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

Ministry of Higher Education and Scientific Research and SDGs



Production of knowledge, transfer and localization of technology to Ministry of Higher Education contribute to economic and societal development

Agriculture and Food Sectors

of important crops

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

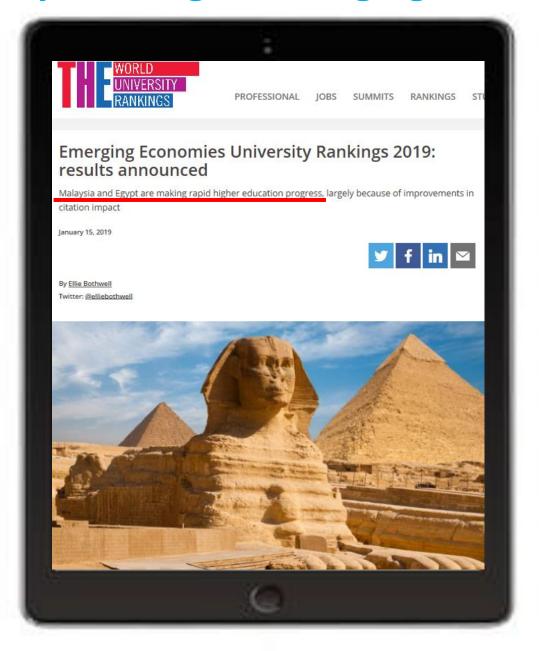
- ✓ increase in the productivity of wheat from an average of 18.5 Ardab per feddan to an average of 24.5 Ardab per feddan
- Development of Plastic Silos
- Local manufacture of vehicle for the transportation and weight of agricultural crops
- ✓ The production of hybrid rice strains is characterized by increased productivity and reduced water supply

Applied and Basic Research

540 Million Egyptian Pounds for over 620 projects



University Ranking of Emerging Economies "2019"



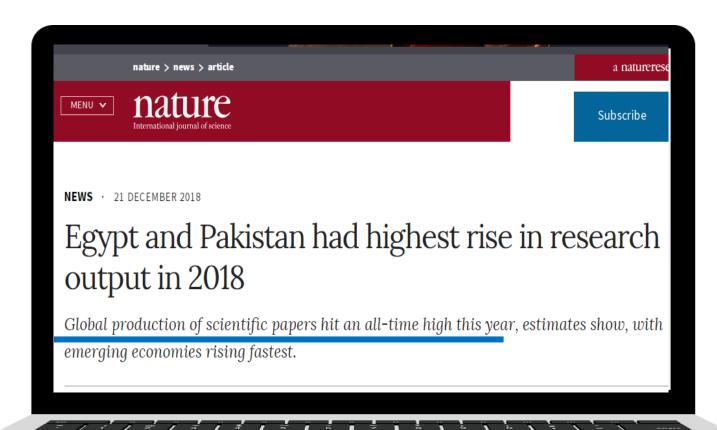


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Research Output of Emerging Economies "2018"



& Scientific Research



Emerging Economies with the largest increases in research output in 2018



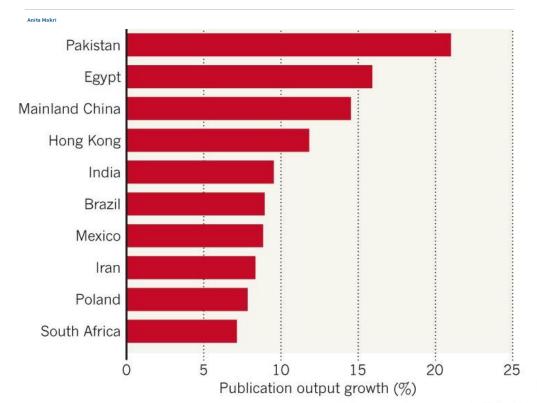
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NEWS · 21 DECEMBER 2018

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.







