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FOREWORD

The purpose of Ibitikar Research Agenda (RA) is to outline the priority research areas that has to be developed, the objectives, the outcomes and desired impacts, the types of intervention and resources available and sector of intervention.

It is an exciting and ambitious endeavour involving 11 Libyan Universities and the University of Salento, together with the EUROMED that will streamline and coordinate the research to enable improvements to the efficient and effective use of resources, exploit synergies and avoid overlaps.

The RA can be considered a starting point, a part of a dynamic process that will lead to a continuous update of this agenda: the more it is cherished and shared, the more it will contribute to the enhancement of the general quality level of the training offer, to the improvement of the research activities in Libya. The RA aims at promote and favourite the cooperation between Libya Universities and the international partners and the future joint activities will implement this trajectory.

The understanding of the complex Libyan scenario with its changed political framework is fundamental in order to achieve significant advance in cooperation for innovation, because the Libyan Universities cannot remain at the margins of the Higher Education (HE) that throughout the world has undergone a deep change (1). This project aims to the theoretical and experimental characterization of an Action Plan and a White Paper for scientific support for the organization of exchange of good practices and extensive knowledge within the IBTIKAR Project. In particular, it focuses on a participatory modality to achieve the goals.

Where a struggle for knowledge is also a struggle for freedom, every synergistic effort of the partners involved in a project becomes incredibly charged with positive energy able of changing the state of things. The multifaceted and complex reality of things requires a moment of silence and bibliographic research in order to penetrate a new world that has so much to offer. Libyan universities have a large potential to improve both fundamental and applied research. High quality research aims at improving the quality of scientific production, the participation in national and international research funding opportunities and the excellence research of individuals through strategic actions and initiatives. With this awareness, the fact of writing an RA for the IBTIKAR project is a challenging and exciting task.

Executive Summary



The Research Vision

The Research Vision encompasses many significant topics that become emblematically representative of entire semantic fields to be analysed, deepened, metabolized, in order to achieve the objectives set for us at the outset:

- ✓ Solving complex global challenges;
- ✓ Empowering whole communities;
- ✓ Strengthening of the reputation;
- ✓ Creation of infrastructure, services and platforms;
- ✓ Elaboration of a strategic plan;
- ✓ Mapping the strengths;
- ✓ Consulting with the research community;
- ✓ Identifying the most critical challenges;
- ✓ Identifying thematic areas that will form a framework for the University's continuing crossdisciplinary;
- ✓ Make research efforts;
- ✓ Ensuring that the research discoveries are translated into relevant real-world solutions;

- ✓ Strengthen and expand key international partnerships with universities, enterprise, government and
- ✓ Communities.

Purpose

Scientific and technological research needs to grow within a multi-stakeholder perspective to strengthen public-private partnership and promote endogenous socio-economic development. Therefore, it is needed to design specific Institutional Research Agenda on the basis of the shared action that bring research to socio-economic stakeholders. Finally, it is fundamental to build a network with the international research community to enable the scientific growth of individuals and the whole academic structure. University decision-makers, define (thanks to a bottom-up participatory approach) the institutional research agenda that will be validated and shared by all the participants.

The Research Agenda (RA)

The RA has been developed purposely with the aim to present the cultural and specific scenery of every Libyan University, as an integrated research area. The outcome of the work is that some priority research areas have been identified by every University. Using the Research Vision document as a starting point, input was requested from the Libyan Universities, in order to make an assessment of their needing and to reflect the key facets of cultural identity: the tangible, intangible and digital. The Research Agenda will help to identify, address and tackle these research challenges not only to improve nowadays the academic reality, but also for help Libya's future economic growth and jobs.

Identifying priorities

Every Libyan University participating in the Ibtikar Project set up a consultation panel of individual experts who represent every research field and discipline. Each Panel identified research areas, activities, gaps and needs across the key facets of tangible, intangible and digital cultural heritage. This input, supported by Euromed and University of Salento, further consultation and expert analysis, identified the priority research areas, future requirements and what will be needed to reach the goal prefixed: promote research and strategic synergies.

Priority Research Areas

The RA declares that it's fundamental to develop scientific support for the organization of knowledge exchange and capacity building actions, in order to promote the academics and administrators activities of Libyan universities. The cooperation for innovation and the exchange of good practices, are crucial and present numerous opportunities and challenges for the people involved in the Ibtikar Project. The RA also recognizes the importance of encourage researchers to

ask the core questions of what is important to improve to come across the gap that exist nowadays and how to make choices.

The priority research areas represent the research areas, gaps and needs identified as part of the consultation. These have been grouped into themes which reflect the broader issues of the scientific research landscape.

Enabling Activities

The Libyan Universities identified a number of priorities that have to be examinated. The elements that are essential for the new research landscape to be successful include soft skills, capability and capacity, management strategies, knowledge sharing and research infrastructure.

Future Research requirements

It has to be provided a study for a structured, forward thinking assessment of the possible future research landscapes. It was guided by one underpinning belief: changes in technology, society, the environment and the economy will be seminal in shaping the future context for research. Furthermore, it has to be highlighted that engaging with experts with an extensive knowledge in a specific field, can a meaningful depiction of anticipated changes be created.

Delivery of the RA

The overwhelming need is for research to be truly integrative and provide opportunities to explore the innovation frontiers and promote synergies. Future research should involve collaboration and work across boundaries disciplinary, conceptual, theoretical, methodological and international.

The Capacity building action

Capacity building action is needed: it will represent the core of Ibtikar Project. Action with both horizontal skills training for Academic and Administrative staff and advanced Thematic skills training for Academic staff and Administrative staff have to be performed through study visits and training weeks.

In details, it is necessary also to enforce the capacities of both Academic Staff and Administrative Staff by providing a consistent training and capacity building action sharing knowledge. European Partners train Libyan Partners on the basic skills required to run research on the basis of the designed model:

- Horizontal skills (soft skills, ICT skills, Research Management, English Language) for all the Administrative and Academic staff of the involved Libyan Universities;
- A Thematic training for Research and Administrative Staff on European and International funding programmes and how to access them, i.e. proposal writing and networking;

- An advanced thematic training on how to manage Research Centers/PhD programmes for the Administrative staff coming from more advanced Libyan Universities;
- An advanced thematic training on contents and methods for Research activities/PhD programmes, in the specific field of Environmental Studies, for the Academic staff coming from more advanced Libyan Universities.

Conclusion

There is genuine willingness to work together, to overcome the fragmentation of information on the state of research, to streamline national programmes to reduce duplication, to exploit synergies and to coordinate research in the cultural heritage arena. The RA also opens up opportunities to create partnerships with the private sector in various fields and other industries. With sufficient and sustained investment, it will be possible to implement this Agenda for the protection and enhancement of Libyan Universities.

INTRODUCTION

Background

Libyan cultural environmental is of exceptional importance. Scientific research is nowadays a necessity and a priority for Universities, which requires accelerating the establishment of procedures and foundations for it, in order to be requirement for every student in Libyan universities (2). The development of countries and achieve their goals and strength depends on what they accomplish and progress of scientific research (3).

It's clear that scientific research is the only way to bridge the gap that separates developing countries from the developed world: it can be considered a necessity that cannot be overstep for many Arab countries, including Libya. On the one side, and on the other side, Libyan researchers can maintain and strengthen their national achievements and preserve their identity and their entity only by having the corner of scientific research (4). In 2009 Tashani highlighted that there was a potential for improving the scientific research environment in Libya (5). One reason to be optimistic about the prospects of the future of science in Libya was the number of postgraduate students in all disciplines who are training in European and North American Universities. According to statistics of the Higher Education Authorities in Libya, there were approximately 3000 Libyan students enrolled in postgraduate studies in British universities alone and almost half of this number in North America (6). However, research output of Libyan universities' academic staff members is still very low (5).

Development experts believe that scientific research is the locomotive that drives society towards sustainable development (2), but there are difficulties that stand in the way of the use of electronic journals, which are technical difficulties, and that the individuals of the sample have a weakness in the skill of using the Internet as needed (7). Four major reasons (5) may explain the problems facing scientific research in Arab countries in general and in Libya in particular: brain drain; lack of funding; lack of scientific infrastructure and incompetent supportive staff, and teaching overload. In 2006 has been estimated that 54% of doctors, 26% of engineers and 17% of scientists graduating from Arab and African universities migrate to Europe, the United States of America (USA) and Canada, and half of African and Arab students studying abroad never return (8).

Higher Education now functions and in relation to its governance, in terms of decisions and strategic orientations while offering training, looking for a better adaptation to the demands of the job market and the emergence of new profiles introduced by the digital revolution. To face these challenges, solutions must be collective. The Libyan Universities must be helped to not remain at margins (1).

It is important to project a training for the graduate student on scientific research skills in what is related to all of his fields, as well as how to write, present and interpret results, proposals and recommendations, and what are the best ways to document references by adding a course for masters and doctorate students that specializes in the basics of scientific research and methods of writing it in the scientific way (2).

Efficient networking between the Libyan scientists abroad and the Libyan scientific institutions could benefit the research community in Libya and in the long run attract the migrated scientists to the potential scientific research opportunities that exist in the country. The new generation of Libyan researchers has a great role to play in keeping the link with the institutions they have trained in and developing an extensive network with other Libyan scientists. A bidirectional relationship between Libyan researchers working in Libya and those working elsewhere is beneficial to both parties (5).

The recently changed Libyan political framework, following the fall of Gaddafi's regime and the resultant end of the international embargo, lead the international community and UNIMED in primis to use the Erasmus+ Capacity Building program as a primary tool to explore possible collaboration paths with Libyan Universities. "Erasmus+ has represented a key to open the door for a fruitful cooperation, for fresh relationship with Libyan actors, for a better understanding the complex Libyan scenario. We therefore activated our university network, created stable and coherent channels of communication, established relationships with Libyan universities in order to jointly open the way for a long-lasting collaboration framework, with the only country of the southern shore of the Mediterranean that, at that time, was not yet part of the UNIMED network.", said the experts of UNIMED (1), in the same report it is highlighted that "The challenge is to pacify the country through knowledge, through the values of peace and harmony, through development and interregional dialogue. It is a matter of defining a national strategy for the Higher Education system, setting clear reachable objectives and tracing the means to be put in place for their realization. Without doubts, this can only be achieved, as the analysis shows, through successful cooperation with international partners, sharing experiences and participating actively in development programs implemented on a global scale. Libva has its place: all the potential and the commitment are there to successfully integrate and develop its universities."

The crucial characteristics of successful world class universities can be considered: leadership, government policy, funding, the ability to continually focus on a clear set of goals and institutional policies, development of a strong academic culture, and quality of the academic staff (9). From this point of view, the IBTIKAR Project can have a strategic role and it's important to cooperate for its success.

Libyan Universities

Libyan Universities are multidisciplinary institutions as they offer courses ranging from applied sciences to humanities (with a majority of humanities). The Libyan International Medical University, which is a totally private institution, appears as an exception as it is a University specialised in medicine.

The Higher Education Institutions in Libya are more teaching than research oriented (Fig.1).



Figure 1 *Question: "How would you describe the mission of your institutions?" Elaboration of data and statistics from UNIMED survey, 2018*

According to the statistics and data from the Ministry of Education, in August 2018 there were 231 faculties in public universities plus 8 Faculties accredited for private universities, for a total of 1.263 Academic degrees Bachelor courses16 and 354 Academic degrees Master courses. Based on Article 107 of the Libyan Decision number 501¹⁹, the Libyan credit system is defined as follows: Unit credit: one hour of theoretical lesson or two hours of weekly practical activity during the specific or general educational terms provided. More than half of the total academic staff counted, teaching is mainly delivered by assistant lecturers (Fig.2).



Figure 2 *Libyan professors according to their academic position. Elaboration of data and statistics from UNIMED survey, 2018*

Libyan universities are stuck in achieving high quality levels in research due to many external and internal factors. Among the key internal factors, strengthening strategic research objectives and

especially governance structures is prodromal to achieve high quality research. It is necessary to identify a set of strategic research objectives for Libyan universities that are in line with local socioeconomic goals and coherent with the international context through a dedicated Action Plan, that has to be intended as a confirmation as a workplan to implement the training: defining agenda, defining training materials.

A training pathway will be identified for the Libyan partners as well as a White Paper for reforming research governance structures will be designed and submitted to relevant stakeholders. Actions to harmonize research into the overall university policy will be defined including organization charts, actions and design goals. In order to be sustainable, research strategies and governance structures will be harmonized with other institutional priorities and complementary actions will be identified.

Research Priorities

This Research Agenda is about presenting the state of the art concerning the Libyan research activities. It recognizes that different Libyan University cannot be seen as separate entities and thus the priorities identified in the RA, cover (and aim to go beyond) the tangible, intangible and digital necessity of each University. Following extensive consultation, some research priorities have been identified by each University. The Universities have identified five (or less than five priorities). The first priorities are:

- ✓ Recycling of organic wastes and bio-energy production (SEBHA)
- ✓ Renewable Energies Generation&Use of Solar and Wind Energy (SU)
- ✓ Environmental studies and climate change. (BWU)
- ✓ Population health related problems (AIU)
- ✓ Renewable energy (ZU)
- ✓ Health care (LIMU)
- ✓ Environmental and Nanotechnology Projects (UOT)
- ✓ Renewable Energies Generation & Use (AIDU)
- ✓ Population health related problems (UOB)
- ✓ National and regional development goals (ELMU)
- ✓ Cancer research (improving diagnosis and treatment methods). (MISU)

THE RESEARCH PRIORITIES



Sebha University SEBHA



	production	
Second	Biotechnology and agriculture	**
Third	The environmental (green gas emission)	btikar
Fouth	Molecular biology and microbiology	=
Fifth	Nanotechnology	

Sebha University is a public university and bears the name of the city where it was established. Its mission is to acquire leadership in education, scientific research, community service, and encourage the creativity and innovation.

In 1976, the university was first affiliated to Tripoli University with only three departments. In 1983, the university was established as SEBHA UNIVERSITY and more faculties were created. Now the university has 18 faculties distributed in different regions of SEBHA, WADI ALAJAL and GHAT. It also includes the faculty of education in N'Djamena, Republic of Chad.

It has to be highlighted that Sebha university is located in south of Libya: 700 km far from Tripoli, 717 km from Bin Waled, and 600 km from Sirte: these very long distances make uneasy sharing the equipment with the other Universities, since it is required transportation cost and accommodation cost.

In total, the university has 11 faculties in campus, and 7 faculties outside the campus. Besides, Sebha University is including different centres such as:

1. Languages Centre

- 2. Research and Consultations Centre
- 3. Training and Development Centre
- 4. The Media Centre
- 5. Centre of Information and Documentation
- 6. Quality Assurance Office
- 7. Information Technology Centre
- 8. Society Service and Development Centre
- 9. Innovation and Entrepreneurship Centre
- 10. African Studies Centre

The academic degree granted by the university:

- 1.Bachelor's degree in human science.
- 2.Bachelor degree in applied science.
- 3. The Higher degree of Masters (MSc)
- 4. Doctorate of Philosophy degree (PhD)

Statistics of Sebha University:

- 1. Number of employees: 3485 employees
- 2. Number of teaching staff: 1290 with 2% international
- 3. Number of departments and divisions: 168
- 4. Libya innovation prizes for 2016-2018 3 patents
- 5. Number of postgraduate students 669
- 6. Number of postgraduate students graduates 651
- 7. Number of Libyan students 9063
- 8. Number of non-Libyan students 488
- 9. Number of graduate students 49143
- 10. Number of non-Libyan graduate students 1095
- 11. Number of permanent faculty members 1065
- 12. Number of collaborating faculty members 85
- 13. Number of foreign faculty members 14

✓ The Research priorities

- 1- Recycling of organic wastes and bio-energy production
- 2- Biotechnology and agriculture
- 3- The environmental (green gas emission)
- 4- Molecular biology and microbiology
- 5- Nanotechnology

✓ The equipment list

1- Cheap Kjeldahl Nitrogen Analyzer Kjeldahl Digestion Furnace

https://www.alibaba.com/product-detail/Cheap-Kjeldahl-Nitrogen-Analyzer-Kjeldahl-Digestion_1600722521460.html?spm=a2700.galleryofferlist.normal_offer.d_title.799c40ce623auD

2- kjeldahl distillation unit automatic kjeldahl nitrogen analysis analyser

https://www.alibaba.com/product-detail/kjeldahl-distillation-unit-automatic-kjeldahlnitrogen_1600286948307.html?spm=a2700.galleryofferlist.normal_offer.d_title.75ab40cedN2CZw

3- Polarimeter Tube Price Optical Rotation Polarimeter Manufacturer Manual Laboratory Digital Fully Automatic Polarimeter Overview

https://www.alibaba.com/product-detail/Polarimeter-With-Manufacturer-Price-High-Accuracy_1600441233417.html?spm=a2700.galleryofferlist.normal_offer.d_title.349e791bE6P3zP

✓ Instruments Proposal

Details are presented in the sites of chosen instruments (the links are giving above).

Detailed technical description

1- instrument 1: Nitrogen Analyzer Kjeldahl Digestion Furnace

- Name of Item: KDN-20C
- Model: KDN-20C
- brand: MINGYI

- Type C digestive furnace adopts quartz infrared heating pipe, the radiation is pri-mary and the conduction is auxiliary; short heating time, high efficiency.

- Machine box adopts specially made plastic spray steel; working area adopts stainless steel
- materials, has good corrosion resistance.
- Double-shell design, double thermal insulation effect with air thermal insulation
- layer and allumium silicate thermal insulation layer.
- Has multiple protection: over pressure, over current, overheating.
- Small and beautiful, easy to operate, user-friendly.
- Holes with 4, 8, 20.
- 2- Instrument 2: kjeldahl distillation unit automatic kjeldahl nitrogen analysis analyser
- Name of Item: Kjeldahl nitrogen analyzer
- Model: KDN-08C
- Brand: NANBEI

- The main body of the instrument uses a steam automatic control generator. With the cooperation of a liquid level regulator, the steam is made in tens of seconds. Stable output in time for use by the still. The lye under the control of the first executive body flows through the distillation tube into the quantitative digestion tube, so that the ammonia fixed in the acid liquid volatilizes under alkaline conditions. The steam under the control of the second executive agency distills the sample under alkaline conditions to completely volatilize the ammonia. The volatilized ammonia is condensed by the condenser, completely fixed in boric acid, and then titrated with

standard acid to At the end point, calculate the nitrogen content, and then multiply it by the protein conversion factor to get the protein content.

3- Instrument 3: Polarimeter Tube Price Optical Rotation Polarimeter Manufacturer Manual Laboratory Digital Fully Automatic Polarimeter Overview

- Polarimeter, JH-P200, and Drawell

- The instrument of rotation is the material spiral. Through the rotation of the sample measurement, can be analyzed to determine the concentration of the substance, content, purity, and so on. Good navigation rotation built-in parr (peltier) precise temperature control system, automatic photoelectric detection technology and humanized human-computer interface, with precise measurement process, the advantages of reliable and convenient operation, widely used in environments, sugar, pharmacy, drug testing, food, spices, monosodium glutamate and chemical, oil and other industrial production, scientific research, teaching department, for laboratory analysis or process quality control.

