



INSTITUTE OF TECHNOLOGY OF CAMBODIA

The 30th Meeting Board of Trustees

Phnom Penh, 16 June 2022

Director's Report 2021-2022

Supplementary Documents:

- General and Pedagogical Documents
- Financial Report

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Proposed Agenda of CA 2022
16 June 2022

8h30 à 12h00 : Room A-113 at ITC

- 1) Opening Remarks by the President of the Board of Trustees
- 2) Adoption of Agenda
- 3) Presentation of Report of Director 2021-2022
- 4) Presentation of General and Pedagogical Documents 2022-2023
- 5) Financial Report: Status in 2021-2022 and Estimated budget for 2022-2023
- 6) Nomination of Direction Team for 2022-2023
- 7) Q&A

MEMBERS OF CA 2022

Membres de droit

1. S.E.Mme PHOEURNG Sackona, présidente du conseil d'administration et ministre de la culture et des beaux-arts
2. S.E.M. Jacques PELLET, ambassadeur extraordinaire et plénipotentiaire de la République française auprès du Royaume du Cambodge
3. S.E.M. MIKAMI Masahiro, ambassadeur extraordinaire et plénipotentiaire du Japon auprès du Royaume du Cambodge
4. S.E.M. YUOK Ngoy, secrétaire d'État du ministère de l'éducation, de la jeunesse et des sports
5. S.E.M. OM Romny, directeur honoraire de l'ITC et secrétaire d'État du ministère de l'éducation, de la jeunesse et des sports
6. S.E.M. Dr. PO Kimtho, directeur de l'ITC
7. S.E.Mme PEN Chhorda, secrétaire d'État du ministère des mines et de l'énergie
8. S.E.M. CHOU Kimleng, secrétaire d'État du ministère de l'économie et des finances
9. Mme TEA Channy, représentante des personnels de l'ITC
10. M. Laurent SERMET, directeur de la direction régionale de l'AUF, Asie-Pacifique
11. M. LAY Méng Sun, directeur de la SKD
12. M. Philippe BOUILLARD, représentant de l'ARES

Membres invités

13. M. Ludovic PROTIN, directeur honoraire de l'ITC
14. M. Christophe GIGAUDAUT, Conseiller de Coopération et d'action culturelle de l'Ambassade de France et directeur de l'Institut Français du Cambodge
15. M. Thomas VALLEE, attaché de coopération scientifique et universitaire de l'Ambassade de France
16. M. Junichi TAKADA, vice-president of TOKYO Institute of Technology
17. Mr. KOICHIRO Watanabe, Senior Advisor of JICA
18. Mrs. KAMEI Haruko, chief Representative of JICA Cambodia Office, AUN/SEED-Net
19. Mr. THOEUEN Vongdy, Program Officer, Japan International Cooperation Agency, Cambodia Office
20. M. Pascal MAUSSION, vice-président des Relations Internationales INP-Toulouse
21. M. IM Kravong, responsable Antenne AUF, Phnom Penh
22. M. Bruno DAGUES, conseiller de la direction de l'ITC
23. Mlle Chikako SASAKI, Coordinator of LBE Project
24. Prof. MARTIAL Adèle, représentante du pays chez l'IRD et représentante du CONSORTIUM 2022

Direction de l'ITC et ses coéquipiers

25. M. SOY Ty, directeur adjoint
26. Dr. OEURNNG Chantha, directeur adjoint
27. Dr. CHUNHIENG Thavarith, conseiller chargé de la coopération
28. Dr. NUTH Sothân, conseiller chargé des affaires académiques
29. Mr. PENH San, conseiller chargé de l'administration
30. Dr. OR Chanmoly, directeur du Centre de Recherche et d'innovation
31. Dr. SIM Tepmony, directeur de la formation de 3^{ème} cycle
32. M. SIEANG Phen, responsable des Relations Internationales
33. Mme SREY Malis, chef du département TC
34. Mme KHEMTRAN Krasel, responsable de la section de français
35. M. CHUM Tival, responsable de la section d'anglais
36. Dr. BUN Kim Gnun, doyen de la faculté de géoressources et géotechnique
37. Dr. HAN Virak, doyen de la faculté de génie civil

38. Dr. CHHUON Kong, doyen de la faculté d'hydrologie
39. Dr. IN Sokneang, doyenne de la faculté de génie chimique et alimentaire et responsable des relations avec les entreprises (UIL)
40. Dr. LIN Mongkolserey, vice-directeur du centre de recherche et d'innovation, coordinateur de l'ITC Tbongkhmum et doyen de la faculté des sciences appliquées et chef de département des mathématiques appliquées et statistiques
41. Dr. CHRIN Phok, chef du département électrique et énergétique
42. M. LAY Héng, vice-doyen de la faculté de génie électrique
43. M. KHIEV Samnang, responsable du service informatique
44. Dr. SRENG Sochenda, chef de département Télécommunication
45. Dr. KHUN Veng Kheang, chef de département de transport et infrastructure
46. M. KIM Vannada, responsable d'assurance de qualité
47. Dr. SRANG Sarot, Responsable du Génie Mécanique et des Systèmes de Contrôle au Département de Génie Industriel et Mécanique et coordinateur du programme international ECAM LaSalle-ITC

1. Summary of activities

– Current state

In 2021-2022, a number of remarkable events have been organized in close cooperation with national and international stakeholders.

Moreover, different meetings of ITC councils have been taken place online as follows:

- International consortium meeting at ITC, 14 March 2022 (Annex 1).
- 29th Board of Trustees meeting, 23 June 2021 (Annex 2).
- Council of Study and Student Life meeting, 1 December 2021 and 11 May 2022 (Annex 4)

An overview of the CA 2021's opinions and recommendation of Consortium 2022 is presented in annex 3.

1.1. Remarkable events at ITC in 2021-2022

1.1.1. The 11th Scientific Day



The 11th Scientific Day on "Smart Technology for Sustainable Economic Growth" is organized by the Research and Innovation Center of the Institute of Technology of Cambodia with the support of the institutions: Ministry of Education, Youth and Sports, Embassy of France in Cambodia, Embassy of Japan and Embassy of the Russian Federation, Japan International Cooperation Agency (JICA), Agence Universitaire de la Francophonie (AUF), Research Institute

for Development (IRD), International Cooperation Center in agricultural research for development (CIRAD), and with the cooperation of 5 other international universities: 1) Kanazawa University, Japan
2) Asian Institute of Technology, Thailand
3) Kyushu University, Japan



- 4) University Bourgogne Franche-Compte, AgroSup Dijon, France
- 5) University of Fukui, Japan

This Scientific Day is an annual event that brings together professors and researchers from local, regional and international networks to share/discuss new technological developments to achieve sustainable economic growth.

The scientific conference was chaired by **His Excellency Dr. Hang Chuon Naron**, Minister of Education, Youth and Sport. This is a two-day event, from May 05 to 06, 2022. For the first day, there will be 5 major interventions and 84 national and international researchers, divided into 8 parallel sessions: Energy Technology and Management; Food Processing and Extraction Technology; Food Quality and Contaminant Assessment; Image Processing and Artificial Intelligence; Intelligent Mechatronics; Materials Science and Structure; Hydrology and Modelling; and Water Quality, Health Risk Assessment, and Wastewater Treatment. On 1 and 2, there will be a total of 36 booths from local and foreign companies, program sponsors, colleges, research centers and innovation centers, ITC graduate school, as well than an exhibition of posters by researchers and students. More than 740 high school students from different schools and were invited to visit the important laboratories of ITC.

1.1.2. Reunion: Institute of Technology of Cambodia and Russian Federation

On April 12, 2022, His Excellency Mr. Anatoly Borovik, Ambassador Extraordinary and Plenipotentiary of the Russian Federation to the Kingdom of Cambodia presided over the ceremony of handing over the bust of Yuri Gagarin. As a reminder, this hero was historically a Soviet pilot and cosmonaut who became the first human to travel in space.



This bust is placed in the ITC STEM Library for students and visitors to view and enjoy. This symbol represents the strengthening of friendships between the two countries and the revival of scientific research between ITC researchers and Russian researchers. "I will make efforts to revitalize cooperation between ITC and leading Russian universities and institutions such as Rosatom, National Research University "Moscow Power Engineering Institute", Moscow Technical University", he specified His Excellency Mr. ambassador.



1.1.3. President Awards to Dr. OM Romny, December 22, 2021

Dr. OM Romny, since taking position as Director of the Institute of Technology of Cambodia (ITC) in 2008, has spent his time and his strength in the development of the ITC.

Indeed, as far as campuses are concerned, ITC has four, for the moment, the first main campus is in Phnom Penh, the second is at Heng Samrin Tbong Khmum University, the third is next to the win-win monument and the fourth in Kampong Cham province.

As for human capital, the current ITC has more than 90 professors/303 with the title of doctor coming from abroad. This number represents 30% of the total number of professors at ITC compared to 7%, the percentage in other universities, according to the annual general assembly of the Ministry of Education, Youth and Sport.



Regarding faculties and departments, ITC has 5 faculties and 13 departments with 5844 students against 5 departments with 807 students in 1997.

In terms of training, ITC was able to launch its Master's and Doctoral training in 2017. This international training has dual degree and joint supervision programs. Therefore, it is internationally recognized. We have 51 doctoral students and 121 master's students.



As for research, it covers 101 research projects most of which are joint research and to make these above projects more operational, we employ 109 researchers.

As far as partnership is concerned, we have many but we mention 27 who are members of our international Consortium : 1) Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), 2) École Nationale Supérieure de

l'Informatique pour l'Industrie et l'Entreprise (ENSIIE), 3) École Nationale des Ponts et Chaussées, 4) Institut de Recherche pour le Développement (IRD), 5) Institut National des Sciences Appliquées de Rennes (INSA Rennes), 6) Institut National Polytechnique de Toulouse (INP), 7) Institut Universitaire de Technologie, 8) Institut Mines-Télécom (IMT), 9) Institut National Supérieur des Sciences agronomiques de l'alimentation et de l'environnement (AgroSup



Dijon), 10) INSA de Toulouse, 11) Institut Agro - Montpellier SupAgro, 12) Université Paris 13, 13) Université de Lille/Polytech Lille, 14) Université de la Réunion (UR), 15) Université Catholique de Louvain (UCL), 16) Université de Namur, 17) École Polytechnique de Bruxelles, 18) Université de Liège (Liège), 19) Université de la Rochelle, 20) Université Paris-Sud, 21) Université de Toulon, 22) Université de Pau et des pays de l'Adour, 23) Tokyo Tech Institute, 24) KYUSHU University, 25) Kasetsart University, 26) Chambre de Commerce et Industrie France-Cambodge, 27) KhmerDev. This testimony shows that we have 18 universities from France, 4 universities from Belgium, 2 universities from Japan and 1 university from Thailand.