Facts & Figures: Egyptian Universities Ranking (Africa)

THE - World University Rankings 50 45 ----Africa # of ranked universities 40 ---Egypt 35 --- South Africa 30 **—**Uganda 25 --- Ghana 20 **Egypt** ---Kenya 15 --- Nigeria 10 ---Tunisia 5 ----Algeria 2017 2018 -- Morocco Year



Nanotechnology



Nanotechnology





Nanotechnology

	Countries & territories	Scholarly Output ↓	iews Count	Field-Weigh 🗸	Citation Cou	
1.	United States	5,139	180,878	1.77	82,198	
2.	China	3,022	98,398	1.60	48,359	
3.	India	2,462	80,035	1.18	20,263	
4.	■ I Italy	1,115	54,049	1.74	13,931	
5.	Germany	1,071	38,438	1.70	16,102	
6.	United Kingdom	1,057	44,163	1.92	18,305	
7.	▼ Iran	834	35,103	1.53	7,935	
8.	Spain	799	37,823	1.64	10,845	
9.	■ France	721	26,716	1.52	7,932	
10.	South Korea	687	27,864	1.48	8,871	
11.	■ Brazil	668	24,135	1.15	5,787	
12.	 Japan 	657	18,911	1.38	8,718	
13.	I►I Canada	569	25,645	1.54	9,115	
14.	Russian Federation	553	15,009	0.88	3,072	
15.	Australia	528	23,796	2.15	11,267	
16.	Saudi Arabia	391	20,004	1.90	5,378	
17.	Malaysia Malaysia	347	16,986	1.41	4,157	
18.	Singapore	327	18,043	2.57	9,087	
19.	Poland	325	12,017	1.06	2,479	
20.	Switzerland	294	13,324	1.95	5,187	
21.	Portugal	289	13,262	1.64	3,655	
22.	■ Netherlands	273	13,745	1.95	5,099	
23.	■ Egypt	266	8,930	1.35	2,495	
24.	Turkey	261	9,139	1.32	1,706	
25.	Taiwan	251	9,098	1.10	2,284	



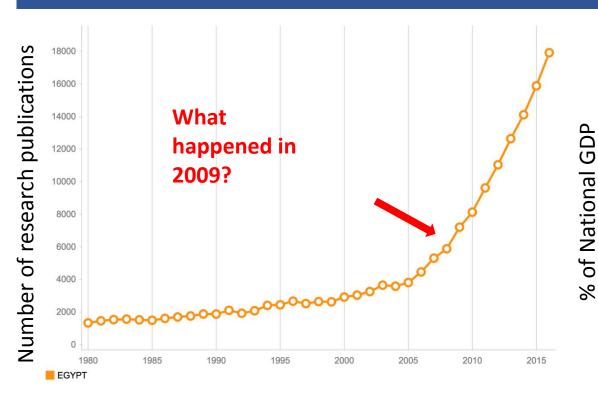
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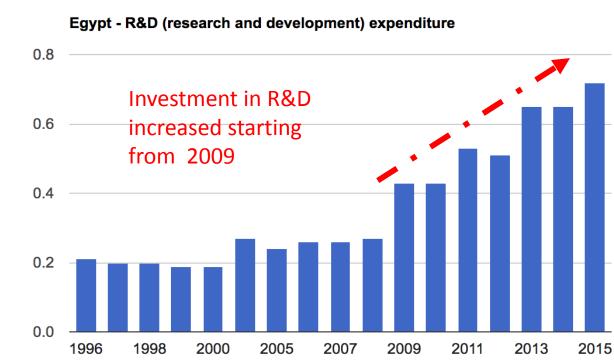