✓ Description of the laboratory and its infrastructures

The research and consultancy center was established in 2008 by the previous decision of the General People's Committee No. (22). RCC is officially responsible for executing researches and the provision of scientific consultations in a way that contributes to the development of society. The center has a multidisciplinary scientific laboratory (lab pictures shown above) in which the practical side of research approved by the scientific committee of the center is carried out in the following areas:

- Field of microbiology
- Field of chemistry
- Field of agriculture
- Medicine field
- Environment field

The devices indicated will be used in the topic of the environmental sciences, for example, the topic of water management; they can be used to measure the level of salts in water and also measuring nitrogen in soil samples as well as in agricultural products. It is predictable that Sebha University will work with environmental sciences under the research agenda specified in the project plan, so these devices (actually not present in the lab of research center) are needed in performing the possible analyses in this field.

Sirte University SU



Sirte University, located in the city of Sirte, Libya, has a diverse research agenda that encompasses a range of fields and disciplines. The University is strongly committed to addressing local community needs and challenges through its research activities, while also contributing to the broader academic and scientific community. Additionally, the University emphasizes the promotion of sustainable development practices and support the development of a skilled and knowledgeable workforce. The Sirte university was established to be a beacon of science seeking to find cultural elites that are effective in society, and it has a firm conviction that education represents the basis for change in society because it represents the cornerstone in the process of acquiring skills, as well as building capacities and competencies for sustainable development of society and elevating it to the ranks of advanced societies and in deliberate steps, those in charge of it sought to develop academically in all humanities, medical and applied sciences

In 1989, the Libyan Ministry of Higher Education established the University as a branch of "Gariones University." Later, with decision No. 745 in 1991, the University became financially and administratively independent under the name "Attahaddi University," as per the higher education ministry's decision. The University's name was then changed to "Sirte University" with decision No.

149 in 2010. Since then, the University has consistently expanded and grown, emerging as one of Libya's premier scientific institutions.

The University is situated on Sirte bay, which is located in the middle of the northern coast of Libya. It is positioned between Tripoli and Benghazi, with each city being approximately 500 km away. Presently, the University comprises 14 facilities that are spread out across 7 campuses. The main campus, along with three other campuses, is situated in Sirte city. The remaining three campuses are located outside the city, wit one being in the town of Zamzm, approximately 140 km to the west. The Harawah campus can be found in Harawah town, situated around 80 km to the east of the city, while the other campus is located in Marda town, which is approximately 350 km to the southeast of the city. The University has a faculty of 650 academic staff and 8000 of students.



University has established several research centers, including the Renewable Energy Research Center, E-learning Center, Agricultural Research Center, Information and Communication Technology Research Center, Human Development Office, Entrepreneurship and innovation Centre and Academic Center for Future Studies. These centers are dedicated to conducting research in their specific fields and advancing the overall understanding of these subjects. Through collaboration with other research institutions and industry partners, they aim to promote innovation and support economic growth.

✓ Research Vision

SU vision is based on the excellence and leadership in teaching, learning, scientific research, community service locally and regionally, and the pursuit of universality.

- Preparing outstanding scientific cadres capable of competing in the labor market
- Providing an educational environment and training programs that contribute to enriching scientific research related to the issues of the developmental society
- Encouraging and developing innovation and entrepreneurship programs are among the main tasks of the university.

The strategic plan of the University enables the main strategic goals namely to provide high quality educational programs in various fields of knowledge. And also support and develop scientific research to contribute to the development of society to achieve local accreditation of all educational programs, strive for universality while ensuring the provision of administrative services in accordance with quality standards, as well as human resources development.

Upgrading the university to become a research institution, a research Beacon, and an incubator for research and graduate students is one of the basics of the University's research vision.

The University's policy is in line with the strategic plan, which certainly corresponds to the (vision, mission and goals), and its strategy is proposed every four years, and the university works to implement its research activities according to a plan in line with the homeland.

The scientific research agenda reflects the orientations of the university's faculty members in proportion to the financial, material and human resources of the University, and in line with its vision, mission and goals.

In addition, in each faculty at the university there is a research and consulting department and the task of knowing the research priorities in various disciplines and organizing and following up research activities such as conferences, seminars and scientific workshops.

One of the strengths of the university and the advantages of the university is its geographical location and proximity to some industrial companies, especially those related to oil manufacturing operations.

In this regard, some departments of the faculties at the University, for example, the Faculty of engineering, coordinate with production and industrial companies in solving various technical problems, taking data from them and studying them in a research framework.it is used as a case study and graduation research for students under the supervision of staff members, companies and industrial facilities are the electricity company, power plants and industrial river water investment ,in addition to some oil companies near the city, such as Ras Lanuf oil manufacturing company.

In this context, the weaknesses of the research programs, there are some difficulties and problems facing the University and lies in the available possibilities for scientific research, which is represented in the lack of many devices and tools, without which there is a lack of addressing some research topics, due to the weakness in funding for research programs, which has to do with several

factors. In addition, the university is a partner also in some projects supervised by the European Union.

✓ FOCUS AREAS

Introduction and Goals

Owing to the current world energy crises of environmental pollution and global warming, the academic and industrial experts are focusing their great attention on alternative energy resources. The current fossil energy resources are predicted to be depleted in the few coming decades due to the highly increased demand and non-sustainable nature of these resources. The extremely clean renewable energy seems to be the most important sustainable resources, where 13% of worldwide consumed energy is produced by renewable technologies. But, these recent resources still need more progress in research and development in order to be comparative with fossil energy. Solar energy is considered the most attractive source of unlimited huge energy. North Africa region has a plentiful solar energy, which reaches about 330 sunshine days all over the year. The world's interest in preserving the environment and the lives of human communities on earth is the most important Scientific and applied orientations towards which most studies and the costs of obtaining species Other energy that it uses in different areas of life, while other types of energy cause exhaust and toxic and harmful gases to humans. The renewable energy is a permanent and inexhaustible energy. and Uncomplicated technologies are used and can be manufactured locally, it is an important factor in environmental, social, and all fields, it is considered an environmentally friendly energy and does not cause any damage to it, provide many job opportunities for the unemployed and its cost is simple and low compared to some other types of energies.

Consequently, Sirte university researcher is focusing to be a building and development of solar energy applications in the area of North Africa. Due to the prospective connection of electric grid between the North Africa and European countries, Libya as a mid-site in North Africa region could be dedicated as the central country for power transportation. Accordingly, Sirte city, could be nominated as the most efficient site in Libya to be the nodal link between Africa and Europe, and also, a climate very suitable for providing renewable energy in terms of wind, sunlight and water, and with consumption energy sources such as fuel, the optimal option is to use clean energy and do not damage the environment.

In this regards, the solar energy applications are highly supported by Sirte university board in the field of energy applications, production and distribution. In our university: we look to open large horizon and new opportunities to make our academic program more valuable and more international especially in some hot topics such as renewable Energy, Environment. Also, in this way, projects it would be a good opportunity to take benefits from program countries expertise and qualifications as well as visiting their institutions using their labs facilities to produce some scientific work. Through this project, the Sirte university aims to build a fruitful exchange with the relevant partners for the internationalization of high education programs. This partnership would certainly be very enriching on various levels: improving international visibility, enhancing quality of education for both

students and teaching staff, access to additional resources for educational and scholarly activities, raise the reputation and attractiveness of study courses at the international level.

Generating wind and solar is increasingly more competitive or cheaper than other forms of energy. That means switching to renewables. To bring clean electricity to renters and low-income communities, in addition to cost savings, renewable energy projects can also increase community resilience. Pairing renewable energy with storage or microgrids can reduce dependence on the grid in times of natural disaster. To achieve our clean energy and climate goals, cities will need to take to renewable energy procurement that combines the tangible benefits of local solar projects. electricity demand and enable a net zero-carbon electricity system. Successful implementation of local solar projects can be an effective first step to build momentum for other more ambitious renewable energy and those kickstarting their clean energy programs by setting up unified courses for future development of International Master degree of in the field of "innovation in green energy and entrepreneurship", we will be able to offer a group of students a high level of education in a relevant and promising field. Indeed.

Cooperation and Exchange of Experiences and Cultures

In its continuous endeavor to spread knowledge and communicate with its local and international surroundings, the University of Sirte has sought since its establishment to establish partnerships and twinning with many regional and international universities, where it is currently supervised and followed up by the University's International Cooperation Office. The following some detail contains the agreements signed between the Sirte university and other universities, the some detail of which is an agreement below cooperation goes well agreements between colleges in Sirte university and industry and Centers Research to integration to partner and merge with institutions that would be a strategic Fit for the future (e.g., petroleum companies, electrical companies and solar energy centers that often result in increment Research execute sound research programs and supports students' graduation projects. And maybe offer summer training to our students. based on that we take, for example, the integrated shared among Local cooperation with solar energy center in Tajoura Libya 2013. and Strong linkages with e.g., petroleum companies, electrical companies) and also, we have cooperated with internal and external universities for example, universities Tunisia, universities Jordon, universities Italy and universities others. In addition, Within the EniMed project such as th'e "Enerbrain" project, the MSc in Renewable and Sustainable Energy is designed with a multi-level approach in capacity building; which follows Enerbrain's strategic education agenda

Sirte University is focusing to be a building and development of solar energy applications

One of the most prominent advantages of solar thermal energy is its low negative impacts on the environment and its reluctance to use solar thermal energy. The production of polluting emissions or the safety threat that often accompanies normal generation techniques. It hardly comes out

Polluted is a little smoke or noise during operation. Investing in solar energy can be a real alternative in some areas that are characterized by sunny weather most of the time of the year, and some countries have already begun to produce clean electric energy from solar panels, including Libya. The University of Sirte has a good infrastructure in the field of solar energy where the installation of Meteorological station for recording redaction energy (ambient temperature solar radiation (Beam, Global and Diffuser) 2013. As well as has Varieties of laboratories, one of its kind laboratories in Libya (e.g. Thermodynamic lab. Heat Transfer lab. and unit of solar energy).

Development of Solar Energy Applications

One of the most prominent advantages of solar thermal energy is its low negative impacts on the environment and its reluctance to use solar thermal energy. The production of polluting emissions or the safety threat that often accompanies normal generation techniques. It hardly comes out Polluted is a little smoke or noise during operation. Investing in solar energy can be a real alternative in some areas that are characterized by sunny weather most of the time of the year, and some countries have already begun to produce clean electric energy from solar panels, including Libya. The University of Sirte has a good infrastructure in the field of solar energy where the installation of Meteorological station for recording redaction energy (ambient temperature solar radiation (Beam, Global and Diffuser) 2013. As well as has Varieties of laboratories, one of its kind laboratories in Libya (e.g. Thermodynamic lab. Heat Transfer lab. and unit of solar energy).

Previous Research Projects in Solar Energy Applications

Based on information regarding every aspect of the projects execution, and operation, for concentrating radiation, and receivers for generating electricity and heat generation from solar thermal energy, which were carried out by the researchers and students at the Faculty of Engineering at Sirte University, including: water heating system fabrication using various methods of concentrating of solar radiation, Water heating system theoretical study for Ibn Sina General Hospital using solar energy technology (2012), Design and fabrication of Solar Concentrator (parabolic dish) Equivalent for Steam Generation (2014) ,Network plan design to provide laboratories building of engineering faulty by a power using solar energy technology (2017) ,Theoretical study of hydropower system in electricity generation (2018),Solar concentrator basin design and fabrication, Estimation of Electric Power Generation in Libya Using Processing Technology of Wind Energy (Sirte Case study), Design and Fabrication and Pilot Testing of Vertical Axis Wind Turbines (2019) and double (Parabolic trough) solar water distillation condenser.(2020) Researches continued later in this direction with interest in renewable energies, and there were valuable scientific research papers that were published in peer-reviewed journals.

Students Recruitment, Staff Recruitment

Graduates, Student and Staff were Recruitment enabled with opportunities to engage in the workforce and/or to assist, coordinate and lead teams in research groups. The Sirte University values education and believes that students bring new ideas, new energy and new skills to the workforce. The Sirte University Strong linkages with industry (e.g. petroleum companies, electrical

companies and solar energy centers) Maybe can be employment of students takes place through these companies that near to Sirte city which work experience directly related to the student's academic field of study. to benefit from the academic, social, and cultural developments that from a diverse campus committed Our employees are also eligible for an extensive and competitive total benefits package, which includes offering employees and their eligible dependents 60% tuition assistance for courses taken at the Sirte University.

Future Research Requirements

The best appropriate technologies in renewable energy are identified according to the local conditions and capabilities. The university can play these roles through its highly qualified local scientific expertise which can participate in finding optimal objective solutions in this field. Existence of an appropriate mechanism to achieve a high degree of interaction, for broader cooperation to face with climate change, soaring energy prices and concerns about security of supply, renewable energy sources such as wind and solar power seem an obvious way forward. Establishing a technical committee to develop future plans to activate and benefit from university research in the field of renewable energies and put them into practice. If we could replace fossil fuels with abundant renewable energy, we would cut energy prices, reduce emissions and lower the future risks of climate change, including the impact on food production. University would like to get some support to achieve the application of renewable energy technology such as: Modern-equipment (solar energy, wind energy), High training programs for staff and technics and Informing for updating researches.



✓ KEY AREAS

- Changes to water resources can have a big influence on our world
- Renewables are a global tendency
- Climate change is already affected human health and also have a significant impact on ecosystems and organisms
- Renewable energy less air and water pollution, to lower greenhouse gas emissions
- Renewable energy within everyone's reach. And it gave it the ability to developers
- Renewable energy is the guarantee of a climate safe world.

✓ Sirte University Research priorities

- 1. Renewable Energies Generation & Use
 - 1.1 Wind Energy
 - 1.2. Solar Energy
- 2. Management and Protection of Water Resources.
- 3. Desertification, climate change and agriculture.
- 4. Medical research

✓ Equipment list

The equipment required to achieve the goals of research activities at Sirte University, could be subdivided into two groups; the group one, concerns the equipment required to achieve the strategic goals of research plan of the University according to the University priorities, the second groups lists the equipment necessary right now as a complementary equipment to already exists research units at the University

Group One

1. Renewable Energies Generation & Use.

1.1 Wind Energy

- 2.1.1. Small scale Wind Energy system includes Wind turbine, gearbox, and generator for measuring and modelling.
- 2.1.2. Software as homer software for modelling Wind energy and provide the speed of wind in any city with help of NAS.
- 3.1.3. Smart grid modelling and analysis in memicboard.

1.2. Solar Energy

1.2.1 Measuring devices

- 1. Temperature.
- 2. Relative humidity.
- 3. Atmospheric pressure.
- 4. Total solar radiation.
- 5. Scattered solar radiation.
- 6. Terrestrial solar radiation.
- 7. Direct radiation and Diffuse radiation.
- 8. Duration of sunshine.
- 9. Providing the possibility of maintenance on the sites through the maintenance Workshop.
- 10. Panels for solar energy to provide 1kw at least.
- 11. Memicboard for emulation and measurments of solar energy.
- 12. Instrumentation calibration systems.

Through a device for collecting and analysing information, various measurements can be obtained in the required format and time period, through (data logger) which the data is unloaded into a computer, where it is classified and analysed by special computer programs.

1.2.2. Photovoltaic conversion of solar energy

Equipment and Measuring Devices

- 1. Equipment and devices for measuring the characteristics of the solar cell and its components.
- 2. Equipment for measuring the performance of solar cell systems and components.

1. Steady state simulator for I-V characteristics measurements

• The name of the system "AECUSOFT solar simulator solsim 150".

2. Spectral Response Measurement System

• The name of the system "AECUSFT solar cell QE measurement system".

3. Anti- Reflective Coating and Passivation Layers

• The name of the system "SE500 advanced Combined Ellipsometer and Reflectometer".

2. Management and Protection of Water Resources.

- 2.1. Flame photometer.
- 2.2. Spectrophotometer.
- 2.3. pH Meter.
- 2.4. Electrodes.
- 2.5. Polarimeters.
- 2.6. Portable Conductivity Meter (EC Meters).

- 2.7. Hydrometer.
- 2.8. Multiparameter Meters.
- 2.9. Dissolved Oxygen Analyzer.
- 2.10. Dissolved Oxygen Monitor.
- 2.11. Test Kits for Chemical Compounds.
- 2.12. Colorimetric test kits.
- 2.13. Titrimetric test kits.
- 2.14. Turbidimeters.
- 3. Desertification, climate change and agriculture.

3.1. Radiation Measurements

- 3.1.1. Pyranograph.
- 3.1.2 Campbell Stokes.

3.2. Temperature Measurements

- 3.2.1. Thermometer.
- 3.2.2. Maximum temperature thermometer.
- 3.2.3. Minimum temperature thermometer.
- 3.2.4. Thermograph.

3.3. Wind Measurements.

- 3.3.1. Wind Van.
- 3.3.2. Anemometer.

3.4. Humidity Measurements

3.4.1. Hygrograph.

3.5. Rain Measurements.

- 3.5.1. Rain Gage.
- 3.5.2. Tipping-bucket rain gage.

3.6. Evaporation Measurements.

- 3.6.1. Piche Evaporimeter.
- 3.6.2. Class A Pan.

4. Medical research

- 4.1. Microplate reader with capacity to detect fluorescence.
- 4.2. MiSeq System for targeted re-sequencing, metagenomics, small genome sequencing.
- 4.3. UV-Visible double beam spectrophotometer.
- 4.4. Rotary evaporator.
- 4.5. Centrifuge.
- 4.6. High Performance Liquid Chromatography (HPLC).
- 4.7. Thermal cycler PCR machine (complete PCR unit).

- 4.8. ELISA Reader Machine (Microplate Reader).
- 4.9. Digital Microscope for Microbiology.
- 4.10. API identification Reader Machine.
- 4.11. Orthopantomogram.
- 4.12. Dental cone beam computed tomography (CT).
- 4.13. Dental x-ray sensor.
- 4.14. Desktop and labtop Computers.

Group Two Complementary Equipment.

EQUIPMENT/INSTRUMENT 1

Meteorological Data logger

Scientific Equipment/Instrument (Short Description)

Datalogger is an electronic device that is used to record and store data over time. Datalogger can be used to record many physical data and environmental conditions such as energy, temperature, humidity, pressure, water level, wind speed and direction, insolation values. and to transfer this data to monitoring systems. In PV Plant, Datalogger periodically records the data they receive from these devices and transfer them to monitoring systems.

Name, model and brand

Meteorological Data logger Center Equipment Environmental Monitoring System with Solar Panel

Link

https://www.alibaba.com/product-detail/Meteorological-Data-logger-Center-Equipment-Environmental 62378277611.html

Any vendor or provider in Libya

N/A

Cost (net VAT and shipping) USD, EUR, (\$1,037.90)

Description of the laboratory and its infrastructures (please attach a layout)

The tool to be located next to the lab building of the Faculty of Engineering, in open space as a part of the renewable energy research unit. The lay out of the unit is available here



Availability of skilled technicians, describe any proper technical support

Faculty of Engineering in Sirte University contains about 12 highly skilled technicians who are specialized in different engineering areas, have been properly trained in various engineering applications.

Coherence of the proposal with the research priorities - specify how the required instrumentation is useful for achieving the research priorities

The equipment is strongly related to the University research priority in particular renewable energy.

Any proposed use as part of a network of laboratories of other IBTIKAR Partners (sharing of instruments and labs)

The unit is available to support students and research groups from IBTKAR partners.

EQUIPMENT/INSTRUMENT 2

Scientific Equipment/Instrument (Short Description)

PV1800 LHM Series High Frequency Off Grid Solar Inverter (AC:120V 1-3KW), PV1800 LHM Series is a multi-function inverter/charger, combining functions of inverter, MPPT solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user-configurable and easy-accessible button operation such as battery charging current, AC/solar charger priority, and acceptable input voltage based on different applications.