Regarding infrastructure, since 2008, ITC got some new buildings such as a research and innovation center (3 floors, 10 rooms, 2014); an F building (4 floors, 33 rooms, 2008); a Samdech Akkak Moha Sena Padei Dekcho HUN SEN conference hall (2012 seats, 2012); a building I (6 floors, 56 rooms, 2015); a 7-storey building, "Knowledge Community Center for construction, manufacturing, electricity and electronics and a 3-storey workshop for civil engineering, in 2021, with ADB funding.

Based on these achievements, JICA Office in Tokyo gave, on December 24, 2021 a certificate of congratulations, (JICA President Awards) to Dr. OM Romny.

1.1.4. National and International Robot Contest

At the end of 2021, the ITC ROBOT team achieved great success. We participated in three robot competitions at national and international level:

First contest: Select team robot to compete in ABU Robocon 2021 at China (Pre-National)

Date: 06 November 2021

Place: Submit the video to TVK

Participants: 9 groups (ITC, NPIC, NUM, NTTI, CADT, RUPP)

Result: 2nd PRICE

Second contest: ABU Robocon 2021 at China (International)

Date: 12 December 2021

Place: Video Conference (Online)

Participants: 21 groups, 11 countries

Result: 19th PRICE (The best idea Award)

Third contest: National Competition Robocon in Cambodia

Date: 26 December 2021

Place : RUPP, Phnom Penh

Participants : 11 groupes (ITC, PPI, NUM, NTTI, CADT, RUPP)

Result: 1st PRICE (The best idea award) et 2nd PRICE (Engineering Award)



1.1.5. Launch of the International ECAM LaSalle-ITC Program

With great effort, ITC and ECAM LaSalle were able to set up, on October 11, 2022, an international program within ITC. This program targets two training areas at the Master's level: industrial and mechanical engineering. The target students are first of all those of Cambodia and France, then those of neighboring countries of Cambodia.



1.1.6. Cambodia Gold Mine Tour

On October 28, 2022, a delegation led by His Excellency Dr. OM Romny visited the Okvao gold mine. Note that Renaissance Mineral Cambodia, owned by Emerald Resources, has the exclusivity to exploit gold from the Okvao mine located in the Mondulhiri region. This Australian group aims to produce around three tonnes of pure gold per year during the first eight years of operation. According to the Cambodian authorities, this country hopes to derive more than 180 million dollars from this production.



In terms of cooperation, Renaissance Mineral Cambodia has very good relations with the Faculty of Geo-resource and Geotechnical Engineering (GGG) of ITC. The main objective of this visit is to strengthen bilateral cooperation for mutual interests between Renaissance and ITC.



1.1.7. Inauguration of Laboratory for Nanostructure and Chemical Analysis

A new laboratory for the analysis of nanostructure and chemistry of approximately 1 million dollars was inaugurated on February 18, 2022, under the high presidency of his Excellency the Minister of Education, Youth and Sport and of the Japanese Ambassador to Cambodia. It is a gift from Japan, via JICA in Cambodia.



1.1.8. Inauguration of Science & Technology Experiments Center



A new Science & Technology Experiments Center was inaugurated on February 18, 2022, by His Excellency SAY Sam Al, Minister of the Environment. This center plays a very important role for the practical work of the first and second-year students in the Foundation Year. It should be noted that it is open to all audiences from different backgrounds, from high school or university. This expensive equipment allows pupils/students to understand the basic notions of science and

especially physics and mechanics.



1.1.9. Inauguration of Biomedical Engineering Lab

The equipment handover ceremony for a biomedical engineering laboratory with the donation of the Czech Republic to the Institute of Technology of Cambodia and the University of Health Sciences was held on January 17, 2022.

The event was organized by the Institute of Technology of Cambodia in collaboration with the University of Health Sciences under the chairmanship of HE Martin VÁVRA, Ambassador of the Czech Republic, H.E. OM Romny, Director General of the Institute of Technology of Cambodia, and H.E. Professor Saphonn Vonthanak, Rector of the University of Health Sciences.



1.1.10. ITC-INDUSTRY OPENHOUSE 2022

The annual ITC-INDUSTRIES meeting took place on February 11, 2022, at the Institute of Technology of Cambodia. We organized this event with more than 60 companies present on site and around 40 companies by zoom. The objective was to make known all the laboratories of ITC and their capacities to all the companies. Those partners will contact ITC for any other possible cooperation, in the mutual interests. It should be noted that that day there were many foreign companies, mostly Japanese and French.



1.1.11. 1st International Conference on Earth Resources and Geo-Environment Technology (EraGET2022)

On February 18, 2022, at the Institute of Technology of Cambodia, “1st International Conference on Earth Resources and Geo-Environment Technology (EraGET2022)”, was organized by the Faculty of Geo-resources and Geotechnical Engineering of this Institute, with the support of the Ministry of Mines and Energy of the Kingdom of Cambodia, Kyushu University, Hokkaido University, JICA in Cambodia and 12 international universities. This conference has 3 objectives: 1) to strengthen the capacity for learning and teaching and research in the field of mineral and petroleum resources, 2) To share experience of new discoveries, and 3) to strengthen and expand partnerships of research with business, community and international institutions.



1.1.12. Foundation stone at the STEM Workshop at ITC Kampong Cham Campus

On March 4, 2022, His Excellency OM Romny laid the foundation stone at the STEM workshop, located at the ITC campus, Kampong Cham province. It should be noted that the construction of this workshop is financed by the World Bank.



1.1.13. Honda Y-E-S Award

Honda Young Engineer and Scientist's (Y-E-S) Award Cambodia Program has been launched successfully in Vietnam in 2006, and in India in 2007. In 2008, this award has been introduced in Cambodia to promote future human resources of this country, and also reward excellent students in science and technology in South Asia via a balanced approach.

It is also important to note that since launching of this award for Cambodian young scientist, number of ITC students' awardee represented majority of total number of selected candidates. The following table illustrates ITC students' awardee since 2010.

Year	Name	Total number	Number of ITC students' awardee
2021	Ms. CHHUOR Sochan Vimul (GCA)	4 ITC/RUPP	1
2020	Mr. KEO Seiha (GCI) Ms. LAY Cheavita (GCA)	4 ITC/URPP	2
2019	Mr. KONG Rathaseyhak (GCA) Mr. CHHENG Ilay (GCI)	4 ITC/URPP	2
2018	Mr. SONG Vergenylundy (GEE)	4 ITC/URA/URPP	1
2017	Ms. NY Vourchnea (GCA)	4 ITC/RUA/RUPP	1
2016	Mr. KOUCH Keang Ang (GCI) Mr. THAI Sereyvuth (GCA)	4 ITC/RUA/RUPP	2
2015	Ms. EA Somuynea Ms. CHHIM Panchapor	4	2
2014	Mr. KOUCH Henghok Mr. PHON Bunheng	4	2
2013	Mr. SRENG Mengoing Ms. SROY Sengly	4	2
2012	Mr. RITH Monorom Mr. KHY Kimleng	4	2
2011	Ms. EK Pichmony Mr. SAY Vortana Mr. CHHOR Marady	4	3
2010	Mr. CHEA Ratha Ms. Rath Sovannsathya	4	2

1.1.14. Admission to Ecole Polytechnique

Since 2007-2008, Cambodian students from ITC has been presented among other foreign students in the most prestige school in France and the world, i.e., École Polytechnique. It is noted that ITC students have sufficient fundamental knowledge to pass the most difficult entrance exam of the school. Table below illustrates names of students who have been studying or had studied at École Polytechnique and their careers. Due to Covid-19 Pandemic, International Exam Committee of Ecole Polytechnique was not able to come to ITC for academic year 2020-2021. The recruitment starts again this year. One ITC student accepted.

No.	Name	Sex	Batch	Degree Earned	Working place	Role
1	MANG Chetra	M	2007-08	PhD	IRT SystèmeX (Paris)	Ingénieur R&D Sénior
2	MUY Sokseiha	M	2008-09	PhD	EPFL (Lausanne, Suisse)	Post-Doctorat
3	SVAY Angkeara	M	2009-10	PhD	LBL International (Phnom Penh)	Directeur Technique (CTO)
4	CHEY Sopheak	M		Engineer	ITC (Cambodge)	Enseignant à temps partiels
5	IM Seyha	M	2010-11	Master	Corsicasole (Paris)	Ingénieur, Chef de projet
6	HUY Seav Er	M		Master	AFD (Phnom Penh)	Ingénieur, Chef de projet
7	SE Dara	M		Master	Suez (Rennes et Phnom Penh)	Ingénieur de Projet
8	UCH Bunnarith	M	2011-12	Master	Suez (Rennes et Phnom Penh)	Ingénieur de Projet
9	KHOUN Ladya	M	2012-13	PhD	Naval Group	Ingénieur-Chercheur
10	SENG Sodarith	M		Master	Vinci Construction (Phnom Penh)	Ingénieur d'Etudes
11	IEA Bunthan	M	2013-14	Master	Ministère du Développement Durable (France)	Ingénieur Corps d'Etat
12	DIN Ratanak	M		Master	Vinci Construction (Paris)	Ingénieur d'Etudes
13	Heang Kitiyavirayuth	M	2014-15	Master	Ecole des Ponts ParisTech (Paris)	Etudiant Architecte
14	Khun Kimang	M		Master	INRIA (Grenoble)	Ingénieur Doctorant
15	Than Poseng	M		Master	Paris Partner (Paris)	Ingénieur Informaticien
16	EANG Chanpaya	M	2015-16	Resigned		
17	NOU Sithea	M		Master	Suisse	Ingénieur
18	CHAO Kimhong	M	2016-17	Engineer	Institut Polytechnique de Paris	Etudiant en Master
19	SAMBATH Vibolroth	F				
20	THY Vathana	M				
21	VENG Namchhoen	M	2018-19	Student		
22	Chhout Laychiva	M	2019-20	Student		
23	Norng Vannvatthana	M		Student		
24	MOK Yong	M	2021-22	Student		

1.1.15. Open House at ITC

Link to 11th Scientific Day, Open Day at ITC was organized on 5-6 May 2022 in order to give opportunity to high school students and also public to understand specialization at ITC and also to visit some laboratories.

2. Recruitment, Evolution of Number of Students and Others Activities

2.1. Recruitment in 2021-2022

Students of engineering program have been recruited through an online entrance examination. Three subjects of this exam are mathematics, physic/chemistry and logic.

2.1.1. Information Campaign

Due to Covid-19 Pandemic, Information Campaign to high school students could not be done on site. Online campaign and social network had been implemented.

2.1.2. Preparation of Entrance Exam

Due to community spread of Covid-19, especially new variants, an online Entrance Exam for Academic Year 2021-2022 was organized. Therefore, hundreds of questions (Question Bank) were prepared for every subject such as Mathematics, Physic, Chemistry and Logic. Lecturers of ITC were requested to propose questions based on curriculum in high school. The Direction of ITC was in charge of Final Selection of questions with confidential.