Sources: World Bank

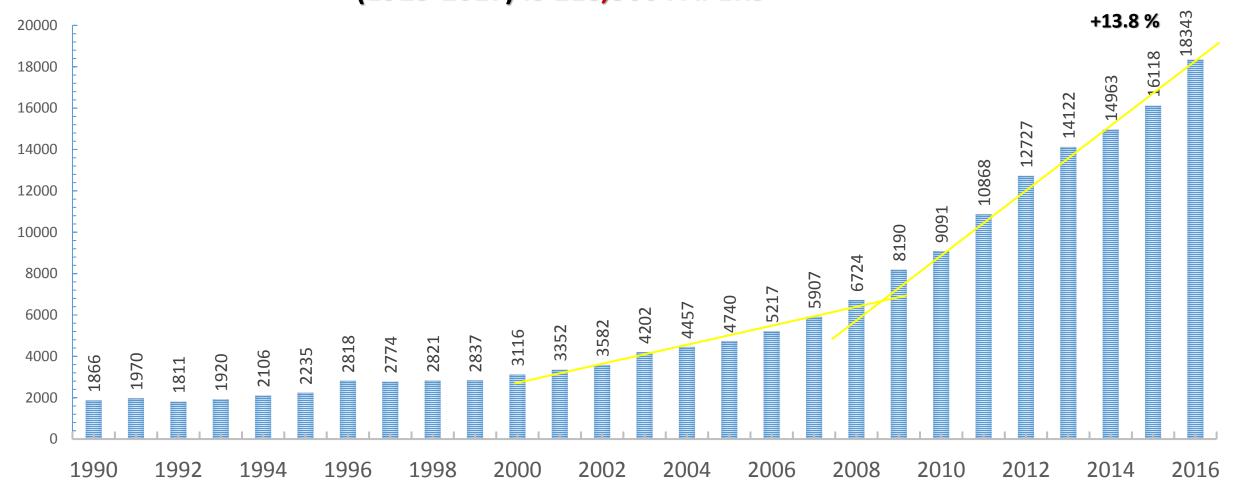
Egypt's R&D Expenditure





NUMBER OF PUBLISHED RESEARCH IN INTERNATIONALLY CITED INDEXED JOURNALS

(1925-2017) IS **218,300** PAPERS





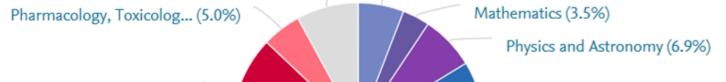
Overall Research Performance (2013-2018)



107,448

Other (7.9%) Computer Science (5.9%) 563,934

Chemistry (8.6%)



Authors

84,722

Immunology and Microbiology (2.3%)

Biochemistry, Genetics ... (8.1%)

Agricultural and Biolog... (5.7%)

Earth and Planetary Sci... (2.5%)

Medicine (14.6%)

Environmental Science (4.0%)

Chemical Engineering (3.4%)

Materials Science (7.1%)

Engineering (11.7%)

Energy (2.8%)

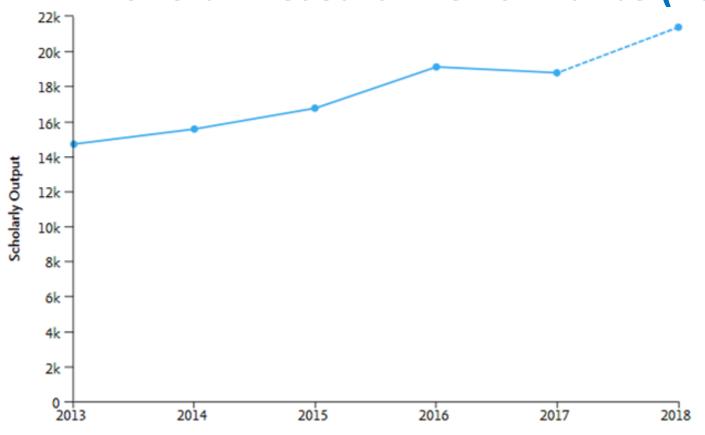
Citation per article

5.2





Overall Research Performance (2013-2018)