Name, model and brand

PV1800 LHM Series High Frequency Off Grid Solar Inverter (AC:120V 1-3KW)

Link

https://www.mustpower.com/pv1800-vm-series-high-frequency-off-grid-solar-inverter-2-5-3kva/

Any vendor or provider in Libya N/A

Cost (net VAT and shipping) USD, EUR, None

Description of the laboratory and its infrastructures

The tool to be installed to the next of the lab building of the Faculty of Engineering, in open space as a part of the renewable energy research unit. The lay out of the unit is available here



Availability of skilled technicians, describe any proper technical support

Faculty of Engineering in Sirte University contains about 12 highly skilled technicians who are specialized in different engineering areas, have been properly trained in various engineering applications.

Coherence of the proposal with the research priorities - specify how the required instrumentation is useful for achieving the research priorities

The equipment is strongly related to the University research priority in particular renewable energy.

Any proposed use as part of a network of laboratories of other IBTIKAR Partners (sharing of instruments and labs)

The unit is available to support students and research groups from IBTKAR partners.

EQUIPMENT/INSTRUMENT 3

Scientific Equipment/Instrument (Short Description)

Pico Scope 4262, 16-bit high-resolution oscilloscope for viewing fast digital signals. This device has been used to gather and increase sampling rate and bandwidth. It is focused on the important for measuring analog signals: increasing the resolution, improving dynamic range, and reducing noise and distortion.

Name, model and brand

Pico Scope 4262, 16-bit high-resolution oscilloscope

Link

https://www.picotech.com/oscilloscope/4262/picoscope-4262-overview

Any vendor or provider in Libya

N/A

Cost (net VAT and shipping) USD, EUR, (£1025)

Description of the laboratory and its infrastructures

The tool to be installed to the next of the lab building of the Faculty of Engineering, in open space as a part of the renewable energy research unit. The lay out of the unit is available here.



Availability of skilled technicians, describe any proper technical support

Faculty of Engineering in Sirte University contains about 12 highly skilled technicians who are specialized in different engineering areas, have been properly trained in various engineering applications

Coherence of the proposal with the research priorities - specify how the required instrumentation is useful for achieving the research priorities.

The equipment is strongly related to the University research priority in particular renewable energy.

Any proposed use as part of a network of laboratories of other Ibtikar Partners (sharing of instruments and labs)

The unit is available to support students and research groups from IBTKAR partners.

EQUIPMENT/INSTRUMENT 4

Scientific Equipment/Instrument (Short Description)

Clamp-on Ultrasonic Doppler Flowmeter, is used to investigate the limit of two-phase flow measurements. The Doppler Effect Ultrasonic Flow meter use reflected ultrasonic sound to measure the fluid velocity. By measuring the frequency shift between the ultrasonic frequency source, the receiver, and the fluid carrier, the relative motion is measured. The resulting frequency shift is named the Doppler Effect.

meter.html?

Name, model and brand

A clamp-on 500KHz to 1MHz or more Ultrasonic Doppler flow meter.

Link

https://www.made-in-china.com/manufacturers/ultrasonic-flow CjwKCAiAuOieBhAIEiwAgjCvcoqTVAL_pVOfMWxiu0EZwQDXHr3oGs7aoWk8KNj6vB1TPHw6YRjBhoCNVkQAvD_BwE

Any vendor or provider in Libya N/A

Cost (net VAT and shipping) USD, EUR, (\$ 200)

Description of the laboratory and its infrastructures (please attach a layout)

The tool to be installed to the next of the lab building of the Faculty of Engineering, in open space as a part of the renewable energy research unit. The lay out of the unit is available here.



Availability of skilled technicians, describe any proper technical support

Faculty of Engineering in Sirte University contains about 12 highly skilled technicians who are specialized in different engineering areas, have been properly trained in various engineering applications.

Coherence of the proposal with the research priorities - specify how the required instrumentation is useful for achieving the research priorities.

The equipment is strongly related to the University research priority in particular renewable energy.

Any proposed use as part of a network of laboratories of other Ibtikar Partners (sharing of instruments and labs)

The unit is available to support students and research groups from IBTKAR partners.

EQUIPMENT/INSTRUMENT 5

Scientific Equipment/Instrument (Short Description)

A 1MHz Clamp-on Ultrasonic Transit Time (Time of Flight), It is a metering instrument to continuously measure, record and display volume of water flowing through sensor by use of ultrasonic time difference method.

Name, model and brand

Mobile temperature measurements devices, range from 20oC to 1000oC

Link

https://www.amazon.com/Infrared-Thermometer-AP-985C-APP-Range-50%E2%84%83%EF%BD %9E800%E2%84%83/dp/B08C4HW964?th=1

Any vendor or provider in Libya N/A

Cost (net VAT and shipping) USD, EUR, (\$ 20)

Description of the laboratory and its infrastructures (please attach a layout)

The tool to be installed to the next of the lab building of the Faculty of Engineering, in open space as a part of the renewable energy research unit. The lay out of the unit is available here.



Availability of skilled technicians, describe any proper technical support

Faculty of Engineering in Sirte University contains about 12 highly skilled technicians who are specialized in different engineering areas, have been properly trained in various engineering applications.

Coherence of the proposal with the research priorities - specify how the required instrumentation is useful for achieving the research priorities:

The equipment is strongly related to the University research priority in particular renewable energy.

Any proposed use as part of a network of laboratories of other Ibtikar Partners (sharing of instruments and labs):

The unit is available to support students and research groups from IBTKAR partners.

EQUIPMENT/INSTRUMENT 6

Scientific Equipment/Instrument (Short Description)

Class B 22 Mins 18L Real Vacuum Autoclave TS18

Sterilization is a core concern for microbiological research; Medical Officer of Health requires having autoclave. It help to facilitate all research centers' to afford B CLASS autoclaves. lingchen develope the TS18 real Vacuum Autoclave: B CLASS, 18L unique function: only 22 min to finish the complete sterilization, to save the researcher 's time and money in managing the sterilization.

Name, model and brand Lingchen, TS 18

Link

https://www.lingchendental.com/class-b-22-mins-181-real-vacuum-dental-autoclave-ts18-product/

Any vendor or provider in Libya

Yes, https://www.facebook.com/bab.alshifa.madical/

Cost (net VAT and shipping) USD, EUR, 1440 \$

Detailed technical specifications (please attach any useful technical document, quotation)

- 1-Working time 22 mins to finish the real vaccume sterilize with 18 liter- highly effective, support the researchers to sterilize the tools by fast time. Internal regulation on spare part position and space, easy for engineer follow the maintaince.
- 2-Class B Technology, real vacuum- apply for instruments and plastic materials (means it can be sterilized from internal and external, more safety and cover to sterilized all the tools in laboratory).
- 3-Digital LED display, 121°C/134°C . Vaccum time can be choose from 1 to 20 min, we suggest to follow the international standard vaccum time: 4 min.
- 4-Full set spare part: heater, magnetic valve, steam steel, water level sensor, all spare part are available, to support dealers.
- 5-The shape is rectangle, the shortcoming is not easy to find the cabinet to hold it, so most of the researcher put it as horizontal, Lingchen design, it is square design, which follow the international cabinet design.



Description of the laboratory and its infrastructures (please attach a layout)

The infrastructure components of a microbiology laboratory are:

- 1. Main Laboratory
- 2. Instrument Room
- 3. Stock Culture Room
- 4. Electron Microscopy Chamber
- 5. Inoculation Chamber
- 6. Store Room
- 9. Chamber of the Laboratory Head
- 10. Staff Room 11. Office Room
- 12. Library-cum-Reading Room
- 13. Seminar Hall-cum-Display Room
- 14. Toilets.



Availability of skilled technicians, describe any proper technical support Yes, there are three qualified technicians with weekly maintained of equipment.

Coherence of the proposal with the research priorities - specify how the required instrumentation is useful for achieving the research priorities

The presence of microbiological autoclave for sterilization is consider as a core for microbiological research in the microbiological research center and add many advantages to researchers regarding the results of all researches. Sterilization of instruments like dishes of cultures.

Any proposed use as part of a network of laboratories of other IBTIKAR Partners (sharing of instruments and labs)

Sirte University opens the horizon of cooperation with the rest of the partner universities in the

innovation IBTIKAR program and contributes to joint medical research that brings the desired benefits to our societies

EQUIPMENT/INSTRUMENT 7

Scientific Equipment/Instrument (Short Description)

Place of Origin: Henan, China Model Number: OEM Warranty: Other Type: OEM Certification: OEM Size: OEM, oem Customized: Yes Control Mode: OEM Rated Power: OEM Nominal Voltage: OEM power phase number: OEM Product Name: Dc Power Application: bus ac converter

Name, model and brand

Manufacturer OEM dc to dc step down buck converter boost converter Brand Name: Newbase

Link

https://www.alibaba.com/product-detail/Manufacturer-OEM-Dc-To-Dc-Step_1600637570883.html?spm=a2700.7735675.0.0.195a6bf3AZXYiS&s=p

Any vendor or provider in Libya

N/A

Cost (net VAT and shipping) USD, EUR, ... \$25.00 - \$75.00/ piece |100 piece/pieces (Min. order), we need 10 pieces

Description of the laboratory and its infrastructures (please attach a layout)

Area available of the laboratory is $72m^2$. there are 2 laboratories

Availability of skilled technicians, describe any proper technical support.

1. teacher. 2 technicians need technical support to provide information about each experiment in the model.

Coherence of the proposal with the research priorities - specify how the required instrumentation is useful for achieving the research priorities Yes it is

Any proposed use as part of a network of laboratories of other Ibtikar Partners (sharing of instruments and labs).

Yes it is

Any other useful information



EQUIPMENT/INSTRUMENT 8

Scientific Equipment/Instrument (Short Description)

Product Parameters

Model	IPS-3000W12	IPS-3000W24	IPS-3000W48
Rated power	3000W		
Peak power	6000W		
Input voltage	12V	24V	48V
Output voltage	110v/120v/220v/230v/240v(+5%)		
Unload current less than	1.1A	0.7A	0.5A
Output frequency	50Hz±0.5Hz or 60Hz±0.5Hz		
Output waveform	Pure Sine Wave		
Waveform distortion	Less than 3%		
USB port	5v 2.1A(2USB port)		
Max. efficiency	90%		
Working temperature	-10°- +50°		
Storage temperature	-30°- +70°		
Shell material	Aluminum alloy		
Display	LCD display(optional)		
Warranty:	1years		

Name, model and brand.

500w inverter power inverter 24v inventors off-grid solar pure sine wave inverter Brand Name: IDEALPLUSING

Model Number: Based on inverter power

Any vendor or provider in Libya N/A
Cost (net VAT and shipping) USD, EUR, ...

\$58.57 - \$390.05/ piece |1 piece/pieces(Min. order) we need 10 pieces

Detailed technical specifications (please attach any useful technical document, quotation, ...) Customized support: support

Customized support: support Place of Origin: Guangdong, China Type: DC/AC Inverters Output Type: Single Output Current: Depends on model Output Frequency: 50/60 Hz Size: Based on inverter power Weight: Based on inverter power Certificate: CE Product name: IDEALPLUSING Output wave form: pure sine wave inverter Network: off grid inverter Display:: LCD display Shell material: Aluminium alloy Package: carton ODM/OEM: Yes

Link

https://www.alibaba.com/product-detail/500w-1kw-2kw-3kw-5kw-6kw_1600443416476.html? spm=a2700.7735675.0.0.195a6bf3q9s90F

Description of the laboratory and its infrastructures (please attach a layout) Area available of the laboratory is 72m2 . there are 2 laboratories

Availability of skilled technicians, describe any proper technical support 1 teacher . 2 technicians , need technical support to understand the model.

Coherence of the proposal with the research priorities - specify how the required instrumentation is useful for achieving the research priorities YES

Any proposed use as part of a network of laboratories of other Ibtikar Partners (sharing of instruments and labs)

YES

Any other useful information



EQUIPMENT/INSTRUMENT 9

Scientific Equipment/Instrument (Short Description)

Customized support: OEM Place of Origin: Guangdong, China Type: DC/DC Converters Output Current: 9A Weight: 80g The maximum output current: 10A The input voltage: 5V-40V The output voltage: 1.2V - 35V Net Weight: 80g Application: For electronics diy project

Name, model and brand

Name: 9A 300W DC-DC Step Down Buck Converter 5-40v to 1.2-35v Power Module Brand Name: oem Model Number: OKY3497-4

Link

https://www.alibaba.com/product-detail/Dc-dc-Step-Down-Module-Okystar_62317296204.html? spm=a2700.7735675.0.0.195a6bf3q9s9OF&s=p

Any vendor or provider in Libya N/A

Cost (net VAT and shipping) USD, EUR, ... 10 - 100 pieces \$2.88

Specification

1. Fixed lamp current is 0.1 times of constant current value (used to identify whether the							
			battery	is	full	when	charging);
2.	2. A dedicated reference IC and a high-precision sampling resistor are used to make the constant current more stable (the temperature drift is less than 5% at a constant current of						
	5 degrees f	rom 20 degr	rees to 60	degrees).	Particularly	suitable for	LED drivers
3.	The output current	is large, and the	he maximum	n output cu	rrent can read	ch 10A, which	meets
						most	needs.
4.	high frequency c	apacitors to e	effectively re	educe outp	out ripple and	l improve wo	rking stability
5.	5. Double heat sink design, MOS tube Schottky diode independent heat sink, good heat						
				dissipa	ition,	mutual	influence
6.	At the cost, the lar	ge-size iron-si	licon-alumi	num magne	etic ring is us	ed to improve	the
	working efficiency	, and the pure	copper doul	ble wire is	used to reduc	e heat and imp	prove
							efficiency.

7. 3296 multi-turn potentiometer, high voltage and current regulation accuracy, good stability.

8. Dedicated current sampling resistor The current sampling precision is high, the stability is good, and the temperature is small. LED is a must.

9. Two-color indicator light, the working status is clear at a glance. Rechargeable. 10. The voltage and current are all adjustable, and the adjustable power supply is good. The 10A current is large and the power is sufficient.

Description of the laboratory and its infrastructures (please attach a layout) Area available of the laboratory is $72m^2$. there are 2 laboratories

Availability of skilled technicians, describe any proper technical support

1 teacher . 2 technicians , need technical support to understand the model

Coherence of the proposal with the research priorities - specify how the required instrumentation is useful for achieving the research priorities

The device is very import for adjust the voltage output from the solar panel

Any proposed use as part of a network of laboratories of other Ibtikar Partners (sharing of instruments and labs)

Yes it is part of the network of laboratories of other Ibtikar Partners

Any other useful information



Bani Waleed University BWU



First	Environmental studies and climate change.	1
Second	Agriculture and desertification control.	⁻ (j <mark>bt</mark> ikar
Third	Managing and protecting water resources.	-
Fouth	Renewable energies (Solar energy in particular).	

Bani Waleed University is a public Libyan university, founded in 1992 as the Faculty of Education (Sirte University), a number of faculties were added in the following years as parts of Almergib, Misurata, and Azzaitouna Universities until 2015 when it was renamed to be Bani Waleed University according to the decision of the Council of Ministers No. (193).

The University has 9 faculties and 71 departments include:

- 1. Faculty of Engineering, four departments.
- 2. Faculty of Agriculture, seven departments.
- 3. Faculty of Science, seven departments.
- 4. Faculty of Economy, eight departments.
- 5. Faculty of Law, two departments.
- 6. Faculty of Medical Technology, four departments.
- 7. Faculty of Arts, eleven departments.
- 8. Faculty of Education, nineteen departments.
- 9. Faculty of Sharia Sciences, four departments.

List of Centers and offices of the University

Bani Waleed University has different centers and offices include:

1. Innovation and Entrepreneurship center.

- 2. Information Technology center.
- 3. Research and Consultations Centre
- 4. Centre of Information and Documentation.
- 5. Training and Development Centre.
- 6. Quality Assurance Office.
- 7. International Cooperation Office.
- 8. Women's Support and Empowerment Office.
- 9. The Media Centre.

✓ The Research Vision

- Providing high-quality education and expert-solutions to societal problems.
- Interconnectedness of science, technology and design
- Training outstanding researchers and giving parity of esteem to discovery, application, knowledge transfer and impact.
- Attract, develop and nurture the careers of excellent researchers and become the location of choice for staff at all career stages.
- Promote multidisciplinary research and education in arts, languages, commerce, social sciences, basic sciences and applied areas of sciences.
- Enhance the research capabilities of the university by engaging faculty in research that integrates the education of a diverse population of students.
- Encourage and support socially relevant and need based research coupled with human values.
- Provide a rich intellectual environment for collaborative research among faculty and students from various departments.
- Develop research and educational collaborations with larger community, including industry, minority serving colleges and university, other universities and institutions of higher learning.

✓ FOCUS AREAS

Work to support the infrastructure, research platforms and services. Through the Research and Consultation Center to work on providing integrated laboratories and qualifying employees, as well as research platforms and establishing an electronic library with other local and international universities.

The University of Bani Waleed works on enhancing the effectiveness of research and development by strengthening cooperation with other local and international research center.

Local and international networks, industrial clusters/districts.

Better Governance & Policy.

Bani Weed University seeks to introduce the concept of good governance spreading principle of quality and institutional and programmatic accreting to its various faculties. Also working on link all its administrative offices in all faculties by technical work for purpose of improving its work policy.

Student Recruitment, Staff Recruitment

The university's work is not restricted to educating and qualifying students, but it also depends on involving them in work and stimulating the economy.

Future research requirements.

Funding

Limited fund from the government

✓ KEY AREAS

- 1. Environment & Climate Change,
- 2. Renewable Energy, Chemical science, ,
- 3. Computer Science,
- 4. Engineering,
- 5. Economics,
- 6. Agriculture,
- 7. Language,
- 8. Biological science,.

✓ The Research priorities

- 1. Environmental studies and climate change.
- 2. Agriculture and desertification control.
- 3. Managing and protecting water resources.
- 4. Renewable energies (Solar energy in particular).

✓ The equipment list

- 1. Digital barometer
- 2. Hygrometer
- 3. anemometer
- 4. Pyranometer
- 5. Peet bros rain gauge with recorder
- 6. Combined analog anemometer
- 7. Combined analog anemometer and wind vane
- 8. Hand-held co2 and temperature detector
- 9. Gas leak detector
- 10. Water level and temperature recorder
- 11. Climate meter pce-hwa 30
- 12. Do meter
- 13. Digital ph meter
- 14. Tds meter
- 15. Professional waterproof dissolved oxygen and bod meter
- 16. Autoclave

Alasmarya Islamic University AIU



First	Medical and Health Sciences	
Second	Applied Sciences	btikar
Third	Basic Sciences	-
Fouth	Health Science	

Alasmarya Islamic University (AIU) is a Libyan public higher education institution located at the centre of Zliten City, 165 km east of the capital city Tripoli. It was founded and established by the governmental decree (No. 257) in September 1995, under the name of Alasmarya University for Islamic Sciences and what is now known as Alasmarya Islamic University (AIU). It is a distinguished university in the field of higher education and scientific research in human and applied sciences where the study at this university is free of charge for Libyans and other nationalities students. AIU vision is to contribute actively to the promotion of social peace and the creation of sustainable national development.