Date, question bank and all regulations of the online examination in both campuses (Phnom Penh and Tbong Khmum) are the same.

2.1.3. Enrolment to the exam

This year, due to Covid-19 spread in the community, the national exam of grade 12 students had been postponed to 27 December 2021. Therefore, the Entrance Exam to recruit 1st Year Engineer students was organized online on 7 February 2022.

Hybrid enrollment to the entrance exam (On site and Online) took place from 17 January to 04 February 2022. In total, there are 3392 candidates applied for this examination in which 3342 registered to ITC Phnom Penh and 50 registered to ITC Tbong Khmum Campus.

The online examination was held on 7 February 2022 under control of ITC management. It is noted that the system of online exam has been developed by a team from GIC department and collaborated by IT Service Center of ITC. The system features (based on Moodle) are such as: question bank, question category (3 levels: easy, medium and difficult), random questions, shuffle questions/answers, question display (1 by 1), autosave, auto submit, etc. Number of questions by subject is as following:

- Maths: 301 Questions (Easy = 103, Medium = 101 and Hard = 97)
- Logic: 284 Questions (Easy = 100, Medium = 100 and Hard = 84)
- Physic: 251 Questions (Easy = 105, Medium = 80 and Hard = 66)
- Chemistry: 170 Questions (Easy = 60, Medium = 60 and Hard = 50)

Figure 1 below shows that number of candidates is increased the last two years because the enrollment and the exam were organized online. Therefore, high school graduates can join the exam from their hometown.

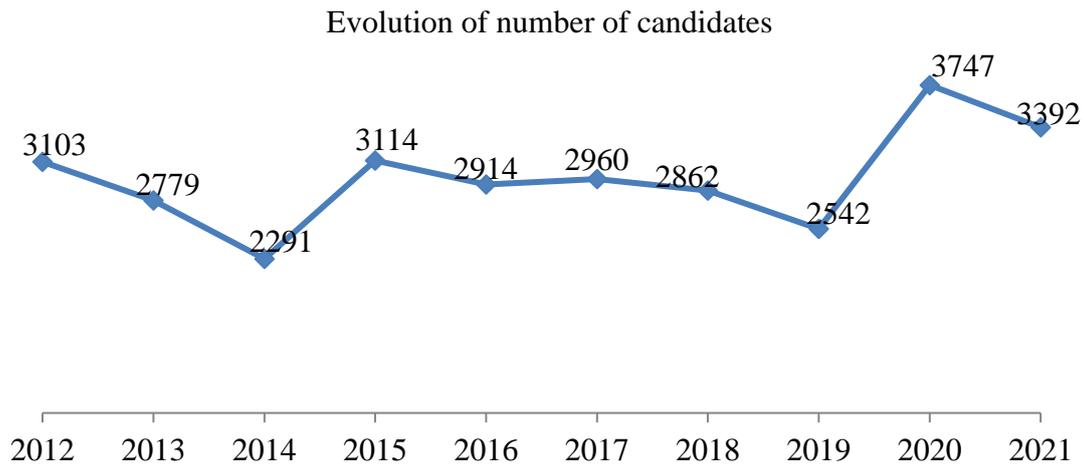


Figure 1. Number of Candidates enrolled in the entrance exam.

2.1.4. Result of Entrance Exam

Result of the Entrance Exam was announced on 8 February 2022. There are 1703 successful candidates (609 Females) and 392 candidates in reserved list (188 Females).

Figure 2 below shows that number of successful candidates increased slightly from 2011 to 2013. But it has remained stable until 2016. Due to new building and equipment, number of successful candidates were increased to 1002 in 2017, 1200 in 2018, 1361 in 2019 and about 1700 in 2020 and 2021.

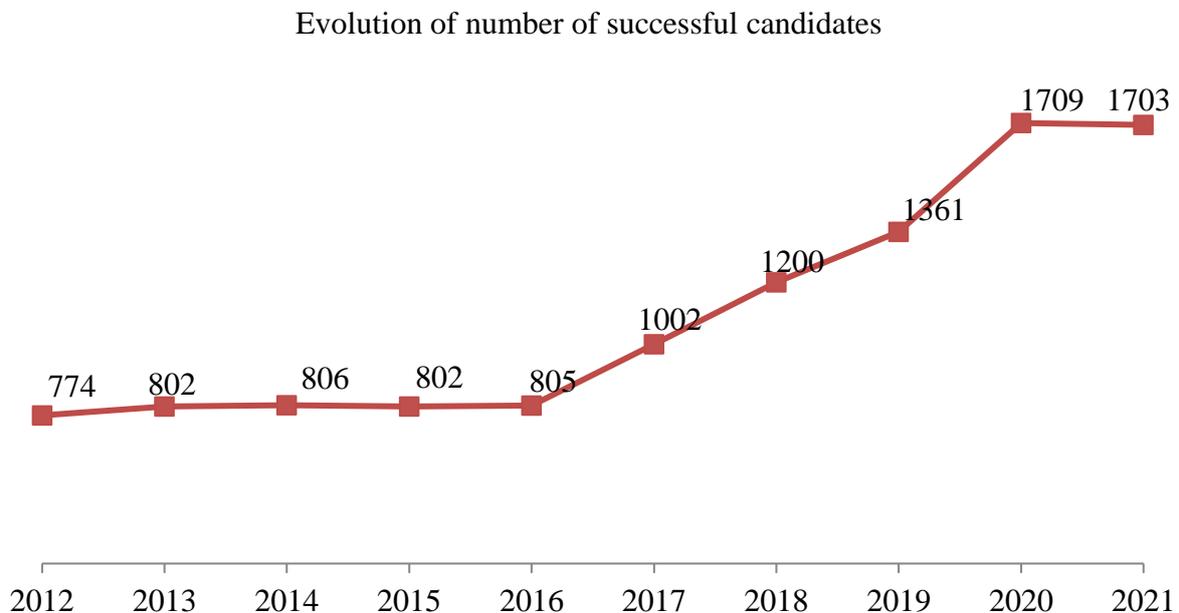


Figure 2. Evolution of number of successful candidates.

2.1.5. Enrollment in 1st Year

Starting date for 1st Year students has been started from 14 March 2022, which is about 5 Month late compared to others students who started their classes since 11 October 2021.

a) Engineering Program (ITC-Phnom Penh)

1615 students (586 Females) have been enrolled in 1st Year of Engineering Program in 2021-2022.

b) Engineering Program (ITC-Tbong Khmum)

Table 1 below presents number of high school graduates registered in the entrance examination, number of successful candidates and the one enrolled in the first year of engineering program at the second campus in Tbong Khmum Province. It is noted that all students enrolled in Tbong Khmum Campus are scholarship holders.

Table 1. Number of students enrolled to 1st Year at ITC-Tbong Khmum.

	Total	Female
Candidate	50	21
Successful candidates	25	12
Waiting List	11	5
Enrolled in I1	30	13

c) Technician Program

For Technician Program, 439 new students (167 Females) have been enrolled in the first year.

2.1.6. Remark and Conclusion

Maintaining the entrance examination (on site or online) is very important in order to keep a positive impression and a very strong brand in mind and appreciation of teachers, students, public and society. It is noted that expense of this examination was fully covered by the Ministry of Education, Youth and Sports, and ITC.

The direction board of ITC should continue to strengthen recruitment strategy of 1st year student of both engineering and technician program by sending staffs to high school in some provinces for advertising and distributing brochures to show the importance and benefit of studying of STEM (Science, Technology, Engineering and Mathematics), especially studying at ITC. The promotion activities can be also implemented online in case of travelling difficulty due to Covid Pandemic.

2.2. Entrance Exam to 3rd Year Engineering Program

2.2.1. Passed from T2 to 3rd Year

The examination is for Technician graduates or equivalent degree. This year 2021-2022, 47 candidates applied for this exam. Candidates have to pass the following tests:

- Writing test on mathematics and physic,
- Interview by relevant department.

Based on result of writing test and interview, Selection committee decided to accept 35 candidates, about 74%. The others were not accepted because their performance is not qualified.

Table 2 indicates number of candidates and successful candidates to 3rd Year distributed by department over the last five years.

Table 2. Number of technician graduates accepted to 3rd Year Engineering Program.

Dept.	Number of candidates and successful candidates to I3									
	2017-2018		2018-2019		2019-2020		2020-2021		2021-2022	
	Candidate	Successful Candidate	Candi.	Suce. Candi.						
GCA	18	11	24	15	29	10	27	10	27	15
GCI	17	7	34	16	18	12	16	9	12	10
GAR	-	-	-	-	-	-	-	-		2
GEE	4	2	12	5	12	10	4	1	6	3
GTR	-	-	-	-	-	-	-	1		3
GIM	9	6	6	3	5	3	7	5	2	2
GRU	4	4	6	3	5	5	-	-	-	-
GIC	-	-	1	1	-	-	1	1	-	-
Total	52	30	83	43	69	40	55	27	47	35

2.2.2. Entry into 3rd Year Engineering Program

Third year Engineering students may come from:

- Engineering students who finished successfully 2nd year of foundation year,
- DUT and technician graduates if they passed writing test and interview,

Table 3 shows actual number of 3rd year Engineering students.

Table 3. Actual number of 3rd year engineering students.

Department	I2 to I3	T2 to I3	Repeating year students	Total
GCA	150	15	3	168
GCI	250	10	11	271
GAR	74	2	2	78
GEE	121	3	5	129
GTR	39	3	4	46
GIC	78	0	9	87
GIM	91	2	8	101
GRU	73	0	1	74
GGG	34	0	2	36
Total	910	35	45	990

2.3. Total number of students and number of reorientations

2.3.1. Total number of students in November 2021

Table 4 presents total number of 2nd to 5th Year students in October 2021 (Starting of academic year). These numbers include students of Engineering and Technician Program. In total, there are 4434 students. It is noted that due to delay of the recruitment, 1st Year students will start their academic year from 14 March 2022.

Table 4. Total number of students in October 2021 (ITC-Phnom Penh).

Dept.	T-1	T-2	Total 1	I-1	I-2	I-3	I-4	I-5	Total 2	Total 1+2
DTC					1624				1624	1624
GCA		60	60			168	159	123	450	510
GCI		69	69			271	161	124	556	625
GAR	-	-	-			78	48	38	164	164
GEE		69	69			129	171	140	440	509
GGG	-	-	-			36	61	60	157	157
GIC	-	-	-			87	84	43	214	214
GIM		34	34			101	117	114	332	366
GRU	-	-	-			74	100	91	265	265
GTR	-	-	-			46	26	29	101	101
Total	0	232	232	0	1624	990	901	733	4202	4434

Below table presents total number of students in 2021-2022 at ITC-Tbong Khmum Campus.

Table 5. Total number of students in 2021-2022 (ITC-Tbong Khmum).