Field weighted
Citation Index
1.00

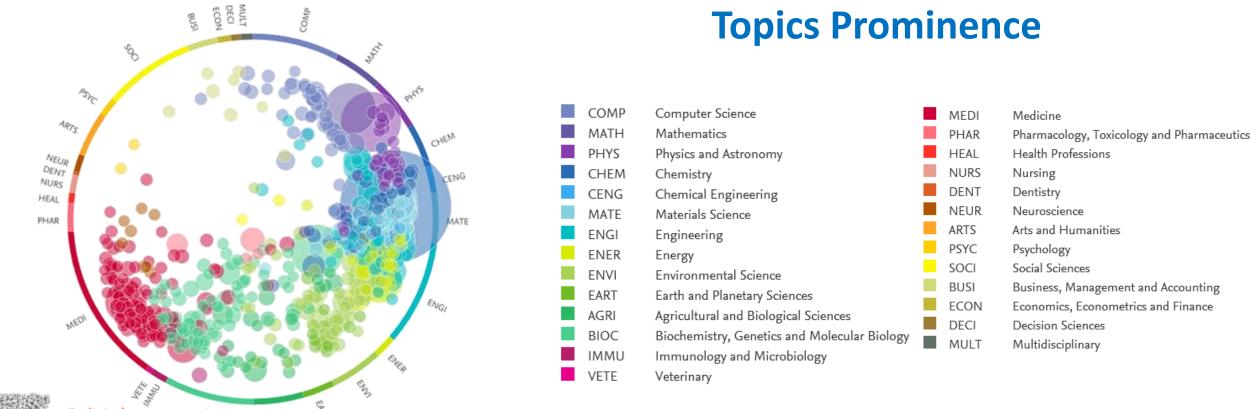


SciVal

Publication Year

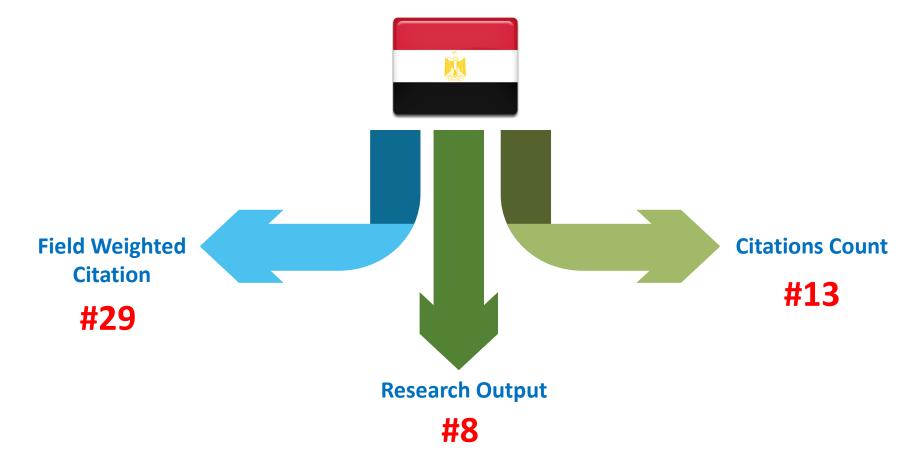


Overall Research Performance (2013-2018)