The AIU comprises 22 faculties, where students can study in different scientific disciplines such as: human sciences (arts, languages, and law) and applied sciences (engineering, economy, IT, medicine, marines etc). Also, the AIU has 6 main centers:

- Research and Scientific Studies Centre.
- Foreign Languages Centre.
- Leadership and Innovation Center.
- Disabilities Inclusive Education and Integration Office

- E-learning Office
- Marine Training Center

University Philosophy

The university adopts a philosophy based on directing all academic, administrative, and financial capabilities to the continuous development and improvement of quality of services provided by the university, which includes:

- Educational services provided to students in order to reach the highest levels of excellence and the ability to compete in the labor market, whether at the level of undergraduate studies (Bachelor's degrees) or postgraduate studies (Master's and PhD degrees).
- Conducting scientific research of high quality in both humanity and applied sciences based on the actual needs of Libyan societies and capable of solving their problems and advancing it in the paths of progress and prosperity.

1) Governing values of the university

The main values governing the university are:

- Mediocrity and moderation: The university seeks to consolidate the values of moderation in accordance with teaching of Islamic religion, authentic Libyan customs, traditions and norms, and common human values.
- Quality and excellence: The university is committed to quality standards according to the program of the National Center for Quality Assurance in Libya, seeking to develop educational and research processes.
- Integrity and transparency: The university is keen to promote the values of transparency in all administrative procedures, leadership practices and decision-making, and affirms its commitment to the values of justice and integrity.
- Continuous development: The university emphasizes the tendency towards continuous improvement and development by keeping abreast of the latest developments in the administrative and academic field.
- Collaboration: The university seeks to collaborate with universities, research centers, local and international institutions and academic bodies, which represents additions to the university and enhances its position.

2) Vision

A distinguished Islamic university in the field of higher education and scientific research in the humanities and applied sciences that contribute effectively to the promotion of social peace and the creation of sustainable national development.

3) Mission

Alasmarya Islamic University (AIU) seeks to prepare distinguished cadres, keeping pace with the requirements of the modern era, meeting the country's developmental needs, and contributing to community services through quality in education and excellence in scientific research, preserving its uniqueness in combining tradition and modernity.

4) Themes and goals

- Quality assurance: Excellence in the application of comprehensive quality systems at the university in order to reach advanced levels in local and international classifications.
- University governance: Seriousness and commitment in practicing university governance standards of fairness, transparency, and accountability to raise quality level of administrative apparatus.
- Academic programs: Developing and establishing high quality academic programs at the university to meet the needs of Libyan communities and in line with the university's mission by preparing high-quality and scientifically qualified cadres and keep pace with requirements of the modern era.
- Students: Preparing distinguished graduates capable of innovation and competition in the labor market, combining scientific solidity, technical mastery and cultural awareness, committed to Islamic values.
- Human resources: Evaluation and continuous development of academic, technical, and administrative staff and supporting them with qualified expertise to achieve the university's mission and goals in light of the internal and external environmental changes.
- Scientific research and innovation: Supporting scientific research and encouraging innovation in selected research fields compatible with society's needs and future aspirations.
- Infrastructure and technology: Developing a strong infrastructure to keep pace with the aspirations of the university.
- Partnership and collaboration: Enhancing collaboration and partnership with local and international institutions and organizations in fields of education, training, scientific research, and community service.
- Community service: Strengthening and documenting communication between the university and the local community.
- Media highlighting and mental image for the university: Achieving effective media communication for the university with its members and the local community; to highlight its activities, publicize its role, and improve its image in the local and regional milieu.

✓ Research Vision

The Alasmarya Islamic University has a research vision which can be summarized as:

- Achieving scientific research priorities by employing scientific research in solving community problems and national development.
- Establishing and developing research centers and laboratories, and providing modern technologies necessary to develop and support innovation and creativity in the field of scientific research.
- Enhancing teaching and research collaborations with other local and regional universities.

✓ Identifying research topics

The challenge is to pacify the country through knowledge, values of peace and harmony, development and interregional dialogue. It is a matter of defining a national strategy for a higher

education system, setting clear reachable objectives and tracing the means to be put in place for their realization (UNIMED, 2020). In confirmation of this and according to what was stated in the university's vision for 2019-2023, the Alasmarya Islamic University, due to its remoteness and deep influence in society, research interests included supporting research and human studies with the aim of strengthening social peace in the country and preserving religious identity during that period in which the country was going through political tensions, which led to wars.

The research interests were as follows:

- Human Science
- Basic Science
- Engineering and IT Sciences
- Health Science
- Medical Science

As a result of the remarkable recovery in the country and the orientation towards development through government support and the Ministry of Higher Education and Scientific Research, significant adjustments have been made recently to the research priorities at the university by working to support conducting research in areas of interest to the development of the society and the environment, particularly applied sciences (i.e. environment, medicine, engineering, and IT).

✓ Research key areas

The university research key areas can be summarized as: geology and climate change, human sciences, energy, electric engineering, health sciences, marine resources, information technology, economy and trade, psychology, and disabilities and special needs.

✓ Research priorities

The university's research priority has been geared toward the investigation and analysis of some important issues, as well as the creation of remedies and solutions via scientific research. The research priorities of the AIU include:

- Given the numerous issues that the surrounding environment faces and caused by industrial and natural issues such as the relationship between factory emissions and humans directly through inhalation of gases or indirectly through the impact of vegetation covered with polluted gases and dusts and subsequent diseases such as cancer which reached to 700 cases.
- The pollution of drinking water sources especially since the costal water level became closer to the ground surface, making it vulnerable to pollution through black wells in neighborhoods that do not have a drainage infrastructure.
- A study of the use of renewable energy in vital places by developing plans to supply hospitals and service facilities.

With regards to the university's research efforts in the applied, medical, and health sectors, it is noted that the number of scientific citations in these fields has climbed to the scientific researcher Google Scholar.

https://scholar.google.co.uk/citations?

hl=en&view_op=search_authors&mauthors=Alasmarya+Islamic+University&btnG=

Accordingly, the main research priorities reformulated as:

- Medical and Health Sciences
- Applied Sciences
- Basic Sciences
- Human Sciences

✓ Scientific Equipment/Instrument

Laboratories at all faculties and research centers at AIU need to be updated and provided with new devices and equipment. Since the university does not have the ability to provide all laboratories with new devices and equipment, it is suggested to establish a laboratory center contains laboratories with up to date technology to serve all faculty members and students at the AIU. Recently, the AIU provided the IBTIKAR with a proposal of buying an important device (Atomic Absorption Spectrophotometer) to help the environmental laboratory to conduct studies related to urgent environmental issues in Zliten City, Libya.

The Atomic Absorption Spectrophotometer is used for quantitative determination of chemical elements by free atoms in the gaseous state. Atomic absorption spectroscopy is based on absorption of light by free metallic ions. The device can be used to determine over 70 different elements in solution or directly in solid samples via electrothermal vaporization.

Name: Atomic Absorption Spectrophotometer (AAS) - Model: BK-AA320N - Brand: BIOBASE

Technical specifications of AAS:

• Wavelength range 190~900nm, wavelength accuracy ± 0.5 nm, resolution <40%, detection limit $\le 0.008 \mu$ g/ml, background calibration >30 times.

- Build-in computer data processing and LCD display.
- Stability: Double-beam system can automatically compensate the light source drift and wavelength drift caused by the variation of temperature and electronic circuit drift.

• Quickly: The cathode lamp needs not be pre-heated for long time and sample can be analyzed immediately.

• High precision of measurement: Gas path system is equipped with precision pressure stabilizing and current stabilizing devices to reach stable flame and low noise. Specially designed fine light beam passes through the flame to ensure a high precision analytical test and low characteristic concentration.

- High energy optical path.
- Long-life and anti-corrosive atomization system.

• Multi-functional analysis mode: flame absorption; flame emission; graphite furnace atomic absorption; hydride generation.

• Safe and reliable gas path system: Special devices of quick gas conversion and safety protection can be used to analyze air-acetylene flame as well as nitrous oxide-acetylene flame and extend the analytic elements to reach more than 60.

Environmental Issues in Zliten City, Libya

Zliten City is located northwest of Libya, about 150 km eastern the capital city (Tripoli), with an area of about 2745 km2 and population approximately 400000. The city has a beach with a length of approximately 65 km. The city is known with developed economy and industry with variety of manufactories. With high population and industrial development, Zliten City has suffered from many environmental issues. The city needs urgent support from the European Union to study these environmental issues and develop solutions and recommendations to help the Libyan Government, the Municipality of Zliten, and citizens. These investigations should be conducted with the Alasmarya Islamic University which currently does not have the facilities and financial funding to support these studies. To conduct these investigations, the university needs to establish laboratories with advanced equipment and facilities. There are four most important environmental problems which are essential for investigations:

1. Environmental impacts of untreated municipal wastewater discharge from Zliten City, Libya on the Mediterranean Sea

In the Mediterranean basin countries, increased demand for clean water and the need to locate alternate water sources are due to factors such as population development, rising living standards, excessive groundwater extraction, and climate change. Consecutively, this demand leads to significant increase of municipal wastewater. The impacts of untreated municipal wastewater on the environment lead to a decline in the value of the environment, poor health, a less prosperous economy, and eventually a lower standard of living. Untreated municipal wastewater has been identified as the most hazardous to water ecosystems due to large amounts of nutrients and organic content (Collins et al. 2018). Wastewater discharges may contain pathogens that are harmful to human health, carcinogens such as heavy metals, and chemical substances that could have negative impacts on the environment by altering aquatic habitats and species composition, reducing biodiversity, limiting access to recreational waters and shellfish harvesting areas, and contaminating drinking water (Environment Canada 2001; CCME 2006). Severe sewage contamination of swimming beaches causes increased outbreaks of respiratory infections or infections of the skin, eye, nose and throat, caused by inhalation of contaminated water aerosols or through body contact with the water.

In Libya, the volume of sewage discharged into the Mediterranean Sea has significantly increased due to the extensive population development in coastal zones, the expansion of residential liquid waste disposal networks, and greater living standards. The increase in population is accompanied with the development and expansion of industry. These alterations are evident in their wastes and add another layer of complexity to the issue of contamination in the receiving marine environment. Like with domestic sewage, a sizable amount of these wastes are still being discharged into the

Mediterranean Sea either untreated or just partially treated. Over the past 40 years, the pollution of the Mediterranean Sea has drawn the attention of scientists, the government, and the general public as a region experiencing an ecological degradation in Libya. Zliten City has only one wastewater treatment plant established in early 1974. This treatment plant was shut down in 1988 due to lack of equipment and periodic maintenance. Since then, untreated municipal wastewater collected from the city has been discharged into the Mediterranean Sea (Figure 1). The flow of untreated wastewater discharged into the sea is estimated 7000-8000 m3/day. Another 4000 m3/day is lost under the ground due to leakage from failed pipes. This leakage contributes significantly to groundwater contaminations in the region. It is expected that the environmental marine pollution caused with untreated wastewater discharge has reached the European Union countries located in the northern side of the Mediterranean Sea. Therefore, the influence of untreated wastewater on the marine environment in the coastal area of Zliten City should be investigated with cooperation with other Mediterranean basin countries.



Figure 1: Photos of marine pollution caused with untreated municipal wastewater in Zliten City, Libya.

2. Environmental impacts of cement industry on the surrounding regions of Zliten City, Libya

The production of cement, as the primary component in construction, increased as a result of the increase in the world's population. At every step of the process, cement manufacturing has an impact on the environment. Generally, the cement industry is a major contributor to air and solid waste pollution. These pollutants can affect air, water, soil, and plants. These include the release of airborne pollutants including dust and gases, the noise and vibration caused by mechanical operation and quarry blasting, and the fact that limestone quarries can permanently alter the local ecosystem. The production of cement has serious impacts on climate. When calcium carbonate is heated, carbon dioxide is produced, which adds directly to greenhouse gas emissions from cement production. Indirect emissions are also produced through the use of energy, especially if it comes from fossil fuels. About 5-10% of all human-made carbon dioxide emissions are produced by the cement industry (Gartner, 2004; Hossain et al., 2017), with 50% coming from chemical reactions (Arachchige et al., 2019) and 40% from fuel combustion (Capros et al., 2001; Mandal & Madheswaran, 2010). It is estimated that every 1000 kg of produced cement by the cement industry causes 900 kg of carbon dioxide released into the atmosphere (Mahasenan et al., 2003). Besides capon oxide, cement industry is a major source of other greenhouse gasses such as oxides of nitrogen, oxides of sulphur, and carbon monoxide (FEPA, 1991). Besides gases, heavy metals (e.g. mercury and cadmium) and dust are major pollutants released during cement production and

handling. It is estimated 0.07 g of dust is released into the atmosphere as a result of the production of 1 kg of cement (Aslanov et al., 2021). Depending on its size, dust generated during cement production is dispersed by wind for short and long distances, and then it can affect water, soil, and plants in the surrounding region.

Zliten City has two cement manufactories located southern the city (Figure 2). These cement manufactories established in 1984 and 2005. The maximum productivity of each manufactory was approximately 15000 ton/day. It has been obvious that these cement manufactories have influenced the environment including air, soil, water, and plants in the surrounding region. Due to long period of air contamination from the cement industry in Zliten City, it is expected that the environmental impacts (pollution) of these cement manufactories has reached the neighbor countries including the European Union countries. Thus, the environmental effects of cement industry in Zliten City need to be investigated.



Figure 2: Photos of air pollution caused with cement industry in Zliten City, Libya.

3. Environmental impacts of the waste disposal site on the surrounding region of Zliten City, Libya

Due to population growth and the modern economy, the increasing volume and complexity of waste causes a serious risk to ecosystems and human health. Estimated 11.2 billion tons of solid waste is collected worldwide every year and decomposition of organic materials of solid waste is contributing 5% of global greenhouse gas emissions, while heavy metals and other toxic pollutants may be present in incinerator ash (UNEP, 2023). Poor waste management, which can range from nonexistent collection systems to inefficient disposal, contaminates air, water, and soil. Burnt waste plastic materials tend to produce toxic substances such as dioxins. Open and unmanaged waste disposal sites contribute to contamination of drinking water and can cause infection and transmit diseases.

Zliten City, with population of approximately 400000, has only one waste disposal site with an area of 100000 m2 located southern of the city (Figure 3). This open site is not well managed by any

governmental or private organizations. When the site is full of waste, the only methods used to reduce the volume of waste are to burnt or bury it. These methods have serious environmental effects. These methods cause contamination of air, soil, and groundwater. Groundwater is an important water source in Zlien City for domestic and agricultural uses. Therefore, the environmental influence of the waste disposal site in Zliten City on air, water, and soil needs to be investigated to better manage the site and reduce the environmental effects.



Figure 3: Photos of waste disposal site in Zliten City, Libya

4. Causes and environmental impacts of groundwater table rise in Zliten City, Libya

Groundwater is a reliable source of water for a variety of purposes including industrial, domestic, and agricultural uses. Shallow groundwater level depends on several factors such as topography, type of soil, wastewater sources, land use, and rainfall amount in the area (Hadi and Alwan, 2020). The water table rises to a higher elevation when rainfall recharge occurs in an unconfined aquifer. However, there are other causes of water table rise due to human activities. Associated with this rising of groundwater table is the potential for several geohazards which can cause significant influence and cost through damage the built and urban environments (Emhanna et al., 2020).

Recently, Zliten City has suffered from rising a shallow groundwater table (Figure 4). There are areas in the city the water table reached the soil surface. The rising of the groundwater table is considered one of the most dangerous problems that threaten the underground structures. This issue may cause environmental impacts to the infrastructure of facilities and services, where the groundwater table reaching communication and electricity underground networks. The causes of the problem remain unknown, and it is expected the rising of groundwater to continue and affects other areas of the city. Therefore, urgent investigations need to be conducted in the city to determine the causes and environmental impacts of this groundwater table rise.



Figure 4: Shallow groundwater table rise in Zliten City, Libya.

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University of Zawia ZU



First	Renewable energy	
Second	Agriculture and food security	
Third	Health	- Ch-
Fouth	Water Resources	
Fifth	Information and communication technology (ICT)	

The University of Zawia (ZU) is one of the Libya Public Universities. It was established in 1988 based on the decision of the General People's Committee (formerly) No. (135). It is a member of the Association of Arab Universities, the Association of African Universities, and the Association of Islamic Universities. The university includes 27 faculties distributed in the cities of: Al-Zawiya, Al-Ajailat, Zuwarah, including majors in arts, teacher preparation, physical education, law, economics, science, veterinary and agricultural sciences, engineering, human medicine, dentistry, pharmacy, medical technology, public health, and information technology. The university, with its administrations and faculties, is currently based on modern educational buildings and facilities in the Campus University, which is located six kilometres south of the city of Zawiya, and it sits on about one hundred hectares. The number of faculty members at the university is about 2400 faculty members. The number of employees is about 2700 employees and technicians.

The ZU has 10 main centers:

- Research and Scientific Studies Centre.
- Foreign Languages Centre.
- Entrepreneurship and Innovation Center.
- E-learning center.
- Computer and information center.

- Human Resources Development and Training Center.
- Libyan National Center for Medical Research.
- North African Center for Serums and Vaccines Research.
- Center for Social Research and Advanced Studies.
- Advanced Center for Plant Research and Complementary Medicine
- University of Zawia ICO Team Research Agenda 3
- University Philosophy

The university adopts a philosophy based on directing all academic, administrative, and financial capabilities to the continuous development and improvement of quality of services provided by the university, which includes:

- ✓ Educational services provided to students in order to reach the highest levels of excellence and the ability to compete in the labor market, whether at the level of undergraduate studies (Bachelor's degrees) or postgraduate studies (Master's and PhD degrees).
- ✓ Conducting scientific research of high quality in both humanity and applied sciences based on the actual needs of Libyan societies and capable of solving their problems and advancing it in the paths of progress and prosperity.

1-Vision

Achieving scientific, cognitive and behavioral excellence of society for integrated and sustainable development.

2- Mission

Contributing to society through the pursuit of education and research at the highest international levels of excellence

3- Themes and goals

- Providing educational programs in various fields according to local and international quality standards.
- Raising the level of scientific research.
- Enhancing the role of the university in community service.
- Providing a suitable environment and improving the level of services.
- Developing continuous policies and programs to qualify and develop the university's human cadres.
- Linking the university's outputs with the requirements of the labour market.
- Supporting and activating joint cooperation between the university and local, regional and international institutions.

Abstract about Research priority

The report then goes on to discuss the research priority areas that the University of Zawia is currently focusing on, which include renewable energy, agriculture and food security, health, water resources, and information and communication technology. Each of these areas is briefly described, along with some of the specific research goals within each area, also identifies some opportunities

and challenges for research at the University of Zawia. The opportunities include collaborations with local industries, local relevance of research, policy influence, international collaborations especially with the existence of the IBTIKAR project, which will enhance support for scientific research, and funding opportunities. The challenges identified include technological integration, data availability, infrastructure constraints, regulatory framework, funding constraints, and industry cooperation.

✓ Research priority

The university's research vision is focused on advancing knowledge and addressing societal challenges through research and innovation. Some of the priority research areas that the University of Zawia is currently focusing on include:

1- Renewable energy

The university is working on developing sustainable energy solutions, including solar and wind power, to reduce Libya's dependence on fossil fuels and help mitigate the effects of climate change.

2- Agriculture and food security

The university is conducting research to improve crop yields and develop more efficient and sustainable farming practices in Libya, with the goal of enhancing food security in the country.

3- Health

The university's medical faculty is conducting research on various health issues facing Libya, including infectious diseases, cancer, and chronic illnesses. The goal is to develop new treatments and therapies that can improve the health outcomes of Libyan citizens.

4- Water resources

The university is conducting research on water resources and management in Libya, with the aim of developing sustainable water management practices that can help address the country's water scarcity issues.

5- Information and communication technology (ICT)

The university is working on developing new ICT solutions and applications that can improve various aspects of Libyan society, including education, healthcare, and governance.