Dept.	I1		I2		I3		I4		I5		Total	F
	Total	F	Total	F	Total	F	Total	F	Total	F		
DTC			38	16							38	16
GCA					8	8	9	7	14	12	31	27
GCI					11	1	11	0	23	3	45	4
Total	0	0	38	16	19	9	20	7	37	15	114	47

2.3.2. Reorientation

The reorientation represents number of students who quitted ITC due to some reasons such as:

- Recipient of scholarship to study abroad
- Changing of institution

- Dropping out since beginning of academic year
- Etc.

Table below summarizes number of reorientation students of Engineering and Technician Programs.

Table 6. Number of reorientation of Engineering and Technician students.

	T-1	T-2	Total 1	I-1	I-2	I-3	I-4	I-5	Total 2	Total 1+2
Total	0	29	29	0	233	42	6	0	281	310

2.3.3. Total number of students in May 2022

In total, number of reorientations is 310 students without taking account of 1st year students who have just started their study in March 2022. Total number of students remains 6224 students. This number includes students of both Engineering and Technician Program. Table 7 shows total number of students in March 2021.

Table 7. Total Number of students in May 2022 (ITC-Phnom Penh).

Dépt.	T-1	T-2	Total 1	I-1	I-2	I-3	I-4	I-5	Total 2	Total 1+2
DTC				1615	1391				3006	3006
GCA	114	49	163			164	159	123	446	609
GCI	148	61	209			260	160	124	544	753
GAR	-	-	-			77	47	38	162	162
GEE	130	64	194			124	145	111	380	574
GGG	-	-	-			34	60	60	154	154
GIC	-	-	-			80	83	43	206	206
GIM	47	29	76			93	117	114	324	400
GRU	-	-	-			73	99	91	263	263
GTR	-	-	-			43	25	29	97	97
Total	439	203	642	1615	1391	948	895	733	5582	6224

2.4. Final Exam (End of Semester)

Due to Covid-19 community spread, common on-site final exam can not be organized. The final exam has been done by each lecturer, mostly online.

It is noted that ITC management system has been developing under support of ARES-CCD project, Belgium. Score input is entered into this system by each lecturer.

2.5. Continuing Education

Continuing Education is designed for technician degree or equivalent degree holders who would like to continue their study in order to upgrade their degree to Bachelor Degree of Engineering.

This year, 139 students (55 females) have registered in this program. Among them, 45 students (35 females) enrolled in GCA Department, 36 (5 Females) in GCI, 46 (9 Females) in GEE and 12 (6 Females) in GIM department.

Table below shows total number of students registered for the continuing education.

Table 8. Number of students registered for the continuing education.

Start	Expected end										
		GCA		GCI		GEE		GIM		Total	
		Total	F	Total	F	Total	F	Total	F	Total	F
2019	2022	24	22	53	7	48	5	19	2	144	36
2020	2023	45	41	58	9	35	10	23	6	161	66
2021	2024	53	48	32	5	45	11	24	2	154	66
2022	2025	45	35	36	5	46	9	12	6	139	55
Total		167	146	179	26	174	35	78	16	598	223

Figures 3, 4, 5 and 6 show number of students enrolled and graduated in GCI, GEE GCA and GIM departments respectively.

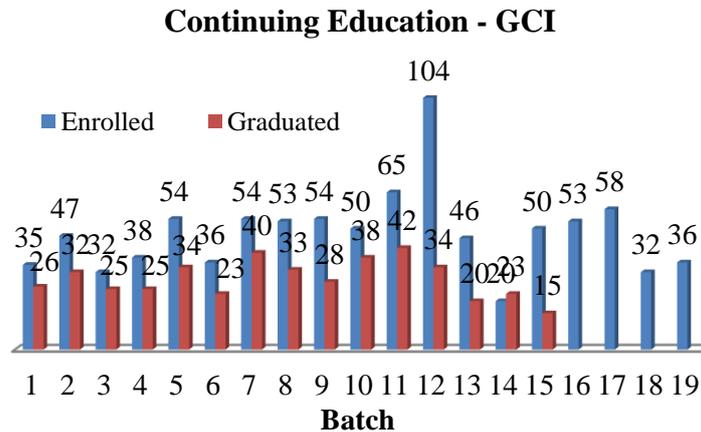


Figure 3. Number of students enrolled and graduated in continuing education (GCI).

Continuing Education - GEE

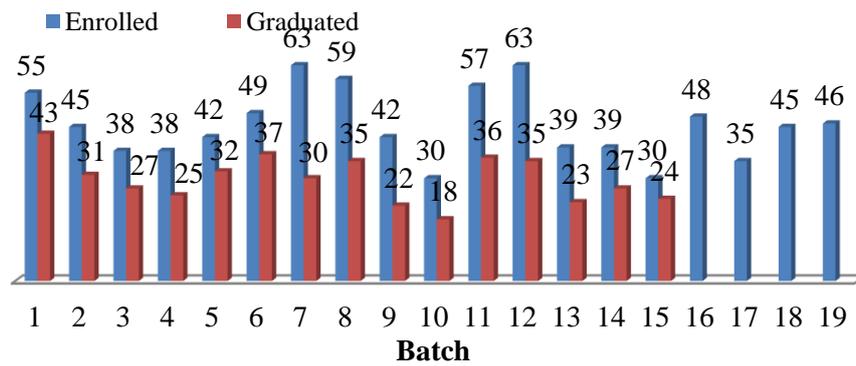


Figure 4. Number of students enrolled and graduated in continuing education (GEE).

Continuing Education - GCA

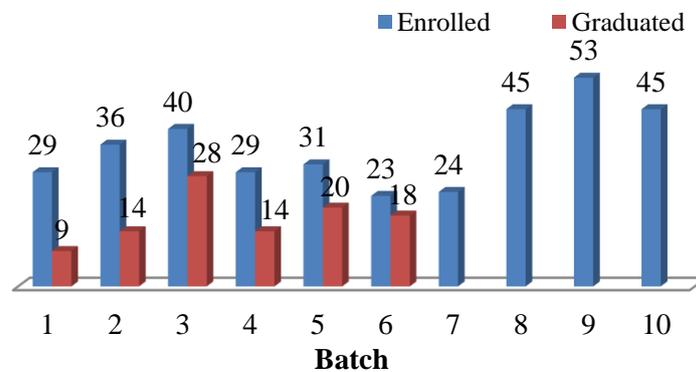


Figure 5. Number of students enrolled and graduated in continuing education (GCA).

Continuing Education - GIM

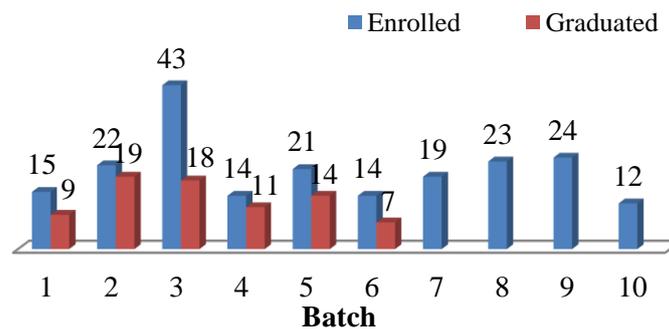


Figure 6. Number of students enrolled and graduated in continuing education (GIM).

2.6. Preparation of ITC students for exam of Grandes Ecoles in France

The cooperation between ITC and Ecole Polytechnique ParisTech was launched in 2007. It is mainly reflected by receiving at Department of Foundation Year long-term polytechnician trainees and organizing international exam of Ecole Polytechnique at ITC. A partnership agreement was signed between the two institutions on 30 October 2014.

An online intensive session of preparation for Institut Polytechnique de Paris (IP Paris) was set up from 15 to 28 October 2021 for 16 eligible ITC students. This online preparation has involved two French professors of preparatory classes of Grandes Ecoles (Olivier GRANIER and Catherine LAIDEBEURE).

Due to the outbreak of Covid-19, the exam conducted online from 30 October to 10 November 2021 by an International Committee of Institut Polytechnique de Paris. Finally, three candidates were accepted. One of them will study at Ecole Polytechnique and two at Ecole Nationale de la Statistique et de l'Administration Economique Paris (ENSAE).

After IP Paris entrance examination, 5 students were selected for online oral exams by École nationale supérieure d'informatique pour l'industrie et l'entreprise (ENSIIE). The oral exam was held on 12 December 2021, as a results, all 5 students were accepted

Since academic year 2007-2008, 50 ITC students integrated in one of the Grande Ecole in France:

- 24 at Ecole Polytechnique,
- 4 at Ecole Supérieure de Physique et de Chimie Industrielles (ESPCI),
- 3 at Ecole Nationale Supérieure des Techniques Avancées (ENSTA),
- 14 at Ecole Nationale Supérieure d'Informatique pour l'Industrie et l'Entreprise (ENSIIE),
- 1 at Ecole Nationale Supérieure des Mines d'Albi,
- 1 at Ecole Nationale Supérieure des Mines d'Alès,
- 1 at Ecole Telecom Sud Paris, and
- 2 at Ecole Nationale de la Statistique et de l'Administration Economique.

These students get systematically scholarships, usually Eiffel Scholarship from Government of France.

Figure 7 below shows number of ITC students integrated in an engineering school since beginning of cooperation.

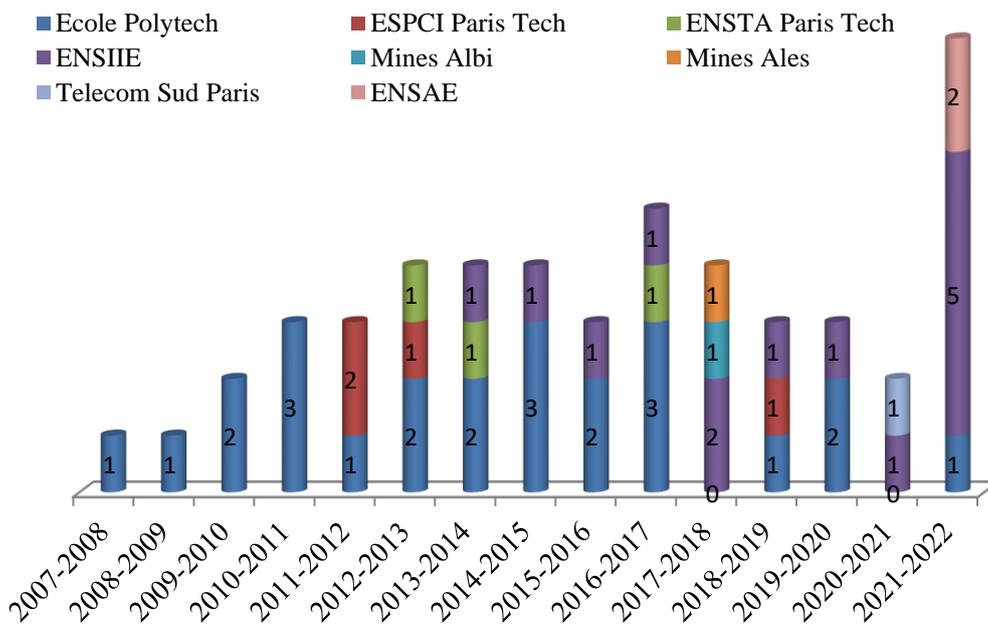


Figure 7. Number of ITC students integrated in an engineering school since 2007-2008.