Water Desalination



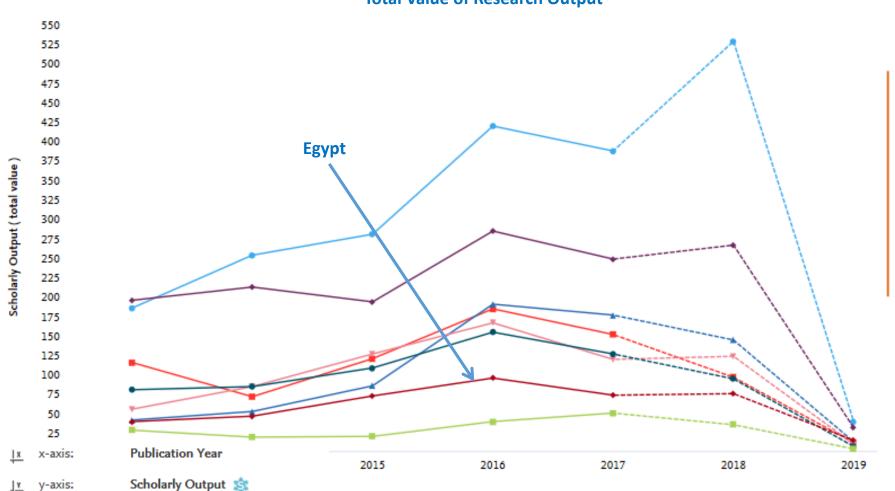


Water Desalination



& Scientific Research





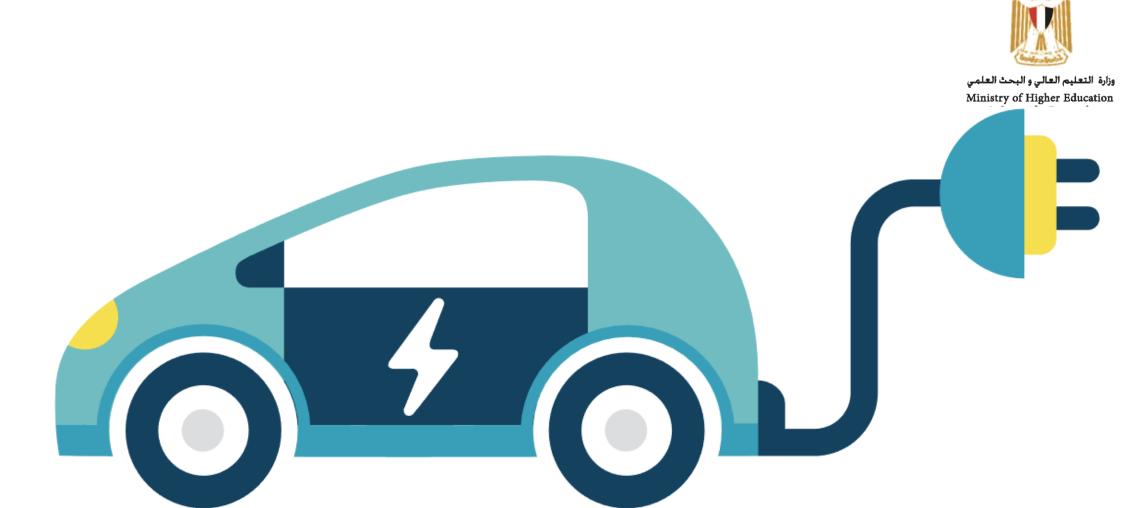
Total 100 Countries & Regions in this research area: by Research Output







Types of publications included: all.



Electric Vehicles



Electric Vehicles

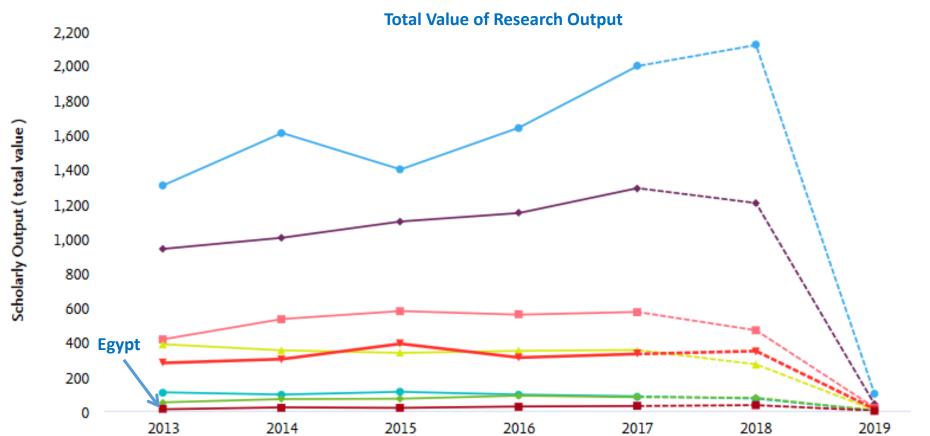




SciVal Total Ranked Countries: 100

Electric Vehicles





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



 Ix
 x-axis:
 Publication Year

 Jy y-axis:
 Scholarly Output ★

Types of publications included: all.







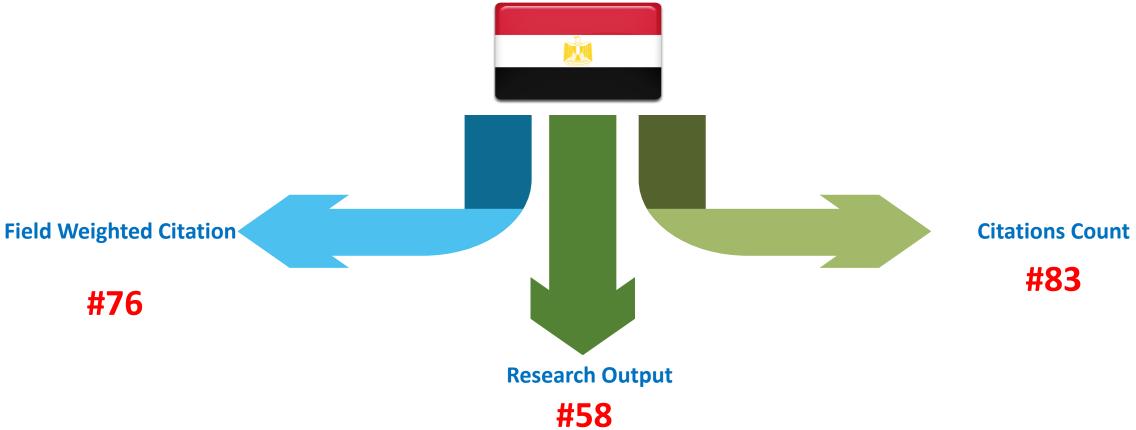
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Smart Agriculture