Overall, the University of Zawia is committed to conducting research that can have a positive impact on Libyan society and contribute to the development of the country.

✓ Opportunities on Research:

1- Applied Research:

The presence of Libya's largest oil refinery, combined cycle power plant and oil export port in Zawia City provides unique opportunities for applied research as a shown in fig(1,2). The University of Zawia can collaborate with these industrial facilities to explore innovative ways of integrating renewable energy technologies into their operations. This could include studying the feasibility of renewable energy co-generation or using waste heat from the refinery to power renewable energy systems.



Fig. (1). Picture of the Zawia refinery site in Libya



Fig. (2). Picture of the Zawia Combined Cycle Powe Plant (ZCCPP)

2- Local Relevance:

The Zawia energy landscape and the challenges posed by the presence of traditional fossil fuelbased facilities, make renewable energy research highly relevant at the local level. The university can focus its research on solutions that directly address the region's energy needs, ensuring that findings have practical applications and impact in the area.

3- Policy Influence:

The University of Zawia research on renewable energies and climate change can play a crucial role in shaping energy and environmental policies in Libya. The evidence-based research can provide policymakers with valuable insights to design effective strategies for transitioning to renewable energy sources and mitigating climate change impacts.

4- International Collaborations:

With increasing global awareness and initiatives in renewable energy and climate change, the University of Zawia can attract collaborations with international research institutions and organizations. These partnerships can bring expertise, funding, and access to cutting-edge technologies to further enhance the university's research capabilities.

5- Funding Opportunities:

As the global focus on renewable energy and climate change intensifies, there are growing opportunities for research funding in these fields. The university can developments of research on tap into various national and international funding programs to support its research initiatives and infrastructure development.

✓ Challenges on Research:

1- Technological Integration

Integrating renewable energy technologies into an energy landscape dominated by conventional fossil fuel-based facilities can be challenging. The University of Zawia will face obstacles in finding efficient and economically viable ways to harmonize renewable energy systems with the existing infrastructure.

2- Data Availability

Comprehensive and reliable data on Zawia's energy consumption patterns, emissions, and environmental impacts may be limited. Conducting accurate climate change modeling and impact assessment could be hindered by data gaps, making it essential to establish partnerships and collaborations to access relevant data sources.

3- Infrastructure Constraints

The transition to renewable energies may require significant changes in infrastructure and energy storage capabilities. Developing a robust grid system to accommodate intermittent renewable energy sources and implementing energy storage solutions can be complex and resource-intensive.

4- Regulatory Framework

The regulatory framework and policies in Libya may not be fully conducive to promoting renewable energy adoption. The University of Zawia may face challenges in developments of research and navigating bureaucratic hurdles and advocating for supportive policies that incentivize renewable energy investment and deployment.

5- Funding Constraints

While there are funding opportunities available for renewable energy research, securing consistent and substantial funding may remain a challenge. The university will need to actively seek funding

from diverse sources to sustain its research efforts and compete with other research institutions in the field.

6- Industry Cooperation

Encouraging collaboration and cooperation between university researcher and existing oil refinery and combined cycle power plant operators may be challenging. There may be resistance to adopt renewable energy solutions due to concerns about economic viability and potential disruptions to existing operations.

✓ List of equipments

1) Software for Life Cycle Assessment and Environmental Impact (LCA), for example (GIS - Geographic Information System).

2) Two Computers Desktop to be used for software and two UPS Replacement Battery to be used for computers.

3) Environmental test meter plus with specific sensors (specification to be sent)

4) Solar powered Wi-Fi Weather Station.

Libyan International Medical University LIMU



First	Medical and Biomedical Research	
Second	Information Technology	
Third	Business Management	<u>U</u>btikar
Fouth	Healthcare Administration and Management	
Fifth	Education and Lerning	

Libyan International Medical University (LIMU) was established on 2007 as the first private national university in the field of medical education. LIMU is located in the heart of Benghazi city; the 2nd biggest city in Libya that is located in the eastern region of Libya. Since its establishment, LIMU has made great effort to maintain academic excellence and quality of its programs' performance and outputs while working according to international standards.

Number of currently enrolled students at LIMU is 2364 and total number of graduates is 832. LIMU has 7 Faculties (Medicine, Dentistry, Pharmacy, Applied Medical Sciences, Information Technology, Business Administration and Engineering) which adopt 35 academic department and 18th program. LIMU adopts unique specialties or programs which are not available in any other university in the country. These programs are: Basic Medical Sciences, Doctor of Pharmacy (PharmD), Health Informatics and Mechatronics Engineering.

All LIMU programs are implemented using active learning strategies including problem-based learning, team-based learning and inquiry-based learning.

Research at LIMU

LIMU administration is very keen to promote and support scientific research, creativity and innovation. LIMU researchers may work independently or in temporary groups for a specific time till production of one or more publications. That is why publications at LIMU remains somehow discrete and can't be grouped under specific research priorities for the university. In addition, currently there are no formal research groups at LIMU, but this is one of the very near future plans to be set at LIMU by Vice President for Research & Consultation and to be implemented via LIMU Research and Consulting Center (RCC). The last is working via a Scientific Committee which is headed by the head of the center and committee members are representatives of all faculties. LIMU recognizes its role in community outreach and social accountability. LIMU offers scholarships to financially support distinguished students.

With the support of LIMU business process project team, research and consulting center processes were defined at all levels and documented. Research policies at LIMU were defined, approved by Vice President for Research & Consultation and to be approved by university council.

✓ Research Priorities

LIMU research policies include:

- 1. Research priority setting policy
- 2. Research Ethics Policy
- 3. Scientific research funding policy
- 4. The policy of supporting and financing translation and authoring works
- 5. Publishing support policy
- 6. The policy of supporting and financing research projects
- 7. Research motivation policy
- 8. The policy of supporting participation in local and international scientific conferences
- 9. The policy of communicating with employers and graduates in the field of scientific research
- 10. Research Cooperation Policy
- 11. The policy of benefiting from the results of distinguished students' research
- 12. Policy for the use of research assets
- 13. Research Integrity Policy
- 14. Scholarly citation policy
- 15. Academic Freedom Policy
- 16. Intellectual Property Policy
- 17. Publishing in LIMU journal policy

LIMU research strategic objectives are attained via a group of projects that are set in accordance with the university strategic goals and objectives. Progress of action plan can be measured using key performance indicators that can be tracked by LIMU higher authority via LIMU Strategic Planning Internal System that has been established and developed by LIMU IT team.

Process of defining research priorities at LIMU can be overviewed via the following diagram:



✓ The Research Vision

Main Key Elements of LIMU Research Vision

- 1. Excellent research (publications in high-ranked journals)
- 2. Serves community and labor market (solve problems)
- 3. Collaboration (National & International)

✓ LIMU Research Vision

To become a house of expertise that contributes to building a knowledgeable society and promoting sustainable development locally, regionally and internationally.

✓ LIMU Research Mission

Producing scientific knowledge affecting society, by supporting integrated, discreet scientific research, and providing scientific consultations and training courses, to contribute to the progress and advancement of human kind.

✓ LIMU Research Objectives

1. Production and localization of knowledge in society, through research teams that are able to direct their scientific efforts towards serving humanity.

2. Building meaningful integrative knowledge by employing and directing research efforts.

3. Contribute to the development of human capital through research, consulting and training.

4. Building bridges of scientific cooperation with the local, regional and international communities.

✓ LIMU Research Goals

1. Double the number of high-quality research produced annually.

- 2. Building value-added research and advisory teams.
- 3. Building confidence in the consultations provided by the university.

4. Annually doubling the number of beneficiaries of the training courses.

Values

- Honesty
- Integrity
- Respect
- Credibility
- Transparency
- Objectivity
- Academic freedom

Principles

- Directing research efforts towards benefiting the community.
- Non-interference and influence in the conduct and results of scientific research.
- Providing consultations that do not contradict the values and customs of society.
- Respect intellectual property rights.
- Teamwork.
- Independence

Research and Consulting Center (RCC)

RCC Vision

An excellent center for research and advisory services.

RCC Mission

Providing excellent research and advisory services that contribute to the development of the community, through university expertise and outside specialties

RCC Goals & Objective

- 1. Establishing stable rules and systems for scientific research at the university.
- 2. Direct scientific research in accordance with the development and service of the community.

3. Maintain projects' schedule in accordance with the university approved scientific research priorities.

- 4. Providing Consultancy for public and privet sector.
- 5. Supporting specific students research projects at the university.
- 6. support publication scientific research result.

7. Preparing and participating in scientific conferences and symposia to contribute to community awareness.

- 8. Linking the university with the community and the labor market.
- 9. Expanding partnerships and cooperation with local, regional and international institutions.
- 10. Attracting sources of funding available locally, regionally and internationally.

LIMU is keen to sign agreements and memorandums of understanding with both local and international institutions, in order to support collaboration in the fields of education and research.

https://aric.limu.edu.ly/international-agreements/

Impact to Society

• Postgraduate studies in specific specialties which are not available in the whole eastern region of Libya

• Establishing a Drug industry in the country and its relation to national medication security

Challenges

- Budget (for equipment manpower access to scientific journals ... etc.)
- Continuum flow of chemicals and operational materials

• Collaboration with local institutions and general society's view of the importance of research

✓ FOCUS AREAS

All research proposals at LIMU should be submitted via LIMU Research Portal, so that they can receive both ethical and scientific approval and fund as well, if applicable.

https://research.limu.edu.ly/research-portal/

RCC provides a group of training and development programs for researchers either face-to-face or using different distance learning tools including MOODLE which is the learning management system at LIMU.

https://portal.limu.edu.ly/course/index.php?categoryid=538

Publications at LIMU are affiliated to different Faculties, as shown via the following link:

https://research.limu.edu.ly/faculties-publications/

Research awards are given to distinguished researchers in a celebration held during the LIMU annual scientific day.

https://research.limu.edu.ly/limu-scientific-days/

LIMUJ is a peer review journal that is supported by the university and provides a space for publication for researchers from Libya and from all over the world.

https://www.thieme-connect.com/products/ejournals/journal/10.1055/s-00053243

Annual estimated budget for research is approved by University Council based on the estimated profit for each specific year. This budget is used mainly to support; research, publishing, training, registration in conferences and travel & accommodation. Noting that there are no available external resources for funding research at LIMU. No governmental support by any mean to LIMU.

There is a focus at LIMU towards developing a quality control lab in order to be used for teaching Pharmacy students, performing analysis for students from other schools at LIMU and also this quality control lab is aimed to be a nucleus for a larger one that can support the establishment of drug industry in Libya.

There is a need for a High-Performance Liquid Chromatography (HPLC) equipment at LIMU to support undergrad teaching, postgrad studies and research. Availability of such equipment will be a big move for LIMU towards postgraduate studies, research and industry.

✓ KEY RESEARCH AREAS

- 1. Medical and biomedical research
- 2. Information technology
- 3. Business management
- 4. Healthcare administration and management
- 5. Education and learning

✓ The Research priorities

The priority list.

1. Medical and Biomedical Research

- 1.1. Clinical pharmacy
- 1.2. Pharmacoepidemiology
- 1.3. Pharmacovigilance
- 1.4. Pharmacoeconomics
- 1.5. Non-Communicable diseases
- 1.6. Mental health
- 1.7. Child health
- 1.8. Oral health
- 1.9. Nutrition and health
- 1.10. Dental profession
- 1.11. Digital dentistry
- 1.12. Sport dentistry
- 1.13. Forensic dentistry

- 1.14. Regenerative dentistry
- 1.15. Non-surgical facial esthetics (n-se) and esthetic dentistry
- 1.16. Special need dentistry
- 1.17. Dental implantology

2. Information Technology

- 2.1. Computer Sciences and Artificial Intelligence
- 2.2. Computer Networks and Telecommunications
- 2.3. Cybersecurity and privacy protection
- 2.4. Cloud computing
- 2.5. Internet of Things
- 2.6. Software Engineering and its Applications
- 2.7. Business Processes and organizations
- 2.8. Data Sciences

3. Business Management

- 3.1. Finance and Banking
- 3.2. Marketing Management
- 3.3. Business administration
- 3.4. Project management
- 3.5. Economics
- 3.6. Political sciences

4. Healthcare Administration and Management

- 4.1. Health Informatics, bioinformatics and e-Health
- 4.2. Health service and quality assurance
- 4.3. Crises management

5. Education and Learning

- 5.1. Programs and curricula
- 5.2. Teaching and learning methods

5.3. Assessment methods

5.4. E-Technology

The 297 research topics/questions can be found in the attached document (research priorities guide)

✓ The equipment list

1. Development of Quality Control Lab

This lab at LIMU serves the community by performing quality control tests on imported food and drug. In addition, it supports research.

Equipment	Manufacturing Company & Model	No	Expec ted Price
U.V and visible spectrophotometer	SHIMADZU - UV-1900I	1	10500 \$
High Performance liquid chromatography	Agilent1290 Infinity II LC System	1	32000 \$
PH-meter / Potentiometer	PHOENIXInstrumentLaboratory pHMeter	1	800\$
Centrifuge	Sigma 2- 16P centrifuge	1	4500\$
Incubator	Forced convection laboratory incubator IPP55	2	3500\$
Electrical Heater with Magnetic Stirrer	Cleaver Scientific Hotplate Magnetic Stirrer	3	700\$
Sieving machine	Retsch Vibratory Sieve Shaker AS 450 basic	1	6000\$
Autoclave	Fedegari vertical autoclaves FVA/A1	1	13000 \$
Fume Hood	4' Fisher American Fume Hood	1	3000\$
Water Bath	BIOTEC-FISCHER SCO- Water Bath	1	1700\$

Different kind of lab glassware / Chemicals / Tools / Safty	Glassware & chemicals	عــدد کبير	3000\$
Tablet hardness test	Erweka MultiCheck 6	1	9200\$
Balance (4 digits)	SHIMADZU analytical balance AUW	2	3000\$
Water Deionizer	250L/H Laboratory Water Deionizer	1	3000\$
Refrigerators	Fisherbrand TM Isotemp TM GeneralPurposeLaboratory Refrigerator	1	6600\$
Computer + printer	Laboratory computers	1	1000\$
	Total		10150 0\$

2. Establishing a Public Opinion Poll Center

This center should conduct public opinion surveys so it can collect, preserve and disseminate public opinion data.

Equipment: A software that is suitable for collection and analysis of the data.

University of Tripoli UOT



First	Environmental and Nanotechnology Projects	
Second	Research excellence	
Third	Engineering Projects	∐ btikar
Fouth	Medical Project	-
Fifth	Sustainable Development	

The University of Tripoli (UoT) is one and the largest institution of Higher Education (HE) in Libya. It is the main local leader in university education, scientific research and knowledge development. It is located at the capital Tripoli, founded and established by Royal Decree on December 15, 1955. The UoT is envisioned to achieve scientific, cognitive and behavioral excellence in society for integrated and sustainable development. Through its strategic plan, the UoT seeks to introduce competitive educational programs at undergraduate and postgraduate levels in terms of focus on the required specializations and skills of graduates. It works on linking these programs with market requirements and needs. This is being done with 35 research groups (RG) at the University which working under the umbrella of the Research & Consultation Center (RCC). The UoT provides a stimulating environment for learning and scientific research including infrastructure, organizational, administrative, service and informational development. It constantly

develops potentials of scientific production, supports research programs and encourages creativity, innovation and excellence in specific areas that serve local and international needs.

It is worth-mentioning that the UoT is scattered on 300-hectare land in six campuses in Tripoli. The UoT Comprises of a number of colleges covering many disciplines of HE including Science, Information Technology, Agriculture, Economics & Political Science, Engineering, Law, Medical Technology, Human Medicine, Nursing, Pharmacy, Physics, Dental & Oral Surgery, Languages, and Islamic Studies. According to the academic year 20121/2022, the total number of students exceeded 75,877, and the teaching staff is about 3,804 Professors.

The research groups at the University of Tripoli cover wide areas of both applied sciences such as engineering, basic sciences, medical sciences, as well as humanities in their various disciplines.

The University of Tripoli has a strategic plan for the years 2022-2026. A team of specialists participated in its preparation and formulation. It was approved by the University Council. It was also referred to the Ministry of Higher Education and Scientific Research to allocate its financial budget. (A copy of the university's strategy in the annexes).

The University strategic goals can be summarized as follows:

1- Developing the university's infrastructure so that it is effective and has a prestigious level among regional and international universities.

2- Developing academic programs and focusing on programs that benefit the community and solving its various problems and preserving its environment.

3- High-level scientific research that has an impact on the development of knowledge at the national and regional levels.

4- Raising the level of the university rank to 2522, according to the global assessment of universities in 2026, and at the African level to 22, and at the Arab level to 15.

5- Establishing partnership between national, regional and international universities and national institutions such as the Commission Libyan Scientific Research.

6- Activating information technology in all university administration, centers, offices and colleges.

7- Activating the university's academic and audio-visual media and its role in defining the university's achievements and attracting students to join the university.

8- Supporting and enhancing the quality of the university and achieving local institutional and program accreditation.

We refer below to a sample of scientific papers published by university faculty members and those involved in research groups. It should be noted that this is a sample where all scientific papers are available on the official university website.

During the life of the university, which is nearly seventy years since its establishment, many distinguished students or/and professors made recognizable achievements, and here we refer to some of them:

1- HAMIDA SAGER

She was born in 1978 in Tripoli, she gained a bachelor's degree from the Faculty of Arts at the University of Tripoli in 2000 and a master's from the Academy of Graduate Studies, Tripoli in 2005. She is currently doing a PhD in Fine Arts at the University of Rome. She has received many

awards in local and international art festivals and fairs. In 2015 she was awarded the Golden Award for the Arts by the Mayor of Gubbio, Italy, as well as coming third place for the Caprese Michelangelo International Festival. In 2014, she also gained an award at the SPA Biennale of Contemporary Art, Belgium. Some of her works are held at public and private institutions in Libya.

2- Professor Mohamed El-Gomati

Professor El-Gomati obtained his BSc degree in Physics and Mathematics from the University of Tripoli in 1970 and went on to study for his MSc in California and PhD from York. He became a Professor in Electronics at the University of York in 1997. His research interests are in Surface Science and Electron Optics with particular emphasis on the development of novel instrumentation for nanos-scale structure and analysis. He is the author and co-author of more than 200 articles and patents in these fields.

Moreover, Professor Mohamed El-Gomati has recently appointed Chairman of the Foundation for Science Technology and Civilisation (FSTC), and has been made an OBE (Most Excellent Order of the British Empire) in the New Year's Honours List for 2012. Professor El-Gomati, a scientist and lecturer on science in the Islamic civilisation, has been a trustee and Vice-Chairman of FSTC for many years. He is an advisor to a number of UK Universities and charities and speaks on the contribution of Muslims in Science, Technology and Civilisation.

3- Dr Faisal Khalil Al-Banani

He was born in the city of Benghazi in 1975, and obtained a Bachelor's degree in Architecture and Urban Planning from the University of Tripoli, and was honored by the Ministry of Education on Flag Day for his academic excellence. In 1981, he obtained a master's degree in architecture from the Catholic University of America, where he continued until 1984 as a student of environmental and urban planning sciences under the supervision of some of the most important intellectual leaders in architecture and city planning, including Peter Blake, Forest Wilson, and George Marco.