2.7. Exam of Japanese Government Scholarship

Table 7 shows the number of ITC students who passed successfully the exam of Japanese Government Scholarship. In 2021-2022, 19 students of ITC among 36 successful candidates won this Scholarship.

Table 9. Number of winners of Japanese Government Scholarship.

Year	Programs								Total (ITC)
	Research		Undergraduate		College of Technology		Specialized Training College		
	Total	ITC	Total	ITC	Total	ITC	Total	ITC	
2010-11	9	0	0	-	0	-	2	2	11 (2)
2011-12	11	0	2	1	8	8	7	1	28 (10)
2012-13	11	0	0	-	14	13	12	3	37 (16)
2013-14	11	0	1	0	16	15	9	3	37 (18)
2014-15	12	2	2	0	15	12	13	7	42 (21)
2015-16	12	2	1	1	6	3	7	3	26 (9)
2016-17	12	3	1	1	7	4	10	5	30 (13)
2017-18	12	1	2	1	5	4	3	3	22 (9)
2018-19	12	5	1	1	7	3	5	0	25 (9)
2019-20	10	5	0	0	11	8	8	4	29 (17)
2020-21	NA	NA	0	0	14	7	8	3	22 (10)
2021-22	12	1	1	1	14	11	9	5	36 (19)

2.8. Scholarships and exemption of tuition fee (2021-2022)

Several funding sources were used to award scholarships to ITC students for encouraging the best students and to help those whose families faced financial difficulty.

There are 2583 scholarships, which represents 39.5% of the total number of Engineer and Technician students. It is noted that the amount of a scholarship varies from 100 to 2600 USD per year and 100% of female students are scholarship holders. The table below shows the different scholarships.

Table 10. Different Scholarships at ITC.

No.	Type of Scholarship	Number of students
1	Government Scholarship (M & P)	477
2	Scholarship for all female students	1783
3	Panasonic	14
4	Chip Mong Insee	12
5	Prince Bank	34

6	Enfant du Mékong	58
7	Smart Axiata	21
8	Sumitomo	8
9	S4C Project	131
10	Akaraka	9
11	CADT	15
12	TEM	21
Total		2583

2.9. Activities report of E-learning Center

2.9.1. Background

ASEAN Cyber University (ACU, <http://aseancu.net>) project was first proposed at the ASEAN – South Korea Summit in 2009. The project is expected to help establishing a foundation for sharing experiences, knowledge, and skills in higher education and long-distance education among ASEAN countries and South Korea. At the first stage, the project is designed to help the CLMV (Cambodia, Laos, Myanmar and Vietnam) countries acquire the technology and knowledge related to e-learning systems, to help students in remote areas access higher education.

In 2011, ITC was selected by the selection committee from Korea for setting up ASEAN Cyber University (ACU) and also mandated by the Ministry of Education, Youth and Sport (MoEYS) of Cambodia to implement the ACU Project. In the project, an e-learning center and multimedia studio had been installed in May 2012 with a content development room, an operation room and learning management system (LMS) servers to host the e-learning course contents. The e-learning center is directly connected to the ACU hub center in Vietnam in order to share online courses among CLMV countries using TEIN (Trans-Eurasia Information Network) high speed network connection.

From January 2020, ASEAN Cyber University project have been finished. There is no support from ACU for course development and course operation. ITC have moved all the courses to our own LMS for course operating in ITC and course from our partners.

The goals of this center are the follows:

- Capacity building of staff and students for e-learning
- Increase access to higher education using ICT as the tool for learning, teaching, and sharing information
- Promote Cambodia life-long learning
- Promote the collaboration on e-learning in CLMV countries
- Advocate best practice, strategy and policy for e-learning

2.9.2. Achievement in 2021-2022

The activities of e-Learning Center can be summarized as following:

No	Activities	Timeline	Description
1	Capacity building for online content development	2012- 2019	61 staffs and certified skill persons (4 in 2019): 41 basic level, 12 pre-master level, 8 advanced level * All training conduct in Seoul, Korea
2	Content Development	2012-2021	40 (ITC) + 2 (partners) online credit courses 1 (partner) online non-credit course
3	Course Operation	Oct. 2020 – Sep. 2021	28 / 40 course (Semester 1: 12, Semester 2: 16) 3188 learners (ITC) * Not including partners contents
4	HEIP Course development orientation	Nov. 2020	Orientation to all lectures at ITC for courses development under HEIP project.
5	Course development for all courses of ITC	Nov. 2020	Develop all courses of ITC under HEIP to support online learning during Covid-19 pandemic. * first step 55 courses from all departments at ITC.
6	Install a new studio	Nov. 2020	Under HEIP project, there is a new studio installation to support course development for all ITC course
7	UNESCO-BEEP Content Operation	Jan. 2019 – Jun. 2020	ITC contributes to operate UNESCO-BEEP content on our local server
8	UNESCO-BEEP Learning Center Operation	Feb. 2019– Now	ITC is one among Learning Centers which operate UNESCO-BEEP contents for out-of-school youth (every Saturday and Sunday) (implement the blended learning model)
9	UNESCO-BEEP Orientation and Training	Feb. – Jun. 2020	ITC provided orientation and training to other Learning Centre (13) to operate UNESCO-BEEP contents
10	Hosting RUA contents	2019 - Now	Support CIRAD (French Agricultural Research Center for International Development) to operate their contents.
11	Development of Local LMS – Moodle	Jun. 2018 – Feb. 2020	With support from World Education and Moodle community, ITC start to develop / customize our local Learning Management System (LMS) using Moodle
12	Supporting the STEM Teacher Training Center of MoEYS (install inside ITC)	Sep. 2019 – 2020	The STEM Teacher Training Center aims to build capacity of secondary school on STEM subjects through online learning material. - ITC works with EMCAST to develop STEM Teacher Training online learning materials. - ITC works with World Best Friend to operate STEM Teacher Training Center
13	Content development for IT Passport Program	Nov. 2020 – Feb. 2021	ITC supported CIESF to develop the videos learning materials (77 contents) for IP Passport Program.
14	BEEP technical support	Sept. – Dec. 2020	Support to DIT for BEEP course operation and System.
15	Content development under	Jun – Dec. 2020	Develop videos teaching materials at ITC with the special supporting package from ARES during COVID-19.

	the support from ARES		
16	Content development for MoEYS	2020	Develop video teaching and learning content of Math and Khmer grade 12 for MoEYS (during COVID-19 pandemic)
17	ITC Entrance Exam	Dec.2020 – Jan. 2021	Prepare system for ITC online entrance exam.
18	SmartEdu Scholarship Online Exam	Feb 2020	Support Smart Axiata to organize SmartEdu Scholarship Online Exam
19	MPWT Entrance Exam	Feb 2021	Support Ministry of Public Work and Transportation (MPWT) for Entrance exam to the Techo Sen Institute under MPWT
20	MoH Entrance Exam	May 2021	Support Medical Online Entrance Exam with 8800 candidates.
21	NIE Entrance Exam	Aug 2021	Support National Institute of Education (NIE) for Online Entrance Exam with 7500 candidates.
22	NIPES Final Exam	Aug 2021	Support National Institute P? Education and Sport for Online Final Exam with 150 candidates.
23	AUF moodle training to UHS	Aug 2021	Support the training of using Moodle for Intermediate level to University of Health and Science (UHS) with corporation with AUF.
24	TTD Final Exam	Oct 2021	Support Teacher Training Department (TTD) for Online Final Exam with 1900 candidates.
25	PD Entrance Exam	Oct 2021	Support Personal Staff Department/MoEYS for Online Entrance Exam with 150 candidates.
26	NIPES Entrance Exam	Nov 2021	Support National Institute P? Education and Sport (NIPES) for Online Entrance Exam with 2000 candidates.
27	TTD Entrance Exam for Secondary Teacher	Nov 2021	Support Teacher Training Department (TTD) for Online Entrance Exam of Secondary teacher with 30300 candidates.
28	TTD Entrance Exam for Primary and Preschool Teacher	Nov 2021	Support Teacher Training Department (TTD) for Online Entrance Exam of Primary and Preschool teachers with 37000 candidates.
29	ITC internal exam	Jan-Dec 2021	Support French Section, English sections, and other courses at ITC for Midterm and Final exam via Online.
30	ITC Entrance Exam 2021 - 2022	Feb. 2022	Prepare system for ITC online entrance exam 2022
31	Cambodia Cyber University Network (CCUN)	Feb. 2022	Prepare proposal and concept note of CCUN

2.10. Activities of library of ITC

Library has always been recognized as vital organizations in supporting the research, teaching, learning and outreach needs of their communities. As stewards of the human record, libraries are responsible for generating, making accessible, and preserving new knowledge and understanding over time. In support of the teaching, learning, and researching mission, the Institute of Technology of Cambodia has provided library which is committed to providing exceptional services to students and faculties; advanced learning, researcher and literacy; creating new knowledge, promoting the freedom of inquiry and enhancing access to recorded knowledge and other useful resources.

The library allows patrons to use 15 computer desktops to surf internet and research their work. Then the library space is increase to support patrons around 200 people, more than that, we also provide photocopy, printing and scanning services.

In the library, we currently have five librarians only, so we are working hard to support all library services and other services such as self-study and e-learning space, two symposiums for patrons, researchers to request discussion with their team/project work.

Due to community spread of Covid, especially new variants, only few students come to library and use facility at the library during first semester of 2021-2022.

3. Educational Report

3.1. Overview of teaching/research staffs at ITC

3.1.1. Number of lecturers

In 2021-2022, ITC has 342 (87 females) full-time, trainee and part-time lecturers, lecturer-researchers and full-time researchers. Table 11 shows the number of lecturers in different departments. Among these 342 lecturers, there are 93 PhD (27.2%), 180 Masters (52.6%) and 69 other degree (20.2%). They give lectures and also participate in research project, as well as other administrative tasks.

Table 11. Number of lecturers/researchers in different departments in 2021-2022.