Smart Agriculture



SciVal

Total Ranked Countries: 100 Starting Year of Publication: 2017

Smart Agriculture

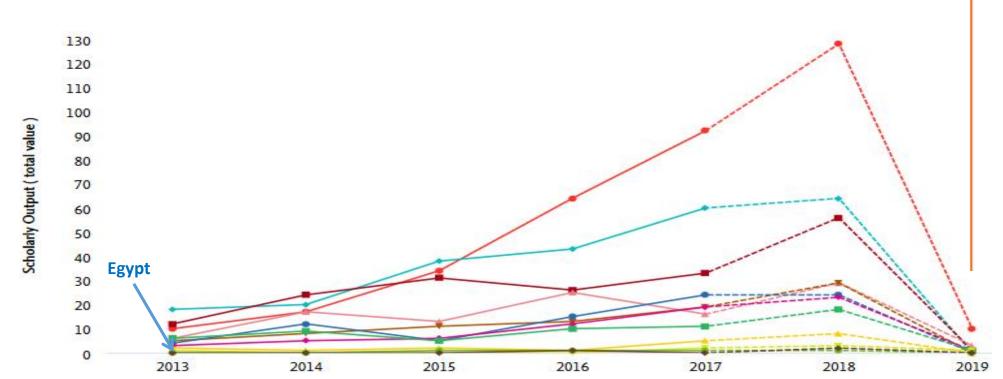


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Total 100 Countries & Regions in this research area: by Research Output







Metric details

y-axis:

<u>Ix</u> x-axis: 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, $\frac{5}{9}$ grants each worth $\frac{1}{3}$

thousand USD provided through the Academy of Scientific research and Technology and Bibliotheca Alexandrina



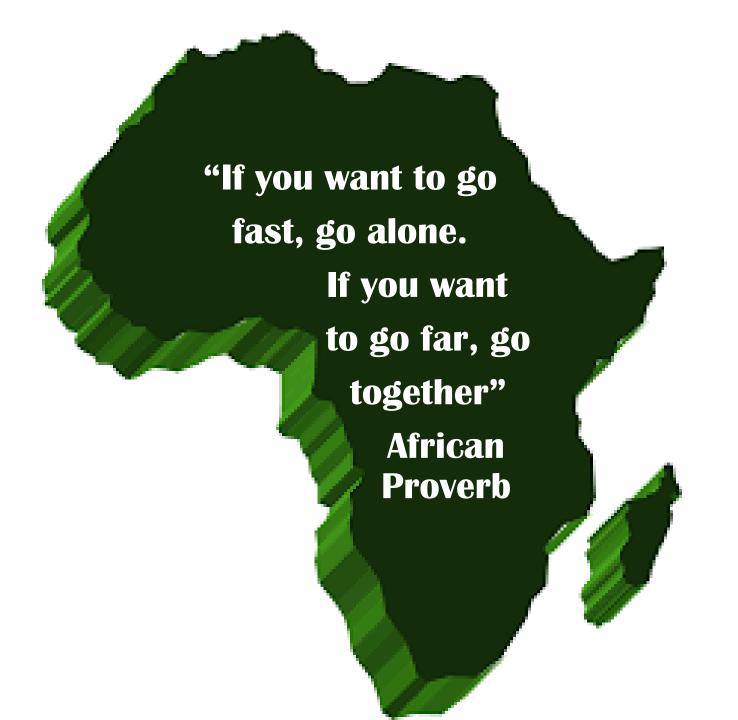
On-going projects in collaboration between Egypt- African States

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

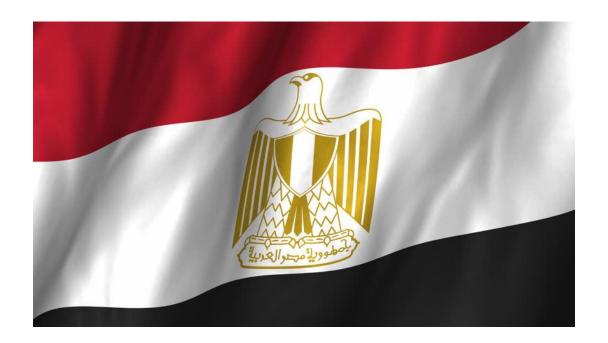
15

thousand USD per year for around researchers from different African states









Thank you