4- Dr. Haitham Muafa Haitem Muafa

He graduated from the Faculty of Human Medicine, University of Tripoli, in 2008, with a general grade (excellent). Then, moved to the United States of America in 2010 and obtained the American equivalent in the same year, with a percentage of 99%, which qualified him to work as a physician in internal medicine at Marshall University Hospital (West Virginia). He received the certificate of the best doctor at Marshall Hospital in June 2016, which qualified him to be awarded the Alpha Omega Alpha Award, which was established in 1902 and is awarded to distinguished people in their work in the United States of America.

✓ The Research Vision

We envision a supportive environment for all University of Tripoli scholars that enables transformative discoveries and innovation, produces new knowledge, and supports creative activities for the benefit of the State of Libya, the nation, and the world. We look forward to our

university and thus our country to be among the first countries in scientific research. We hope to see a great development in the field of education at all levels in line with what is happening in the developed world. We seek to invest material and human resources in creating a real scientific research environment that will raise the ranking of our university among the world's advanced universities. We hope that our university's research will not be limited to purely academic research, but will be an important tributary of industrial development in our country, which will help to make a rapid shift at the economic and development levels. We aspire to create a real partnership with advanced universities from the developed world and to transfer scientific research mechanisms and ways to achieve the welfare of our people.

✓ FOCUS AREAS

The university provides undergraduate and postgraduate levels of study and awards the following degrees:

- Intermediate Certificate (Diploma).
- Bachelor's degree.
- Licentiate's degree
- Master's degree.
- Doctorate degree (PhD).

The University of Tripoli has 22 Faculties contains more than 182 departments of different specialties and shared among six campuses of the University.

In order to achieve all these goals and to internationalize the university, ICO is committed and was assigned by the university to:

- Join the leading international university network
- Establish joint programs with other prestigious institutions
- Increase mobility numbers for staff and students
- Increase the number and visibility of international conferences organized and hosted by UOT
- Increase international research funds
- Internationalize the curriculum
- Increase international mobility programs for students and staff
- Establish summer schools
- Establish and maintain international projects
- Involve national and international students in projects
- Promote diversity
- Support networking with international communities
- Develop a website that raises the international profile of the university
- Involve managers from each unit for the implementation of internationalization
- Improve international language skills of staff
- Establish mechanisms for sharing good practices
- Participate in the improvement of UoT performance towards institutional excellence

The ICO of the University of Tripoli is still trying to achieve the university's strategic goals of internationalization. As an entry point for almost all international activities, the ICO tries to

establish and build strong professional relationships with regional and international institutions to help improve the university.

ICO organizes and manages the partnership for international cooperation projects in capacity building and promotes student and researcher mobility by strengthening cooperation, facilitating logistics and establishing agreements with national and international institutions. UoT through ICO is now engaged in a number of bilateral agreements and in some European projects in capacity building HE (within former Tempus, Erasmus Mundus and Erasmus+ programs). The university also has signed many Memorandum of Understanding (MOU) with international universities and organizations

Further, the university sale the Research, Consulting and Training Center (RCTC). The RCTC was established at the UOT as an advisory research body that depends in achieving its tasks on a dedicated technical cadre in addition to the UOT professors, engineers, technicians and laboratories. The RCC strives for cooperation, integration and interconnection with national institutions and various research centers to reach the most successful solutions and make the most of local expertise and ensuring a comprehensive renaissance.

The fundamental responsibility of the RCTC's training department is to plan and coordinate training programs that will meet the needs of UOT and society in all fields of study with input from experts both inside and outside the institution, hence promoting the role of experts and specialists in UOT.

In order to meet the needs of society in a variety of areas, including information technology, sustainable development, strategic planning, quality assurance, management development, media and public relations, safety and security, the center organizes training courses, workshops, round tables, lectures, seminars, and many other activities. As an example, the RCTC held roughly 29 training courses, 29 workshops, 4 talks, and 1 conference in the previous year (2022).

The University of Tripoli has concluded a number of agreements with the following institutions. They include technology transfer, knowledge transfer, training and employment.

- National Center for Disease Control
- Libyan Iron and Steel Company Misurata
- Libyan Oil Institute
- The Higher Committee for Childhood
- Arab Center for Training and Maintenance
- Ministry of Agriculture, Livestock and Marine
- Libyan Authority for Scientific Research
- Municipality of Tripoli Center
- The Public Authority for Water Resources
- Diabetes and Endocrinology Hospital
- Biotechnology Research Center

- The university seeks to contribute to solving the problems of society by providing research, consulting and training services in basic issues related to development, which allows the possibility of presenting appropriate models to solve these problems in distinguished scientific methods and with high professionalism.
- Determining the International Science Day for Peace and Sustainable Development on November 10th every year and highlighting the important role that scientific research plays in society.

- The establishment of a pharmaceutical consulting office and it is managed by faculty members with experience in the field of medicines, herbs and natural products who analyze all types of drugs, whether physical, chemical or bacterial analysis. Customs and control laboratory on Medicines, Food, Forensic Medicine, the Biotechnology Research Center and the National Center for Disease Control.

- Providing consultations to the Ministry of Agriculture, research centers and farmers in the field of agricultural pesticides and soil and water analysis. Training course in the field of pruning fruit trees. As well as a training course in the field of beekeeping

- In order to achieve a sustainable strategy for interdisciplinary research, the University is enhancing the activities of the University Strategic Research Groups by backing a small group of interdisciplinary research leaders to develop four major distinctive research activities.

- The RCTC and the University of Tripoli have constituted research groups from the staff members at the university and in collaboration with other partner universities. These groups are the expertise in certain fields which offer consultation in their competent areas. This step is to aimed at increasing the research activities in different and various fields.

✓ KEY AREAS

- AI and Data Science
- Health Science
- Energy
- Sustainable Development

✓ The Research priorities

- Environmental and Nano-technology Project.
- Research excellence
- Engineering Projects
- Medical Projects

✓ The equipment list

1- Cheap UV-Visible spectrophotometer (an example, L7 double beam UV-Vis spectrophotometer). This instrument:

- should do full scan from 200 to 800 nm, including the operation and maintenance manuals.

- should be Europe electricity system (220-240V/50/60Hz) with Europe socket type (two pins socket)

- should be able to transform the data to excel format in a flash memory).

- should include at least 4 quartz and 4 glass 1cm cuvettes.

Price: \$2,500.00

2- Ge-ATR, ATR-FTIR spectrophotometer (An intuitive, easy to use FTIR spectrometer delivering high performance and flexibility) with the following requirements:

- The equipment must be able to do full scan from 5000 to 500 cm-1.

- It should include the operation and maintenance manuals.

- It should be Europe electricity system (220-240V/50/60Hz) with Europe socket type (two pins socket)

- It should be able to transform the data to excel format in a flash memory).

- the image bellow is an example.

Price: \$ 20,000

3- Shaking water bath with the following specifications:

- Electricity, 220-240V/50-60Hz, European socket type.

- Capacity, 10 Liters.
- Shaking Speed, 0 to 150 RPM Adjustable.

- Temperature Range, Ambient +5°C to 100°C.

- Temperature Stability, + / - 0.5°C or better.

- Racks, Universal-type Stainless Steel Spring Rack.

4- Analytical Balance 120g/0.1mg Precise Electronic Scale 0.0001g Digital Balance for Jewelry Store Lab Pharmacy Chemical Plant (120g/0.1mg).

-(of 3 or 4 decimal display, 1bout 100g, with a precision of 0.001g, 220-240V/50-60Hz, European socket type, Built in calibration tools. The image below is an example. Price \$4,000

5- Benchtop pH-mV Meter, 0 to 14 pH Range, +/- 0.02 pH Accuracy, 0.01 Resolution – 860031. Price \$ 2,000

6- Scanning Electron Microscope (SEM):

Full spare parts, 1 year warranty, Magnification $6X \sim 300,000X$, complete software and PC, operation training program. Price \$90,000.

7- X-Ray Diffraction, complete with software, PC, user and service manual. Training program. Price \$ 60,000.

8- Wavelength Dispersive X-ray Fluorescence Spectrometer for Cement Mineral steel, Training program, User and service manual. Price \$ 70,000

9- Atomic absorption Spectroscopy, Training program, User and service manual. Price \$ 40,000

10- Inductively coupled plasma- atomic emission Spectroscopy, Training program, User and service manual. Price \$ 30,000

11- High performance liquid chromatography (HPLC), Training program, User and service manual. Price \$ 20,000

The University of Ajdabiya AIDU



First	Renewable Energies Generation & Use	
Second	Clean and Efficient Manufacturing & Transport	
Third	Management and Protection of Water Resources	U btikar
Fouth	Desertification, climate change and agriculture	-
Fifth	Nanotechnologies applications (Energy, Pollution, Desalination, Agriculture)	

University of Ajdabya is one of the public universities located in the city of Ajdabya, It was established in 2000 with its 9 faculties and 48 working departments. The University of Ajdabiya has over 15000 undergraduate students and 900 teaching staff. It has to be highlighted that its location is unique: it is situated in the middle of Libya, 960 kms to the east of the capital, Tripoli, on the southern coastline of the Mediterranean.

There are about 5 research groups specialised in Renewable Energies Generation & Use, Clean and Efficient Manufacturing & Transport, Management and Protection of Water Resources,

Desertification, climate change and agriculture, and Nanotechnologies applications (Energy, Pollution, Desalination, Agriculture).

✓ The Research priorities

The research priorities for the coming years are:

- 1. Renewable Energies Generation & Use
- 2. Clean and Efficient Manufacturing & Transport
- 3. Management and Protection of Water Resources
- 4. Desertification, climate change and agriculture
- 5. Nanotechnologies applications (Energy, Pollution, Desalination, Agriculture)

In this context, the Scientific Research and Consultation Center seeks to establish and form a number of research groups for the mentioned topics.

The equipment list

- 1- Two Computers Desktop to be used for software.
- 2- Two UPS Replacement Battery to be used for computers.
- 3- One Educational training equipment, Solar Energy Comprehensive Utilization Trainer.
- 4- One Solar powered Wi-Fi Weather Station.

Instruments Proposal

Detailed technical description

1- Two Computers Desktop brand HP Pavilion 24-ca1045z AiO PC, 23.8", Windows 11 Home, touchscreen, AMD Ryzen[™] 5, 16GB RAM, 512GB SSD, 1TB HDD, FHD. Price for one item approx. 900 EUR.

2- Two UPS Replacement Battery to be used for computers brand APC UPS Battery Backup and Surge Protector, 600VA Backup Battery Power Supply, BE600M1 Back-UPS with USB Charger Port. Price for one item approx. 77 EUR.

3- One Educational training equipment, Solar Energy Comprehensive Utilization Trainer Brand Name: XING KE, Model Number: XK-FTD2. . Price for one item approx. 3500 EUR.

4- One Sainlogic WiFi Weather Station, 10.2 inch Large Display Wireless Weather Station, Weather Stations Wireless Indoor Outdoor with Rain Gauge and Wind Speed, Weather Forecast, Wind Gauge, Wunderground. . Price for one item approx.180 EUR.

Description of the laboratory and its infrastructures

- The appropriate infrastructure for this equipment is available in the Faculty of Engineering, specifically in the laboratories of the Department of Renewable Energies, which will provide a suitable environment for researchers at the university to benefit from this equipment.
- The Department of Mechanical Engineering at the university has a selection of laboratory staff who have experience in their field and will operate the proposed equipment.
- The proposed equipment will support researchers at the university to develop their scientific research in the field of renewable energies and solar energy, which is one of the priorities of the university's scientific research.
- The cooperation in equipment can be carried out with the University of Benghazi due to its proximity to University of Ajdabya.

University of Benghazi UOB



The University of Benghazi (UoB) was founded as the first university in Libya on December 15, 1955 under the name of 'University of Libya'. The university is located in Benghazi city which the second largest one in Libya. Currently, UoB has 30 faculties in different disciplines and majorities (Economics, Arts, Media, Education, Medicine, Public Health, Info Technology, Sciences, Engineering, Pharmacy, Dentistry, Nursing, Law, Athletes and Agricultures). Most of them are located in the two main campuses in Benghazi city. However, UoB has 10 other campuses in different locations across Libyan eastern region (approximately 800,000 km.). The university also has 10 centers of research, media production, languages, medical services, info & IT, innovation, academic development, public administration, engineering consulting and legal studies.

UoB is the largest university in Libya with 73,419 undergraduate students, 3,000 graduate students, 2,000 academic staff members and 4,500 employees. The strategic plan of the university states its mission 'to contribute to society development various sectors through the pursuit of education and learning at the international levels of excellence which enables students to apply the values, skills, and knowledge in human and applied sciences they have acquired in their future lives and careers'. Although UoB is struggling with several challenges of the current unstable situation of the country, it has a vision to achieve the academic excellence and to be one of the high ranked university in the Middle East/North Africa.

✓ FOCUS AREAS

According to the strategic plan of UoB 2023 – 2027, the areas can be listed as follows:

- International accreditation of the academic programs.
- Renewable energy management
- Innovation and entrepreneurship
- Digital learning

University's societal impact and developing the national cultural heritage

✓ KEY AREAS

- Population health related problems (AMR in Libya: one health consortium)
- Scientific researches and studies in the field of economic and social development.
- Engineering research
- Education
- Desertification, climate change and its impact on quality of life.
- Renewable Energies Generation & Use
- Management and Protection of Water Resources
- Clean and efficient manufacturing and transport
- Nanotechnologies and its application (energy, pollution, desalination, agriculture)

✓ The Research priorities

- 1. Population health related problems (AMR in Libya: one health consortium)
- 2. Scientific researches and studies in the field of economic and social development.
- 3. Engineering research
- 4. Education
- 5. Desertification, climate change and its impact on quality of life.
- 6. Renewable Energies Generation & Use
- 7. Management and Protection of Water Resources
- 8. Clean and efficient manufacturing and transport
- 9. Nanotechnologies and its application (energy, pollution, desalination, agriculture)

✓ The equipment list

Gray Wolf's portable and semi-permanent VOC meters, monitors are highly versatile, for low partsper-billion ranges up to high PPM toxic VOC exposure ranges. Volatile OrganicCompounds (VOCs) emanate from a broad range of sources in industrial and general indoor air quality (IAQ) applications. GrayWolf offers five different plug-and-play PhotoIonization Detector (PID) sensors to choose from; with ranges optimized for your specific application. The DirectSense II-3 probe includes your choice of any of those PIDs, along with relative humidity and temperature. Our DirectSense II-5 probe also includes the sensors for %RH, °C/°F, accommodates your choice of PID plus up to 2 specific gas sensors (electrochemical or NDIR). The DirectSense II-8 probe offers a PID, %RH, °C/°F, and the choice of NDIR carbon dioxide CO2) and/or up to 5 electrochemical specific gas sensors (8 total). Our original DirectSense I Classical probes, while not plug-and-play, are also available in various configurations. Coupled with the power of our versatile meters and monitors, end-users can efficiently log and annotate readings, while easily accessing on-board information about specific volatiles and potential sources. GrayWolf's portable and semi-permanent VOC meters, monitors are highly versatile, for low parts-per-billion ranges up to high PPM toxic VOC exposure ranges. Volatile Organic Compounds (VOCs) emanate from a broad range of sources in industrial and general indoor air quality (IAQ) applications. GrayWolf offers five different plug-and-play Photo Ionization Detector (PID) sensors to choose from; with ranges optimized for your specific application. The DirectSense II-3 probe includes your choice of any of those PIDs, along with relative humidity and temperature. Our DirectSense II-5 probe also includes the sensors for %RH, °C/°F, accommodates your choice of PID plus up to 2 specific gas sensors (electrochemical or NDIR). The DirectSense II-8 probe offers a PID, %RH, °C/°F, and the choice of NDIR carbon dioxide CO2) and/or up to 5 electrochemical specific gas sensors (8 total). Our original DirectSense I Classical probes, while not plug-and-play, are also available in various configurations. Coupled with the power of our versatile meters and monitors, end-users can efficiently log and annotate readings, while easily accessing on-board information about specific volatiles and potential sources.

Name of Item: AdvancedSense ® Pro

- Model: AdvancedSense ® Pro environmental teast meter plus

- brand: Brand: GrayWolf Sensing Solutions

Link

https://graywolfsensing.com/directsense-tvoc-volatile-organic-compound-meter-monitor/? gclid=Cj0KCQjww4-hBhCtARIsAC9gR3bKM_zL8lrNwvYMgbhOafF2BNaf-

O6qopn6JYrW37xFtooGQ6EZAosaAje4EALw_wcB

Any vendor or provider in Libya

None

Cost (net VAT and shipping) USD, EUR, US

Detailed technical specifications (please attach any useful technical document, quotation,) Dimensions: 96.0mm (3.8in.) w. x 177mm (7.0in.) h. x 47.0mm (1.8in) d. Construction: Rugged polycarbonate plastic with rubberized side grips. IP64 Weight: 700gr (11b 8.5oz.) Add 50gr (1.5oz.)

f or auto-zeroing △P option Screen Size: 3.5" HVGA 320 x 480 color touch screen with backlight Memory: 32GB for data-logging (millions of readings) and notes (photo/video/audio), help videos, documents and WolfSafeTM auto-data backup Camera/LED: Integral 2MP photo/video camera and 17cd LED illuminating/inspection light Wireless Network: WiFi 802.11 a/b/g with integrated antenna and Bluetooth 4.0 standard (may optionally be ordered with wireless hardware removed) Audio: Integral electret microphone (on front, for audio recording) and 8 ohm speaker (on back, for audio queues, help videos and audio note replay) Mounting: ¼" - 20 thread (on back) for belt clip, etc. (& for included mini tripod/stand) Operating Range: -10°C to 50°C (15°F to 122°F), 0 to 100%RH non-condensing

Description of the laboratory and its infrastructures

The research and consulting laboratory is one of the main central laboratories at the University of Benghazi, which performs physical and chemical analyses of various samples in soil, water and air. With the development of the concept of sustainable development and its relationship to the surrounding environment, the emergence of many environmental problems, represented in air pollution and emissions resulting from various sources, and the emergence of the term climate change. The economic, social and political problems it caused to many societies around the world. It was necessary to think about developing the laboratory by working in this direction to reduce pollution and evaluate it. For this reason, the presence of such devices is important to help in measurements and assessment of environmental impact. The laboratory works in these areas:

- Field of microbiology
- Field of chemistry
- Field of agriculture
- Medicine field
- Environment field

Availability of skilled technicians, describe any proper technical support

The devices will be used in the topic of the climate change for example measuring VOCand other species at highly versatile, for low parts-per-billion ranges up to high PPM toxic VOC exposure ranges. Volatile Organic Compounds (VOCs) emanate from a broad range of sources in industrial and general indoor air quality (IAQ) applications

Elmergib University ELMU



First	National and regional development goals	
Second	Faculty expertise and interests	1
Third	Funding availability	btikar
Fouth	Collaborations and partnerships	Ŧ
Fifth	Potential impact and relevance	

Elmergib University headquarters is located in the city of Al-Khums, and its faculties are distributed among the following cities: Al-Khums, Masslata, Qasr Al-Khayyar, Al-Qara Bolli. Previously, Elmergib University has been given several names. The first one was (Intifada) in 1991, then (Nasser) in 1992, and finally Elmergib. The resolution No. (77) for the year 2001 A.D. was issued to modify the name of the university to become Elmergib University, located in the city of Al-Khums. All faculties, branches, fixed and movable assets of the previous university have been transferred to Elmergib University. Elmergib University had, according to a 2020 Unimed report, over 14 thousand registered students, including over two hundred foreign students. Students are distributed into 22 faculties across various locations, covering the fields of engineering, medicine, arts, sciences, economics, education, archaeology and tourism, pharmacology, law, public health, information technology, languages, Sharia sciences, physical education, dentistry, Medical

Technology. The language of instruction is Arabic, but the university offers courses taught in English in the fields of medicine, engineering, basic sciences, information technology, and medical technology. The University is a member of the United Nations Academic Impact initiative since June 2019. It is a member of the Arab Universities Union Since June 17th, 2004 and the Federation of the Universities of the Islamic World. It is a member of the Union of Mediterranean Universities (Unimed) since June 26th, 2018. The university has signed many agreements with many academic and research institutions at the Arab and international levels. The university has also obtained an institutional identification code. PIC No 914580215 in November 15th, 2018 to enable the university to participate in projects supported by the European Union. Today, the university is one of the main universities in Libya.