Degree		GCA	GCI	GEE	GGG	GIC	GIM	GRU	GTR	MAS	DTC	SF	SA	Total
PhD	Full-time	10	14	7	6	1	8	10	5	2	0	0	0	63
	Trainee	5	2	0	6	1	2	5	0	0	0	0	0	21
	Part-time	3	2	0	0	0	0	3	0	0	1	0	0	9
Sub-total 1		18	18	7	12	2	10	18	5	2	1	0	0	93
Master	Full-time	2	3	9	6	7	12	9	4	4	10	5	3	74
	Trainee	15	7	6	3	11	14	6	0	0	1	0	0	63
	Part-time	8	7	1	0	1	0	6	4	7	3	3	3	43
Sub-total 2		25	17	16	9	19	26	21	8	11	14	8	6	180
Engineer/Bachelor	Full-time	1	2	1	1	1	0	0	0	0	3	4	0	13
	Trainee	0	0	1	0	0	1	0	0	0	0	0	0	2
	Part-time	1	11	4	0	0	0	3	0	0	1	21	13	54
Sub-total 3		2	13	6	1	1	1	3	0	0	4	25	13	69
Total		45	48	29	22	22	37	42	13	13	19	33	19	342

Number of lecturers/researchers increases slightly each year. The evolution of number of lecturers in the past 10 years is shown in Figure 8.

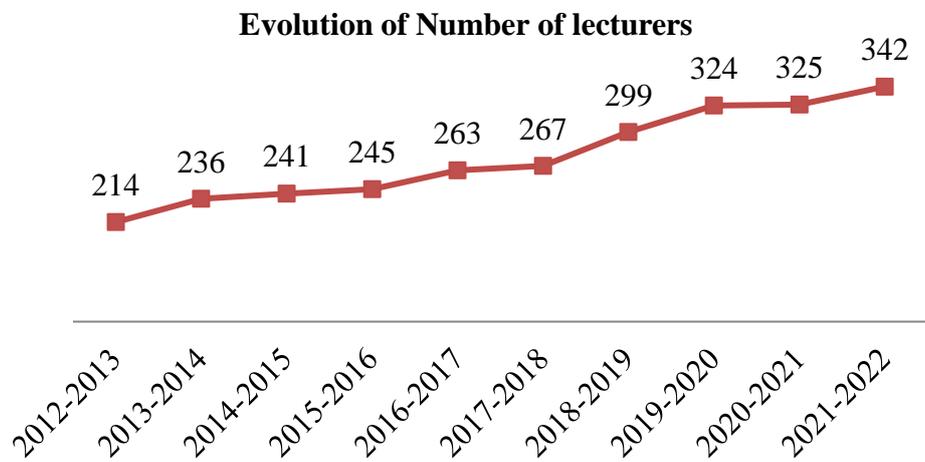


Figure 8. Evolution of Number of Lecturers.

Evolution of number of lecturers with PhD and Master Degree is shown on Figure 9. Through regional and international cooperation, number of PhD holders increases about 2.5 times over the past 10 years, from 40 in 2012-2013 to 93 in 2021-2022. Number of Master holders also increases from 100 in 2012-2013 to 180 in 2021-2022. They are potential human resources for teaching and research at ITC.

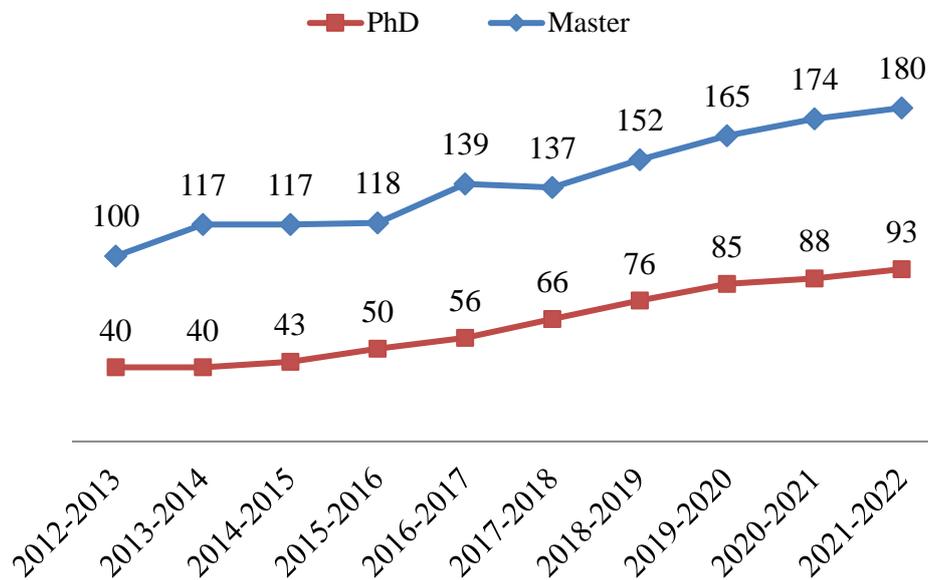


Figure 9. Evolution of number of PhD and Master Holders.

3.1.2. Lecturers graduated from different countries

Lecturers/Researchers of ITC were graduated from different countries and regions in the world:

- At local level in Cambodia (33.9%) in which most of them are lecturers in Department of Foundation Year, English and French sections.
- At regional level (23.7%) in 5 ASEAN countries: Thailand, Indonesia, Philippines, Malaysia, and Vietnam
- At international level (42.4%) in 12 countries: France, Japan, Belgium, South Korea, Russia, Canada, USA, Australia, China, Spain, India, and New Zealand.

Figure 10 indicates percentage by country that ITC lecturers/researchers were graduated from. Abroad, ITC lecturers/researchers graduated from France the most, followed by Japan, Thailand, Indonesia and Belgium.

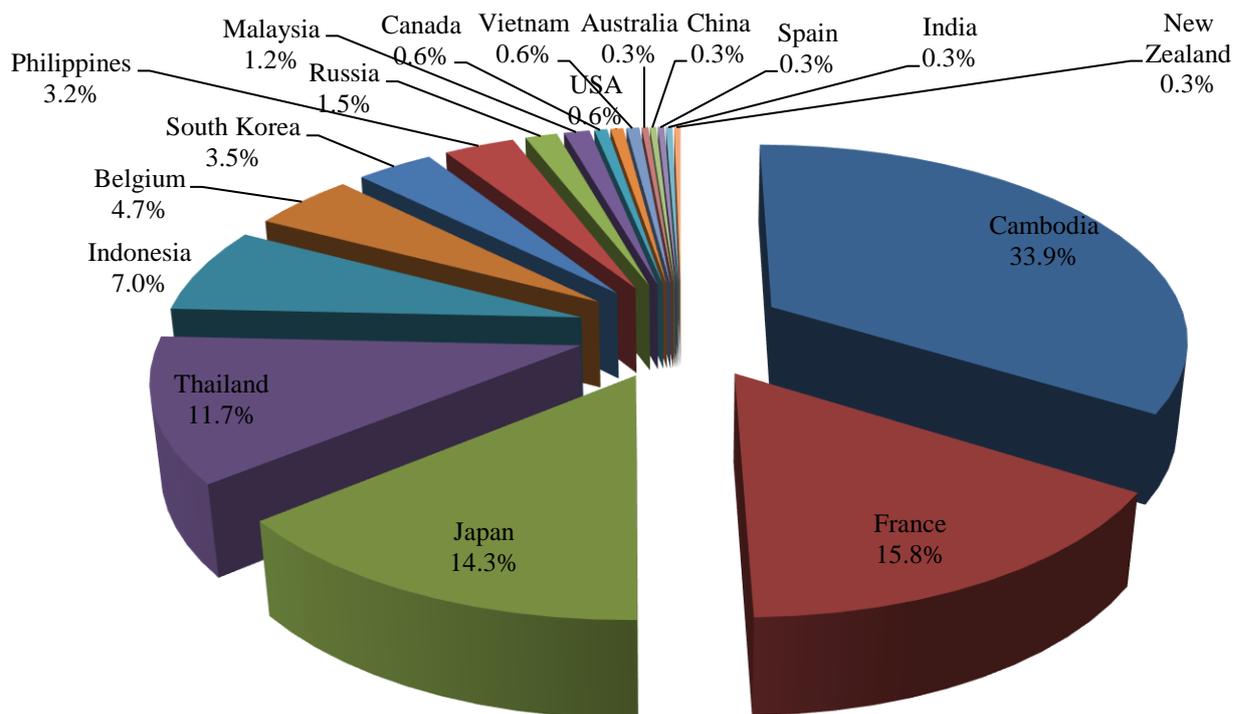


Figure 10. ITC lecturers graduated from different countries.

3.1.3. Conclusion

Human resources of ITC have increased in recent years with PhD's Degree holders. This year, number of PhD is 93 which is slightly higher than last year (88).

With strong collaboration with partners and through some projects, young lecturers and students have been sent to partner universities abroad to continue their PhD's Degree abroad and will come back in the upcoming year. To ensure quality of teaching and research, ITC needs to recruit and maintain young Master and PhD holders who are dynamic for both academy and research.

3.2. Student Employability

An online survey on student employability (google form) was conducted at the end of 2021. 319 students graduated in 2021 filled in the questionnaire which is about 56% of total graduates. Result of this survey is shown graphically on Figure 11.

Figure 11 shows that 76% of engineers graduated in 2021 are employed in different sectors (private, public, NGOs and own business). 17% are continuing their studies mostly in oversea. 7% are seeking employment or awaiting result of interview or could not be reached.

Among the employed, 90.8% works with private sector, 5.9% with public sector, 0.8% with NGO and 2.5% run their own business.

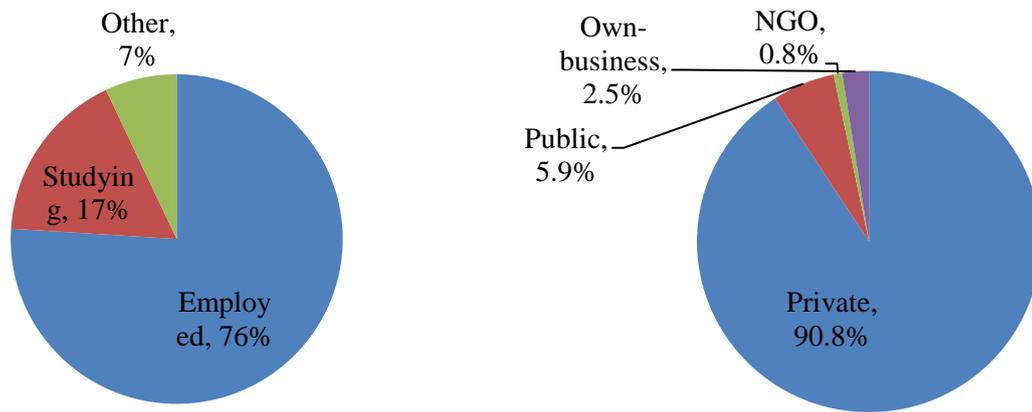


Figure 11. Engineering students graduated in 2020-2021.

3.3. Graduate School of ITC

3.3.1. Introduction

Graduate School of ITC (Bureau de 3ème cycle de l'ITC) plays an important role in supporting and providing services regarding the development of human resources at graduate (Master and Doctoral) levels at ITC. Its prime objective is to increase the number of highly qualified human resources in fields of Sciences, Engineering, Technology and Architecture, demanded by markets and the Cambodian society.