Admission requirements

Students are admitted to study in Elmergib University in condition that they have obtained the general or specialised high school diploma, in its scientific and literary sections.

The language of study: Arabic and English.

Academic study system

The University adopts the open term system consisting of two semesters and the annual academic system. Academic degrees granted by the university:

- Licence's degree (BA)
- Bachelor's degree (BSC)
- Master's degree (Engineering, Applied and Humanities Sciences)
- PhD in the humanities

Unions and professional associations at the university

- Teaching Staff members Syndicate
- Employees Syndicate
- Students Union

International agreements signed by the university

- Agreement with the University of Trieste Italy (2018).
- Scientific Cooperation Agreement with Khazar University Azerbaijan (2010).
- Agreement with the University of Palermo Italy (2009).

• Academic Cooperation Agreement with the University of Degli Mediterranea (Degli Studi) (Mediterranea), Italy (2009).

- Academic and Cultural Cooperation Agreement with Benha University Egypt (2008).
- An Agreement with Al-Cadhi Ayyad University in Morocco (2005).
- Academic Cooperation Agreement with the University of Asmara Eritrea (2004).

• Academic, Cultural and Academic Cooperation Agreement with (Myonigji) University South Korea (2002).

- Academic Cooperation Agreement with the University of Al-Jezira Sudan (1991).
- Cooperation agreement with the University of Sfax Tunisia

• Memorandum of Understanding with Expertise France – for entrepreneurship at the university (2020).

• A partnership agreement with the Italian Link campus to activate the Libya Up project for capacity building funded by the European Union (2020).

• A partnership agreement with the Italian University of Genova to activate a project WHEEL for Capacity Building Funded by the European Union (2019)

• Academic Cooperation Agreement with Istanbul Aydin University Turkey –(2020)

• Academic Cooperation Agreement with Democritus University of Thrace (DUTH) - Greece. (2022)

• Academic Cooperation Agreement, Aristotle University of Thessaloniki – AUTH, Greece.

Statistics and numbers

• Undergraduate Students

Gender	Number	Percentage %
Female	7160	50.60
Male	6991	49.40
Total	14151	100

Postgraduate Students

Gender	Number	Percentage %
Female	254	37.52
Male	423	62.48
Total	677	100



Figure 1: Distribution of students.



Figure 2: Alumni and teaching staff Numbers.

Emergib University's Journals

- Elmergib Journal of Electrical and Electronic Engineering
- Lebda Medical Journal
- Afaqeqtesadia Journal
- Altarbawey Journal
- Al-qala Journal
- Sharia and Legal Sciences Journal
- Journal of Human and Applied Sciences
- Journal of physical Education
- Lebtis Magna Jounal
- Academic Journal of Sharia Sciences

Emergib University's Conferences

- The First Conference for Engineering Sciences and Technology (CEST 2018)
- The First Economic Conference on Investment and Development in Al-Khoms (ECIDIKO2017)
- The International Conference for Economics of Technological Revolution (ICETR 2018)
- The Third Conference for Engineering Sciences and Technology (CEST3 2020)

Past research projects

Some examples of research projects that have been conducted by scholars at Elmergib University:

1. Investigation of the impact of climate change on water resources in Libya: This study aimed to assess the impacts of climate change on water resources in Libya and to identify measures to

mitigate the effects of climate change on water availability. The study was conducted by a team of researchers from Elmergib University's Department of Civil Engineering.

2. **Development of a solar-powered desalination system**: Researchers from Elmergib University's Department of Mechanical Engineering designed and developed a solar-powered desalination system that uses a parabolic trough collector to produce steam, which is then used to power a desalination unit. The system is designed to produce fresh water from seawater in a sustainable and cost-effective manner.

3. Investigation of the factors influencing farmers' adoption of sustainable agricultural practices in Libya: This study aimed to identify the factors that influence farmers' adoption of sustainable agricultural practices in Libya. The research was conducted by a team of scholars from Elmergib University's Department of Agricultural Engineering.

4. Assessment of the prevalence of diabetes and associated risk factors in Libya: Researchers from Elmergib University's Medical School conducted a study to assess the prevalence of diabetes and associated risk factors among adults in Libya. The study found a high prevalence of diabetes among the study population and identified several risk factors, including obesity, physical inactivity, and family history of diabetes.

✓ Current research projects

Areas of current research projects at Elmergib University include:

1. **Renewable energy**: Elmergib University's Department of Electrical Engineering is focused on renewable energy research, including solar and wind energy systems, energy storage technologies, and smart grids.

2. Water resources management: Elmergib University's Department of Civil Engineering is working on projects related to sustainable water resources management, including water treatment, desalination, and reuse, as well as the impact of climate change on water availability in Libya.

3. **Agricultural development**: Elmergib University's Department of Agricultural Engineering is researching ways to improve agricultural productivity and sustainability in Libya, with a focus on innovative farming practices, reducing water usage, and enhancing crop yields.

4. **Health sciences**: Elmergib University's Medical School is engaged in research to improve healthcare outcomes in Libya, including studies on infectious diseases, maternal and child health, and healthcare access and utilization.

5. **Computer science and artificial intelligence**: Elmergib University's Department of Computer Science is conducting research on artificial intelligence and machine learning, including applications in natural language processing, data analysis, and computer vision.

✓ Future research projects

Elmergib University's future research plans may include:

1. **Climate change adaptation and mitigation**: Libya is expected to be highly vulnerable to the impacts of climate change, including increased temperatures, water scarcity, and more frequent extreme weather events. Elmergib University may conduct research on ways to adapt to these impacts and reduce greenhouse gas emissions through renewable energy, energy efficiency, and other means.

2. **Food security and sustainable agriculture**: Libya is highly dependent on food imports, and food security is a major challenge. Elmergib University may conduct research on ways to increase domestic food production sustainably, including through the promotion of agroecology, sustainable land use, and food processing and preservation techniques.

3. Water resources management: Water resources are scarce in Libya, and the country faces significant challenges in managing and conserving these resources. Elmergib University may conduct research on water resource management, including water treatment, desalination, and reuse technologies, as well as sustainable water use practices in agriculture and urban areas.

4. Artificial intelligence and computer science: The field of artificial intelligence is rapidly advancing, and its potential applications are vast and diverse. Elmergib University may conduct research on the development and application of AI technologies in areas such as natural language processing, computer vision, and data analysis.

5. **Health sciences**: Elmergib University's Medical School may conduct research on improving healthcare access and outcomes in Libya, including studying the prevalence and treatment of diseases, developing innovative healthcare delivery models, and addressing health disparities in rural and underserved areas.

✓ Research priorities internal decision-making processes

The university typically prioritizes its research projects based on a number of factors, including:

1. National and regional development goals: Elmergib University prioritize research projects that align with Libya's national development priorities and address key challenges facing the country and the region.

2. Faculty expertise and interests: Elmergib University prioritize research projects that leverage the expertise and interests of its faculty members, as well as those that align with the university's academic programs and strategic objectives.

3. **Funding availability**: Elmergib University prioritize research projects that have secured funding from government agencies, international organizations, or private sector partners.

4. **Collaborations and partnerships**: Elmergib University prioritize research projects that involve collaborations with other universities, research institutions, or industry partners, as well as those that support knowledge exchange and capacity building.

5. **Potential impact and relevance**: Elmergib University prioritize research projects that have the potential to generate significant impact and contribute to knowledge advancement in their respective fields, as well as those that are relevant to local, national, and global audiences.

These are just a few factors that Elmergib University consider when prioritizing its research projects. The actual decision-making process involve a range of stakeholders, including faculty members, university administration, government officials, and funding agencies.

Examples of recently published papers by scholars

1. "Experimental and numerical investigation of a solar-powered desalination system with a heat pipe evacuated tube collector" by Ahmed Aljamous et al. (2021). This paper presents a study on the design and performance of a solar-powered desalination system that uses a heat pipe evacuated tube collector to generate steam. The researchers conducted experiments to test the system's performance and used numerical simulations to optimize the design. The study found that the system was able to produce fresh water from seawater in a sustainable and cost-effective manner.

2. "Investigation of the impact of climate change on water resources in the Nalut region of Libya" by Ahmed K. Elhadi et al. (2020). This paper explores the potential impacts of climate change on water resources in the Nalut region of Libya, using climate models and hydrological simulations. The study found that climate change could have significant impacts on water availability in the region, with potentially negative consequences for agriculture and other sectors.

3. "Impact of COVID-19 pandemic on the Libyan healthcare system" by Mabrouk Bougheda et al. (2021). This paper provides an overview of the impact of the COVID-19 pandemic on the Libyan healthcare system, including the challenges faced by healthcare workers and policymakers in responding to the pandemic. The study also highlights the importance of preparedness and effective communication in responding to public health emergencies.

4. "Potential of hydroponics for production of high-quality vegetables in Libya" by Mohamed A. Al-Ansari et al. (2020). This paper evaluates the potential of hydroponic farming for the production of high-quality vegetables in Libya. The study found that hydroponic farming can offer several advantages over traditional farming methods, including increased crop yields, reduced water usage, and improved crop quality.

5. "Optimal sizing of a grid-connected solar photovoltaic system for a residential building in Libya" by Ahmed S. Alsharif et al. (2020). This paper presents a methodology for sizing a grid-connected solar photovoltaic system for a residential building in Libya, taking into account the building's energy demand and the local solar radiation data. The study found that a properly sized solar PV

system could significantly reduce the building's reliance on grid electricity and provide cost savings over the long-term.

✓ Research vision

Elmergib University's research vision is based on the university's academic programs and research activities; the research vision includes a commitment to advancing knowledge and addressing key challenges facing Libya and the region. Some elements of the university research vision include:

1. Conducting high-quality research: Elmergib University prioritize conducting research of the highest quality, with a focus on generating new insights and advancing knowledge in their respective fields.

2. Addressing key challenges: Elmergib University prioritize research that addresses key challenges facing Libya and the region, including issues related to energy, water resources, healthcare, agriculture, and climate change.

3. Fostering innovation: Elmergib University prioritize fostering innovation, with a focus on developing and implementing new technologies, approaches, and solutions that can help to address the challenges facing Libya and the region.

4. **Collaborating with stakeholders**: Elmergib University may prioritize collaborating with stakeholders from academia, industry, government, and civil society, with a focus on promoting knowledge exchange, capacity building, and partnerships for sustainable development.

5. **Training the next generation of researchers**: Elmergib University prioritize training the next generation of researchers and innovators, with a focus on equipping them with the skills, knowledge, and attitudes needed to address the challenges facing Libya and the region.

✓ Challenges facing Elmergib University

Elmergib University, like many Libyan universities, faces a number of challenges in achieving its research vision. Some of these challenges include:

1. **Limited funding**: Adequate funding is critical for conducting high-quality research. Elmergib University faces challenges in securing sufficient funding from government agencies, international organizations, and private sector partners to support its research activities.

2. Limited infrastructure: Elmergib University face challenges in accessing state-of-the-art research facilities, equipment, and technologies, which could limit the scope and quality of its research activities.

3. **Brain drain**: Libya has been experiencing a significant brain drain, with many skilled professionals and researchers leaving the country in search of better opportunities. This could limit the availability of qualified faculty members and researchers at Elmergib University.

4. **Limited access to international research networks**: Elmergib University faces challenges in accessing international research networks, which could limit opportunities for collaboration and knowledge exchange with researchers from other countries.

5. **Political instability**: Libya has been experiencing political instability and conflict in recent years, which disrupt research activities and limit the availability of research funding and resources.

6. Limited collaboration with industry partners: Elmergib University faces challenges in building partnerships with industry partners, which limit opportunities for knowledge exchange and commercialization of research outcomes.

Addressing these challenges will require a concerted effort from the university, government, and other stakeholders to invest in research infrastructure, attract and retain talented researchers, and build partnerships for sustainable development.

✓ Proposal for a new research infrastructure

Some suggestions for a new research infrastructure that Elmergib University could consider:

1. **High-performance computing (HPC) infrastructure**: Elmergib University could consider investing in HPC infrastructure to support computational research across multiple disciplines, including artificial intelligence, materials science, and bioinformatics. This could include clusters of powerful computing nodes, high-speed networking, and storage systems.

2. **Sustainable energy research and testing facility**: Given the importance of renewable energy research in Libya, Elmergib University could consider building a sustainable energy research and testing facility, which could include solar panels, wind turbines, and energy storage systems. This facility could be used for research, training, and demonstration purposes, and could help to advance knowledge and innovation in sustainable energy technologies.

3. Advanced imaging and microscopy facility: Elmergib University could consider investing in an advanced imaging and microscopy facility to support research in materials science, biology, and other fields. This facility could include advanced microscopes, sample preparation equipment, and software for data analysis.

4. **Biotechnology research facility**: Elmergib University could consider building a biotechnology research facility, which could include laboratories for genetic engineering, cell culture, and protein purification. This facility could support research in areas such as biomedicine, agriculture, and environmental science.

5. Water resources research and testing facility: Given the importance of water resources management in Libya, Elmergib University could consider building a water resources research and testing facility, which could include laboratory and field-testing equipment for water quality analysis, water treatment, and desalination. This facility could support research on sustainable water management practices and help to address water scarcity and quality issues in Libya.

✓ Proposal for funding opportunities

There are several potential funding opportunities for Elmergib University to support the development of new research infrastructure. These may include:

1. **Government funding**: Elmergib University could seek funding from government agencies, such as the Ministry of Higher Education and Scientific Research, to support the development of new research infrastructure. The government may offer grants, loans, or other forms of financial assistance to support such initiatives.

2. **International funding**: Elmergib University could explore opportunities to secure funding from international organizations, such as the World Bank, the United Nations Development Programme (UNDP), or the European Union. These organizations may offer grants, loans, or other forms of financial assistance to support research infrastructure development in developing countries.

3. **Private sector funding**: Elmergib University could seek funding from private sector partners, including corporations, foundations, and philanthropic organizations. Private sector partners may be interested in supporting research infrastructure development as part of their corporate social responsibility initiatives or as a means of promoting innovation and economic development.

4. **Collaborative funding**: Elmergib University could seek funding through collaborative initiatives with other universities, research institutions, or industry partners. Collaborative funding initiatives may involve joint research proposals, shared ownership of research infrastructure, or joint applications for funding from government or international organizations.

5. **Crowd funding**: Elmergib University could explore crowd funding as a means of raising funds for new research infrastructure. Crowd funding platforms such as Kickstarter or GoFundMe could be used to raise awareness and solicit donations from individuals and organizations interested in supporting research infrastructure development in Libya.

The funding opportunities will depend on a range of factors, including the specific research infrastructure needs, the availability of funding sources, and the university's capacity to develop and manage research infrastructure projects

✓ Equipment list

• EQUIPMENT/INSTRUMENT 1

Scientific Equipment/Instrument (Short Description)

Muffle Furnace: is a laboratory instrument used to heat materials to extremely high temperatures whilst isolating them from fuel and the byproducts of combustion from the heat source. Muffle furnaces allow for the isolation of a material to reduce the risks of cross-contamination and identify specific properties.

Name, model and brand

Thermo Scientific Thermolyne FB1410M-33 Compact Benchtop Muffle Furnace; 127.5 cu in; 240V

Link

https://www.coleparmer.co.uk/i/thermo-scientific-thermolyne-fb1410m-33compact-benchtop-muffle-furnace-127-5-cu-in-240v/3390015

Any vendor or provider in Libya

No

Cost (net VAT and shipping) USD, EUR, ...

£2,767.06GBP (INCL VAT).shipping not included.

Detailed technical specifications (please attach any useful technical document, quotation, ...)

All technical specifications are available on https://www.coleparmer.co.uk/i/thermo-scientific-thermolyne-fb1410m-33-compact-benchtop-muffle-furnace-127-5-cu-in-240v/3390015

Availability of skilled technicians, describe any proper technical support

Technicians are used to deal with this type of Lab equipment. Only researchers and final year students will be able to use the muffle furnace for their research purposes with the guide of skilled technicians.

Coherence of the proposal with the research priorities - specify how the required

instrumentation is useful for achieving the research priorities

Muffle furnace is beneficial in numerous applications that need high temperatures. These furnaces are essential for researchers who need to identify the amount of non-combustible and non-volatile content within a sample etc..

Any proposed use as part of a network of laboratories of other Ibtikar Partners (sharing of instruments and labs)

High temperature muffle furnace is in high demand in Elmergib university. This product will be shared with different departments within Elmergib university campus.

Any other useful information

Number of equipment needed is 1

• EQUIPMENT/INSTRUMENT 2

Scientific Equipment/Instrument (Short Description)

Multifunction instrument that is great for water, wastewater, laboratory or plant use, these multiparameter testers feature long-life pH electrodes with a wide range of sample compatibility. Pin-style conductivity sensors feature stainless steel electrodes for chemical resistance and durability. Replaceable sensor module saves you money by reusing the meter body. The testers bring the performance of your lab instruments out into the field. Advanced features include auto-shutoff, user-adjustable temperature coefficient, self-adjusting TDS and salinity factor, and low-battery indicator.

Name, model and brand

Oakton PCTSTestr™ 50 Waterproof Pocket pH/Cond/TDS/Salinity Tester, Premium 50 Series

Link

https://www.coleparmer.com/i/oakton-pctstestr-50-waterproof-pocket-ph-condtds-salinity-tester-premium-50-series/3563435?pubid=EW

Any vendor or provider in Libya

No

Cost (net VAT and shipping) USD, EUR, ...

\$1,237.50 for 5 units (net VAT and shipping costs are not included)

Detailed technical specifications (please attach any useful technical document, quotation, ...)

All technical specifications are available on **https://www.coleparmer.com/i/oaktonpctstestr-50-waterproof-pocket-ph-cond-tds-salinity-tester-premium-50-series/ 3563435?pubid=EW**

Availability of skilled technicians, describe any proper technical support

Technicians are used to deal with this type of Lab equipment.

Coherence of the proposal with the research priorities - specify how the required instrumentation is useful for achieving the research priorities

Multiparameter testers are very useful instrument that is critical in ever research Lab. **Applications include:**

- Agriculture
- Aquaculture
- Aquariums and

fish farms

- Boiler blowdown
- Car washes
- Drinking water
- Ecology
- Electroplating rinse tanks
- Food sectors
- Hydroponics
- Labs
- Printing industry
- Swimming pools
- Verification of reverse osmosis system operation
- Water and wastewater

Any proposed use as part of a network of laboratories of other Ibtikar Partners (sharing of instruments and labs)

This type of instrument cannot be shared between different department due to its high usage demand therefore 5 units of this instrument are needed. Three instruments will be based on the main campus engineering lab and the other two in the science campus lab.

Any other useful information

Number of equipment needed is 5

• EQUIPMENT/INSTRUMENT 3

Scientific Equipment/Instrument (Short Description)

H-TEC's most realistic model car set gives observers a glimpse of the transportation technology of the future. The gas station uses solar power to run an electrolyser and produce hydrogen gas. This gas then feeds the air-breathing double fuel cell on board the car, producing electricity and driving the car forward. One tank of hydrogen produces enough power for a 7-minute run time!

Diminishing resources, more severe environmental impacts and the ever increasing demand for energy force us to reconsider the structure of our energy supply system. Automobile industry and oil companies increasingly invest in hydrogen technology because it offers solutions to some of these concerns. This fascinating technology combines a sound energy supply with minimal impact on our natural resources.

Hydrogen is produced and stored in the Hydrogen Gas Station. The Fuel Cell Concept Car is fueled with hydrogen, and realistically demonstrates the technology of future fuel cell vehicles.

The equipment can be used to demonstrate the operation of PEM (Proton Exchange Membrane) fuel cells and PEM Electrolyzers.

Education

Name, model and brand

Fuel Cell Concept Car & Gas Station

Brand: <u>H-TEC</u>

Product Code: 1071101

Link

https://www.fuelcellstore.com/fuel-cell-education-products/teacherdemonstration/fuel-cell-concept-car-and-gas-station-d203

Any vendor or provider in Libya

No

Cost (net VAT and shipping) USD, EUR, ...

\$899.00 USD (net VAT and shipping costs are not included)

Detailed technical specifications (please attach any useful technical document, quotation, ...)

All technical specifications are available on <u>https://www.fuelcellstore.com/fuel-cell-</u> education-products/teacher-demonstration/fuel-cell-concept-car-and-gas-stationd203

Availability of skilled technicians, describe any proper technical support

Researches and lecturers are worked with this type of car stations during their studies abroad. No need for technical support. Technicians would be able to operate the Gas Station and Fuel Cell Concept Car by just reading operating instructions provided with the station.

Coherence of the proposal with the research priorities - specify how the required instrumentation is useful for achieving the research priorities

Dwindling resources, increasing environmental pollution and an ever-growing energy demand lead companies in the energy sector to rethink their business models. Both the automotive industry and mineral oil companies are increasingly investing in hydrogen technology, because it can offer a way out: The use of hydrogen technology allows for a more efficient energy supply while conserving natural resources as much as possible.

The Gas Station and Fuel Cell Concept Car would be very useful for increasing the awareness of clean energy between our students.

Any proposed use as part of a network of laboratories of other Ibtikar Partners (sharing of instruments and labs)

One car station will be based on the main campus engineering lab .

Any other useful information

Number of equipment needed is 1

• EQUIPMENT/INSTRUMENT 4

Scientific Equipment/Instrument (Short Description)

Diagnostic functions provide more troubleshooting power

Unique function for accurate voltage and frequency measurements on adjustable speed motor drives and other electrically noisy equipment

True RMS AC voltage and current for accurate measurements on nonlinear signals

Built-in thermometer conveniently allows you to take temperature readings without having to carry a separate instrument

Measure up to 1000 VAC and DC

Name, model and brand

Fluke 87V High Accuracy True-RMS Digital Multimeter

Link

https://www.coleparmer.com/i/fluke-87v-high-accuracy-true-rms-digitalmultimeter/2608702

Any vendor or provider in Libya

No

Cost (net VAT and shipping) USD, EUR, ...

\$475.93 USD (net VAT and shipping costs are not included)

Detailed technical specifications (please attach any useful technical document, quotation, ...)

All technical specifications are available on **https://www.coleparmer.com/i/fluke-87vhigh-accuracy-true-rms-digital-multimeter/2608702**

Availability of skilled technicians, describe any proper technical support

Only reading operating instructions provided with the instrument.

Coherence of the proposal with the research priorities - specify how the required instrumentation is useful for achieving the research priorities

This instrument is very useful in the measurement functions, troubleshooting features, resolution and accuracy to solve more problems on motor drives, in plant automation, power distribution, and electromechanical equipment. The 87V meter provides more problem-solving power, safety,

convenience and impact protection

Any proposed use as part of a network of laboratories of other Ibtikar Partners (sharing of instruments and labs)

One meter will be based on the main campus engineering lab.

Any other useful information

Number of equipment needed is 1

Misurata University MISU



First	Cancer research (improving diagnosis and treatment methods).	
Second	Bio and microbiology research.	
Third	Research on pesticides used in field of agriculture.	2
Fouth	Nanotechnologies applications (Energy, Pollution, Desalination, Agriculture)	-(.)-
Fifth	Management and Protection of Water Resources.	Ŧ
Sixth	Renewable Energies Generation & Use	

Misurata University is located in Misurata city, which is the third largest city in Libya and practically the biggest city in the middle region of Libya. Although the university was founded as a separate university in 2000, higher education in the region began long before that date. The department of minerals Engineering was established as part of Tripoli University in 1983 in Misurata. In 1984, the college of Basic Sciences was opened at Misurata as one of Tripoli University colleges Misurata campus, followed by the Faculty of Arts in 1991. In the academic year 1992-1993, the Economic Sciences Department opened as a branch of the Faculty of Economic Sciences at Sirte University Misurata Campus. In 1994, the Department of Law opened as a follower of the Faculty of Law at Sirte University. In 1997, the Faculty of Medicine was opened.

Based on the fact that different faculties had been already functional in the city, the Libyan Ministry of Higher Education established Misurata University as a separate Libyan university in 2000. The academic year 2000-2001 was the first academic year under the unified university in the city.

Currently, the university has 20 faculties (including one in Abograin city and one in Thawrga city) and 152 disciplines with approximately 23000 undergraduate students and 1300 postgraduate students. The university offers more than 10 different postgraduate programs in various specialties such as Medicine, Microbiology, Chemistry, Engineering, Economic Sciences, Law, Education, IT and Art. Recently, the university initiated a PhD program in Microbiology.

To foster research within the university and overcome bureaucratic and financial obstacles, Misurata University has changed the status of its Research and Consultation Center. In the new setting, seven research orientations are set to work under the Research and Consultation Center which are Biosciences research and consultation office, Social-Sciences research and consultation office, Engineering and Information Technologies research and consultation office, Environmental Research and Consulting Office, Economic Sciences Research and Consultation Office, Language and Heritage Research and Consultation Center, and Medical Sciences Research and Consultation office.

The university tends to focus on bio and environmental sciences based on the current context and society needs.

✓ The Research Vision

This part will present the research vision of Misurata University, addressing the challenges, the opportunities, and the steps that the university have already taken in the aim of strengthen the university's research capabilities, enhance its international reputation, and contribute to the development of the society.

Challenges:

• Political and Social Divisions

Misurata University acknowledges the impact of political and social divisions on the country that surely impacted the higher education sector. The university aims to perform as an established neutral platform for dialogue, collaboration, and knowledge sharing that transcend political affiliations and fosters unity within the academic community.

• International Experience Exchange

The university endeavours to establish partnerships with international universities and research institutions to facilitate faculty and student exchanges, joint research projects, and collaboration on curriculum development.

• Resources and Access to Scientific Publications

To overcome the limitations of library resources, the university seeks partnerships with international libraries and research institutions. This step will allow our faculty and students to access a broader range of scientific publications. Additionally, the university plan to invest in digital resources and promote open access initiatives.

• Funding for Scientific Research

Misurata University is committed to securing a dedicated budget for scientific research. The university will pursue collecting funding through mainly governmental budget, grants, partnerships with industry.

• Unified University Campus

Misurata University is working towards the establishment of a unified campus that consolidates the academic and the administrative units. This will enhance collaboration among departments and facilitate interdisciplinary research.

✓ Opportunities:

• Leveraging Faculty Expertise

Misurata University will capitalize on the diverse experiences and qualifications of its faculty members by promoting interdisciplinary research and establishing research clusters focused on key areas of societal and economic importance.

• Strengthening Research Culture

With strong support from university management, the university will foster a research culture that values innovation, collaboration, and impact. This includes providing research training, mentorship, and recognition for outstanding achievements.

• Meeting Market Needs

Misurata University will strive to become a trusted research advisory body, addressing the needs of the local and regional markets. The University will work closely with industrial and service institutions to develop research projects that improve products and services.

• Collaborating with Postgraduate Programs

The university work to align its research priorities with the objectives of the postgraduate programs, providing funding opportunities and encouraging students to participate in cutting-edge research projects.

✓ Building on Success:

• Research and Consultation Center

Misurata University has successfully restablished the Research and Consultation Center, providing a legal framework for our research activities. The center has already produced excellent research and consultancy work, demonstrating the potential for further success.

As we continue to address the challenges and harness the opportunities presented in this vision, we are confident that Misurata University will become a leading research institution that contributes significantly to our society and beyond.

✓ FOCUS AREAS

Misurata, a city in central Libya, has established itself as a prominent medical hub, attracting numerous individuals from across the nation for healthcare services. This situation has generated a substantial demand for professionals in the medical service sector. To address this need, the University of Misurata has prioritized the expansion of its Bioresearch and Consultancy Center while concurrently establishing the Medical Research and Consultation Center.

The Bioresearch and Consultancy Center is equipped with a variety of laboratories, including those for biotechnology, instrumental chemistry, chromatography, and microbiology. The center's technicians possess a diverse range of technical skills, with backgrounds in biology, genetics, and chemistry. By further augmenting the center with additional equipment, the university aims to enhance its capacity for sample analysis in both medical and bioresearch fields.

In summary, the city of Misurata serves as a key medical destination in Libya, which has led to a surge in demand for medical service professionals. To address this need, the University of Misurata has invested in the development of its Bioresearch and Consultancy Center and created the Medical Research and Consultation Center. These efforts will help improve the abilities of technicians and expand the services offered in medical and bioresearch domains.

✓ KEY AREAS

Seven major research orientations are set to work under Misurata university Research and Consultation Center which are:

- Biosciences research and consultation office,
- Social-Sciences research and consultation office,
- Engineering and Information Technologies research and consultation office,
- Environmental Research and Consulting Office,
- Economic Sciences Research and Consultation Office,
- Language and Heritage Research and Consultation Office
- Medical Sciences Research and Consultation Office.

✓ The Research priorities

Priority list.

- Cancer research (improving diagnosis and treatment methods).
- Bio and microbiology research.
- Research on pesticides used in field of agriculture.
- Nanotechnologies applications (Energy, Pollution, Desalination, Agriculture).
- Management and Protection of Water Resources.
- Renewable Energies Generation & Use.

The equipment list

The equipment requested by Misurata University are:

- Density meter,
- Refractive index meter,
- Capillary column chromatography.

Model and brand:

1. Density meter, DMA[™] 35 Ex Petrol PORTABLE DENSITY METER, Anton Paar GmbH. 2. Refractive index meter, SmartRef, Anton Paar GmbH.

3. Capillary column chromatography, Elite-5, Perkin Elmer.

Links:

- 1. https://www.anton-paar.com/us-en/, through a third party company https://www.arizk.com/.
- 2. https://www.anton-paar.com/us-en/, through a third party company https://www.arizk.com/.
- 3. https://www.perkinelmer.com/, through a third party company https://deltalabs.ly/index.html.

The vendor or provider in Libya:

- 1. Atef H. Rizk & Co. 12 Midan Sarry el Qubba 11331 Cairo, Egypt.
- 2. Atef H. Rizk & Co. 12 Midan Sarry el Qubba 11331 Cairo, Egypt.
- 3. Delta Scientific Laboratories, Ras Hassan Road, Tripoli, Libya.

Technical specifications:

item-1 https://www.anton-paar.com/corp-en/products/details/dma-35%20/?sku=183057

item-2 https://www.easydens.com/products/smartref,

https://www.my-smartref.com/pages/specifications

item-3 https://www.perkinelmer.com/product/col-elite-5-30m-0-25mm-0-25um-n9316076

CONCLUSIONS

The specific scenery of Libyan Universities that join the Ibtikar Project, is showed in the Research Agenda, highlighting excellences, needs and aspirations. It's clear that Libya has been experiencing political instability and conflict in recent years: this very difficult situation disrupts research activities and limits the availability of research funding and resources. The cooperation for innovation and the exchange of good practices are strategic and encourage researchers to ask the core questions of what is important to improve to come across the gap that exist nowadays and how to make choices.

This document is only a starting point to assess the state of the art and to reflect the cultural identity: tangible, intangible and digital. Every Libyan University identified the priority research areas, future requirements and what will be needed to reach the goal prefixed: promote research and strategic synergies. Renewable energies and climate change, sustainable development, nanotechnology, but also biotechnology and medicine are fields of great interest for Libyan Universities.

The Research Agenda is useful to identify, address and tackle the research challenges not only to improve the academic reality, but also for help Libya's future economic growth and jobs. It is

predicable to build a network with the international research community to enable the scientific growth of individuals and the whole academic structure.

Sebha University SEBHA: Sebha University is a public university and its mission is to acquire leadership in education, scientific research, community service, and to encourage creativity and innovation. In particularly, Sebha University aims to focus on the environmental sciences, for example, the topic of water management (to measure the level of salts in water and also to measure the nitrogen in soil samples as well as in agricultural products). It has to be highlighted that Sebha university is located in south of Libya: 700 km far from Tripoli, 717 km from Bin Waled, and 600 km from Sirte: these very long distances make uneasy sharing the equipment with the other Universities, since it is required transportation cost and accommodation cost. It is predictable that Sebha University will work with environmental sciences under the research agenda specified in the project plan and specific devices are needed to perform lab tests.

Sirte University SU: Sirte University emphasizes the promotion of sustainable development practices and support the development of a skilled and knowledgeable workforce. Owing to the current world energy crises of environmental pollution and global warming, the academic and industrial experts are focusing the attention on alternative energy resources, with the aim to become reference center in the field of solar energy applications in the area of North Africa. Another research priority is the wind energy. The best appropriate technologies in renewable energy are identified according to the local conditions and capabilities. SU aims to build a fruitful exchange with the relevant partners for the internationalization of high education programs. It is predictable to get some support in terms of: modern-equipment (solar energy, wind energy), high training programs for staff and technics and informing for updating researches.

Bani Waleed University BWU: Bani Waleed University works to support the infrastructure, research platforms and services and seeks to introduce the concept of good governance spreading principle of quality and institutional and programmatic accreting to its various faculties. The BW Research Priorities are Environment & Climate Change and Renewable Energy and Chemical science and through the Research and Consultation Center to work on providing integrated laboratories and qualifying employees, as well as research platforms and establishing an electronic library with other local and international universities. It is predictable to work on enhancing the effectiveness of research and development by strengthening cooperation with other local and international research center.

Alasmarya Islamic University AIU: The AIU challenge is to pacify the country through knowledge, values of peace and harmony, development and interregional dialogue. AIU research interests include supporting research and human studies with the aim of strengthening social peace in the country and preserving religious identity during that period in which the country was going through political tensions, which led to wars. The AIU university research key areas can be summarized as: geology and climate change, human sciences, energy, electric engineering, health

sciences, marine resources, information technology, economy and trade, psychology, and disabilities and special needs.

University of Zawia ZU: The ZU research vision is focused on advancing knowledge and addressing societal challenges through research and innovation. The University of Zawia has significant opportunities to contribute to scientific research in the fields of renewable energies and climate change, despite the presence of an oil refinery and a combined cycle power plant. By leveraging interdisciplinary collaboration, industry partnerships, government support, and real-world testing grounds, the university can advance sustainable solutions to combat climate change and promote a greener future for the region. However, challenges related to technological integration, funding, policy, industry cooperation, and public perception must be carefully addressed to maximize the impact of its research endeavours.

Libyan International Medical University LIMU: LIMU adopts unique specialties or programs which are not available in any other university in the country. These programs are: Basic Medical Sciences, Doctor of Pharmacy (PharmD), Health Informatics and Mechatronics Engineering. LIMU aims at be considered a house of expertise that contributes to building a knowledgeable society and promoting sustainable development locally, regionally and internationally. LIMU focus on a quality control lab for teaching Pharmacy students, performing analysis for students from other schools. This quality lab can be a nucleus for a larger one that can support the establishment of drug industry in Libya. There is a need for a High-Performance Liquid Chromatography (HPLC) equipment at LIMU to support undergrad teaching, postgrad studies and research.

University of Tripoli UOT: The UOT research groups cover wide areas of both applied sciences such as engineering, basic sciences, medical sciences, as well as humanities in their various disciplines. The UoT is envisioned to achieve scientific, cognitive and behavioral excellence in society for integrated and sustainable development. The University of Tripoli has a strategic plan for the years 2022-2026. A team of specialists participated in its preparation and formulation. It was approved by the University Council. Through its strategic plan, the UoT seeks to introduce competitive educational programs at undergraduate and postgraduate levels in terms of focus on the required specializations and skills of graduates. UoT aspires to create a real partnership with advanced universities from the developed world and to transfer scientific research mechanisms and ways to achieve the welfare of our people.

The University of Ajdabiya AIDU: AIDU have 5 research groups specialised in Renewable Energies Generation & Use, Clean and Efficient Manufacturing & Transport, Management and Protection of Water Resources, Desertification, climate change and agriculture, and Nanotechnologies applications (Energy, Pollution, Desalination, Agriculture). The research priorities for AIDU are: Renewable Energies Generation & Use; Clean and Efficient Manufacturing & Transport; Management and Protection of Water Resources; Desertification, climate change and agriculture; Nanotechnologies applications (Energy, Pollution, Desalination, Agriculture). The research griculture; Nanotechnologies applications (Energy, Pollution, Desalination, Agriculture). The research griculture; Nanotechnologies applications (Energy, Pollution, Desalination, Agriculture). The

AIDU Scientific Research and Consultation Center seeks to establish and form a number of research groups for the mentioned topics.

University of Benghazi UOB: The UOB strategic plan it's 'to contribute to society development various sectors through the pursuit of education and learning at the international levels of excellence which enables students to apply the values, skills, and knowledge in human and applied sciences they have acquired in their future lives and careers'. Although UoB is struggling with several challenges of the current unstable situation of the country, it has a vision to achieve the academic excellence and to be one of the high ranked university in the Middle East/North Africa. UoB focus on the concept of sustainable development and its relationship to the surrounding environment, to face the emergence of many environmental problems, represented in air pollution and emissions resulting from various sources, and the emergence of the term climate change.

Elmergib University ELMU: ELMU prioritize research projects that align with Libya's national development priorities and address key challenges facing the country and the region. The research vision includes a commitment to advancing knowledge and addressing key challenges facing Libya and the region. Some elements of the university research vision include: conducting high-quality research; addressing key challenges; fostering innovation; collaborating with stakeholders; training the next generation of researchers. ELMU, likemany Libyan universities, faces a number of challenges in achieving its research vision. Some of these challenges include: limited funding; limited infrastructure; brain drain; limited access to international research networks; political instability; limited collaboration with industry partners. A concerted effort from the university, government, and other stakeholders is required to invest in research infrastructure, attract and retain talented researchers, and build partnerships for sustainable development.

Misurata University MISU: MISU promotes interdisciplinary research and clusters on key areas of societal and economic importance. MISU tends to focus on bio and environmental sciences based on the current context and society needs: the concept of sustainable development and its relationship to the surrounding environment, the emergence of many environmental problems (air pollution and emissions resulting from various sources), the climate crisis. The city of Misurata has established itself as a prominent medical hub: it serves as a key medical destination in Libya, which has led to a surge in demand for medical service professionals. MISU has invested in the development of its Bioresearch and Consultancy Center and created the Medical Research and Consultation Center. By further augmenting the centre with additional equipment, the university aims to enhance its capacity for sample analysis in both medical and bioresearch fields. The MISU University tends also to focus on bio and environmental sciences based on the current context and society needs.

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