Vision

Excellence in graduate education in STEM so that graduates have full potentials and skills to meet the requirement of the Cambodia's 2030 vision.

Mission

The Graduate School of the Institute of Technology of Cambodia (GS-ITC) commits to achieving the long-term vision of ITC concerning graduate education by providing services to the campus community that maintain integrity and excellence in graduate education in STEM through clear and consistent policies, high standards, efficient procedures and direct student support. We seek to support and serve as a resource for all graduate students, and to support faculty and staff by fostering relationships, increasing communications and collaborations, and delivering comprehensive research and data resources to inform about graduate education. The graduate school:

1. Improve and develop graduate training programs in STEM to align with national, regional and international standards.
2. Educate graduate students to have full potentials and skills in STEM to meet the requirement of the Cambodia's 2030 vision.

Core Values

- Excellence in graduate education
- Recruitment and graduation of outstanding students
- Ethical conduct and integrity in graduate studies and researches
- Diversity among students, faculty and staff

- Communication and collaboration throughout the graduate community
- Accountability and transparency
- Graduate-student professional development
- Preservation of academic standards
- Maintaining accurate data and records.

Goals (2021-2030)

1. Improve and develop 10 graduate training programs in STEM to align with national, regional and international standards.
2. Educate 952 graduate students to have full potentials and skills in STEM to meet the requirement of the Cambodia's 2030 vision.

3.3.2. Summary of Realized Activities

No	Activities	Based line (2020-21)	Target (2021-22)	Realized (March 22)	Plan 2022-23	Indicator	
1	Increase number of partnerships	Academic institutions	21	21	21	21	Number
		Development agencies	4	4	4	4	Number
		Government/Private sectors/NGO	3	3	3	3	Number
2	Operate thematic programs (Master)	7	8	7 (Postponed due to Covid-19)	8	Number	
3	Operate research-based program (Master)	5	7	7	8	Number	
4	Launch joint Master's degree ITC- NUM	0	0	0	0	Number	
5	Seek for funds/scholarships to support students	Master programs	63	70	58	30	Number
		Doctoral programs	54	60	55	55	
6	Increase promotional activities to prospective students (ITC)	-	600	325	600	Number, list of attendance	
7	Conduct fresh graduate employment survey of master and doctoral graduates (annually).	46	48	37	65	Number of responses	
8	Internationalize the programs through our regional and international partnerships.	2	4	2	4	Number	

9	Increase communication among campus community, faculty staff and prospective students.	Leaflet, website, Telegram, Outlook email, meetings, study fair	Leaflet, website, On-line application, Telegram, Outlook email, digital governance	Leaflet, website, On-line application, Telegram, Outlook email, digital governance	Leaflet, website, On-line application, Telegram, Outlook email, digital governance	Means of communication
10	Fully implement Partnership programs of the HIEP projects.	5	5	5	5	Number
11	Increase number of research topics that respond to the societies needed through supporting from research fund institutions such as ministries, LBE/JICA project, WB project.	15	30	15	30	Number
12	Increase number of students' publications in journals/conferences	15	20	67 (14 journal articles)	35	Number
13	Enroll PhD students for academic year 2021-2022	54	64	55 (8 students dropped)	62	Number
14	Number of PhD students graduated by academic year 2021-2022 (accumulated)	0	14	4 (2 students failed)	15	Number
15	Enroll Master students for the full-time thematic master programs 2021-2022	92	112	122	136	Number
16	Number of Master students graduated by academic year 2021-2022 (accumulated)	229	294	277	340	Number
17	Implementation of EU-AFD project to support <i>Urban Supply and Sanitation Engineering</i> program	65%	100%	85% (Delayed due to Covid-19)	100%	Percentage

3.3.3. Master Programs

Currently, ITC offers 7 full-time thematic Master programs in the field of engineering and applied sciences. In general, the duration for each Master program is 2 or 3 years, classified as year 1 level (M1) and year 2 level (M2). For students holding ITC Engineer's degree, they are allowed to enter directly the M2 program, thus being able to spend only 1 year more in addition to 5 years in engineering program to complete the Master's degree (5+1 program). However, this opportunity is selective. The list of the Master programs is given in the following Table.

List of Thematic Master Programs

No	Program	Eligible student's background	Promo.	Descended from	Remark
1	Master of Materials and Structural Engineering (M-MSE)	GCI, GIM, GGG, GRU, others equivalent field	12	MGCI (+MGIM)	<ul style="list-style-type: none"> • In operation • Program Head: <i>Dr. LIM Sovanvichet</i> • Double diploma with INSA de Rennes
2	Master of Computer Science (M-ECS)	GIC, GEE, others equivalent field	8	MGIC	<ul style="list-style-type: none"> • In operation • Program Head: <i>Mr. HENG Rathpisey</i>
3	Master of Water and Environmental Engineering (M-WEE)	GRU, GCA, GCI, GGG, others equivalent field	8	MGRU	<ul style="list-style-type: none"> • In operation • Program Head: <i>Dr. KET Pinnara</i> • Financial support by EU-AFD project
4	Agro-industrial Engineering (M-AIE)	GCA, RUPP, RUA, others equivalent field	8	MAIE	<ul style="list-style-type: none"> • In operation • Program Head: <i>Dr. TY Boreborey</i>
5	Master of Energy Technology and Management Engineering (M-ETM)	GIM, GEE, others equivalent field	6	MGIM (+MGEE)	<ul style="list-style-type: none"> • In operation • Program Head: <i>Dr. KIM Bunthern</i>
6	Master of Mechatronics, Information and Communication Engineering (M-MIC)	GIM, GEE, others equivalent field	6	MGIM (+MGEE, +MGIC)	<ul style="list-style-type: none"> • In operation • Program Head: <i>Dr. PEC Rotna</i>

7	Master of Transport Engineering (M-TIE)	GCI, GIM, GIC, GEE	2	New program	<ul style="list-style-type: none"> • In operation • Program Head: <i>Dr. PHUN Veng Kheang</i>
8	Master of Data Science (M-DAS)	GIC, GEE, MATH	0	New program	<ul style="list-style-type: none"> • Not yet in operation • Program Head: <i>Dr. LIN Mongkolsery</i>

The number of graduated master students from the academic year 2010-2011 to 2020-2021 is in total 277 graduates (61 females). In the last academic year, there are 48 new graduates (female = 15) and 39 graduates (15 females) benefitted from partial and full scholarships. A list of Master Thesis is presented in Annex 5. The statistics of graduates in 2020-2021 is report in Table below.

Number of Students graduated in academic year 2020-2021

Program	Number of students graduated in 2020-2021						Cumulative graduated students from Promotion 1		
	Partial or Full Scholarship Students		Non-scholarship students		Total	Female	Number of promotions	Total	Female
	Total	Female	Total	Female					
M-MSE	1	0	5	0	6	0	11	96	11
M-ETM	-	-	-	-	-	-	6	27	0
M-WEE	30	12	-	-	30	12	7	79	27
M-AIE	-	-	-	-	-	-	6	26	18
M-ECS	4	2	1	0	5	2	7	26	4
M-MIC	1	0	3	0	4	0	6	20	0
M-TIE	3	1	-	-	3	1	1	3	1
M-DAS	-	-	-	-	-	-	-	-	-
Total	39	15	9	0	48	15	Total	277	61

Among 277 graduates, 33 graduates (3 females) pursue their study at PhD level (see Annex 6) and 8 PhD students (2 female) are registered in cotutelle programs at ITC and partner universities in France and Belgium.

Double-degree program M-MSE, ITC-INSA-Rennes. ITC and INSA Rennes, France, has established double-degree program since academic year 2010-2011. Up to now, there were 81 students (11 females) graduated from this program. Table below reports the statistics of the master graduates in this double-degree program from 2010-2011 to 2020-2021.

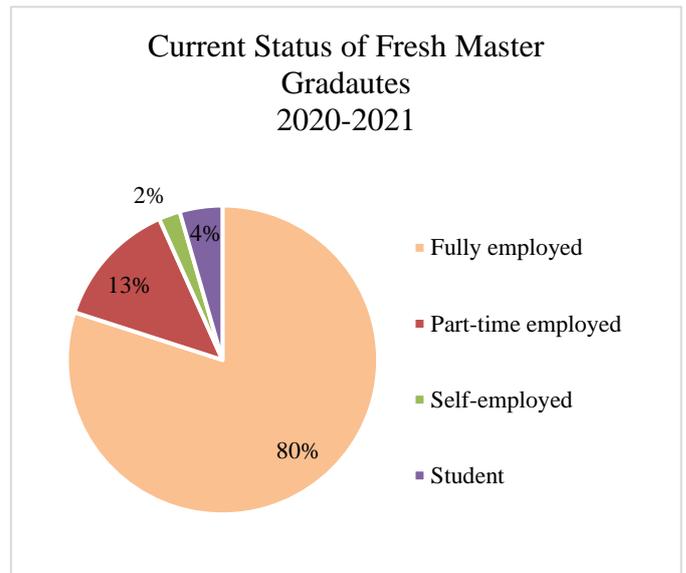
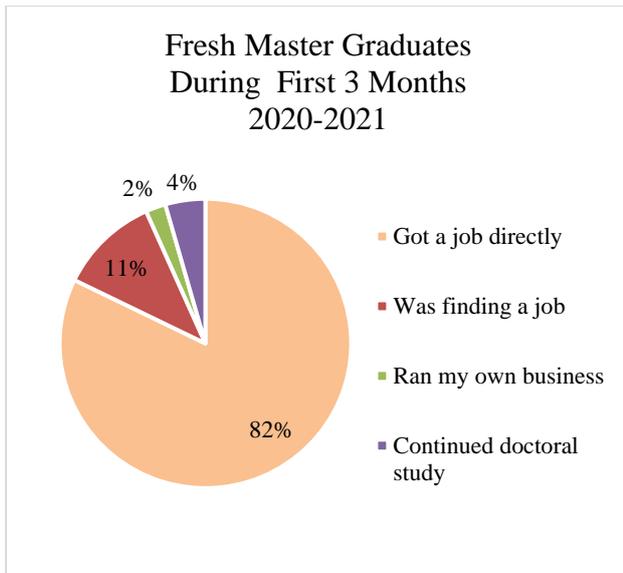
List of Graduates in Double-Degree Program M-MSE

Year	Enrolment		Graduated		Graduated (double-degree)	
	Total	F	Total	F	Total	F
2010-2011	6	0	5	0	5	0
2011-2012	10	0	9	0	9	0
2012-2013	7	3	7	3	7	3
2013-2014	7	0	6	0	6	0
2014-2015	12	0	7	0	7	0
2015-2016	5	0	5	0	1	0
2016-2017	12	1	10	1	8	1
2017-2018	12	4	11	4	11	4
2018-2019	16	1	15	1	11	1
2019-2020	17	2	15	2	13	2
2020-2021	12	0	6	0	3	0
2021-2022	14	2	-	-	-	-
Total	130	13	96	11	81	11

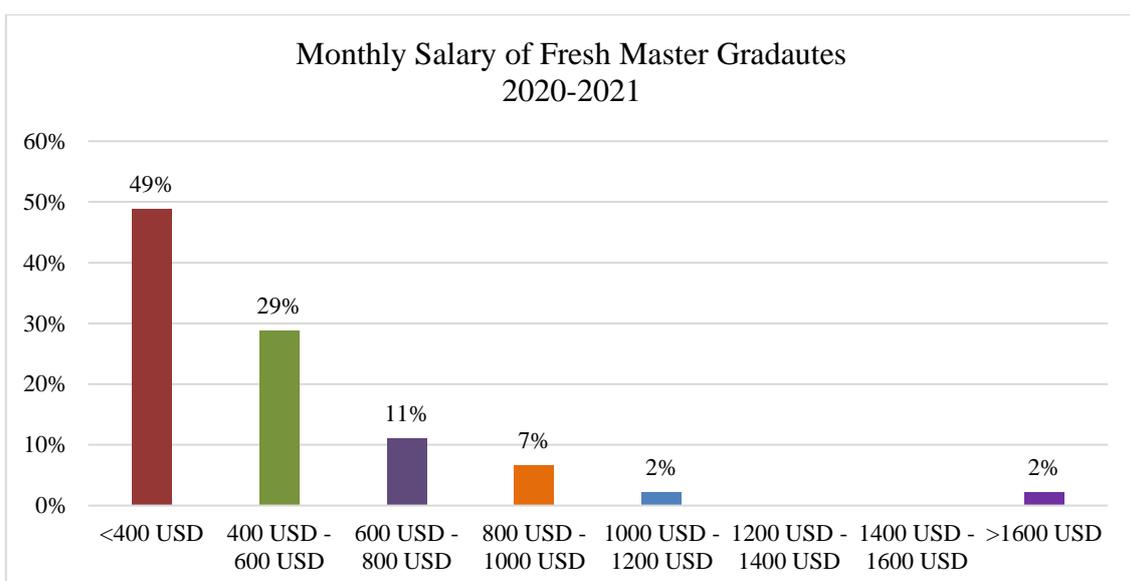
Fresh Graduate Employment Survey

In the academic year 2020-2021, a fresh graduate employment survey was conducted via Microsoft form. The objectives of this survey are (1) to know if our fresh graduates had difficulties in finding a job and their current employment status, (2) to see if pursuing a master degree (via their salary/income and their current position) provides value adds, and (3) to know where the graduates are currently working. Out of 48 fresh graduates, 45 (or 94%) of them responded to the questionnaires, which is a good participation rate.

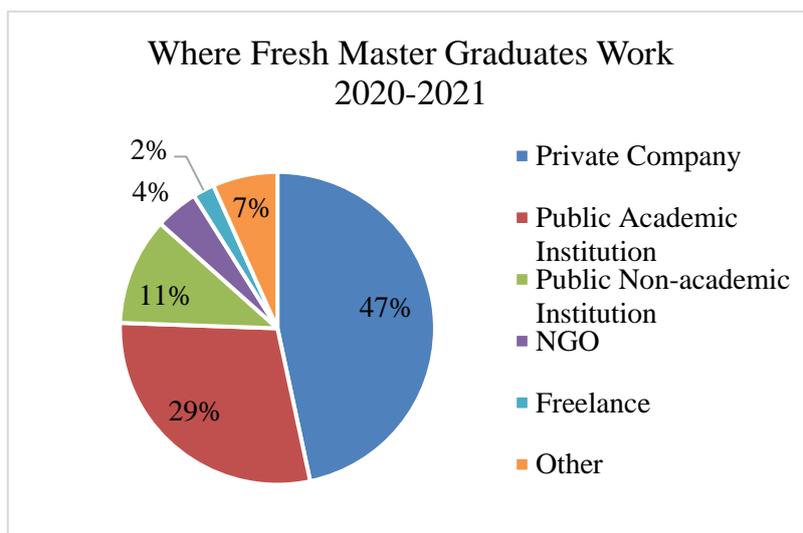
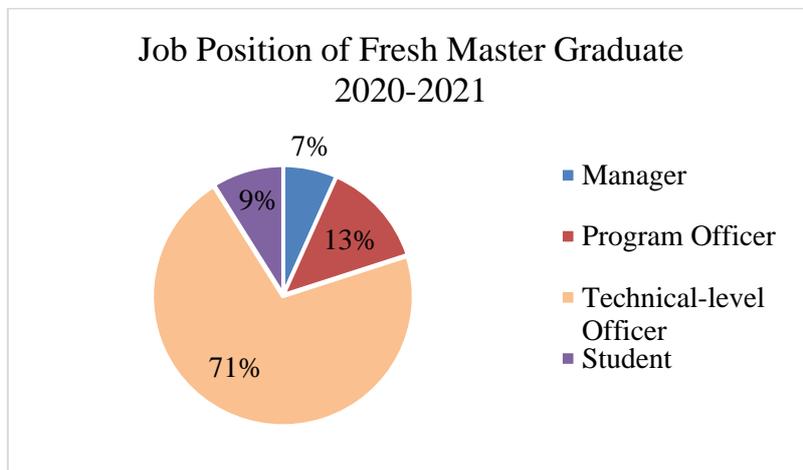
The result of the survey is described as follows. When asking the question “What did you do within the first 3 months just after graduation?”, 82% of them said they got a job directly, while 11% of them said they were looking for a job, 2% (or 1 person) of them said he/she ran his/her own business, and 4% (or 2 people) of them said they continued to doctoral study. The following charts show a contrast between the situations of fresh graduates within a period of 3 months versus 6 months. From the survey, we conclude that most of the fresh graduates could easily find a job within 3 months after graduation, and all of them were employed within 6 months.



The employment status alone cannot reflect the value added (hence the added knowledge, skills, and quality) that fresh graduates obtained from spending 1 or 2 years more in the master program after their engineer's or bachelor's degree. In this regard, we need to investigate economically on how much fresh master graduates gain in terms of base salary or income, compared to those of undergraduates. The following chart shows the distribution of monthly base salary of fresh master graduates in 2020-2021. We see that 22% of master respondents have a base salary at least 3 times more than that of non-skill workers, 29% of master respondents have a base salary at least 2 times more than that of non-skill workers, while 49% of master respondents have base a salary less than 2 times of that of non-skill workers. However, this still scores better compared to the statistic 2020, which shows that 71% of undergraduate respondents had a base salary less than 400 USD (Survey in 2020, ITC Tracer Study). On average, the base salary of the fresh master graduates is between 440 USD to 590 USD.



When asking the question “What job position are you holding?”, 7% of them said they had the role as manager, 13% said they had the role as program officer, 71% said they had the role as a technical-level officer, and 4% of them said they were students. Their workplaces share across private and public institutions: 47% in the private sector, 40% in the public sector, and 4% in NGOs. The complete statistics are shown in the following charts.



Program’s Supports

The programs receive co-financial supports from various partners/projects, e.g., from ARES-CCD (R2) of Belgium, AUF, Erasmus+, EU-AFD Project and HEIP. The supports are mainly for student scholarships, staff’s and student’s mobilities, and student’s research activities.

Enrollment and Scholarship Awards

The official announcement has been disclosed at ITC, at Graduate School and on ITC Facebook, and at the MoEYS page. For the academic year 2021-2022, there are in total 122 students (39 females) enrolled into 7 master programs and 61 students receive scholarships. In year 2 (M2), students are required to complete the coursework in Semester I (October-February) and to conduct their research/internship and produce their thesis report in Semester II (February-July). Table below shows the exact number of enrolled students and scholarship awards.

Number of Students enrolled in 2021-2022

Program	Partial or Full Scholarship Students				Non-scholarship Students				Total	Female
	M1		M2		M1		M2			
	Total	F	Total	F	Total	F	Total	F		
M-MSE	-	-	3	0	-	-	11	2	14	2
M-ETM	2	0	8	2	1	0	4	0	15	2
M-WEE	9	4	22	10	1	0	5	4	37	18
M-AIE	2	2	6	6	2	1	6	4	16	13
M-ECS	3	1	-	-	5	0	6	1	14	2
M-MIC	1	0	3	0	3	0	7	2	14	2
M-TIE	-	-	2	0	2	0	8	0	12	0
M-DAS	-	-	-	-	-	-	-	-	-	-
Total	17	7	44	18	14	1	47	13	122	39

Type and number of scholarships for this academic year are presented in the following Table.

List of Sources of Scholarships

Nº	Type of Scholarship	Benefit	Number of beneficiaries
1	HEIP-NUBB	1000 USD for tuition fee + monthly allowance	5
2	HEIP-SRU	1000 USD for tuition fee + monthly allowance	7
3	AFD-EU	1000 USD for tuition fee + 250 USD/month during 10 months for allowance	29
4	ITC 100%	100% Tuition Fee	2
5	HEIP-ITC	100% Tuition Fee/Monthly allowance	11
6	Others	Tuition Fees/Research Fund	4
Total			58

3.3.4. Doctoral Programs

ITC received permission from the Ministry of Education, Youth and Sport to run the PhD training programs by the **Prakas No. 909 AYK. BrK**, dated on the 29th September 2017. The document allows ITC to launch and run the PhD training programs in the five specialized fields:

1. Water and Environment (WAE)
2. Food Technology and Nutrition (FTN)
3. Mechatronics and Information Technology (MIT)
4. Materials Science and Structures (MSS)
5. Energy Technology and Management. (ETM)

The doctoral programs at ITC are full-time with the minimum period of study of 3 years.

Launching doctoral programs and recruiting PhD candidates. Launching doctoral training programs has been one of the focal interests of ITC. For the academic year 2021-2022, we successfully enrolled 55 PhD students (17 females). The statistics of PhD enrollments and graduates are reported in the following Table. (See Annex 7: List of Doctoral Student registered in 2021-2022 for the list of all PhD students.)

The statistics of PhD Enrollments and Graduates

Name	Program										Total	F
	WAE		FTN		MIT		MSS		ETM			
Number	Total	F	Total	F	Total	F	Total	F	Total	F		
Total number of PhD graduates	2	0	1	1	1	1	-	-	-	-	4	1
PhD Graduated in 2020-21	2	0	1	1	1	0	-	-	-	-	-	-
Total number of PhD enrolments by 2021-22	-	-	6	5	2	0	2	0	3	0	13	5
PhD Enrolled in year 1	-	-	6	5	2	0	2	0	3	0	13	5
PhD Enrolled in year 2	3	2	2	0	11	0	6	2	3	0	25	4
PhD Enrolled in year 3	2	2	1	1	2	0	-	-	3	2	8	5
PhD Enrolled in year 4	-	-	-	-	4	0	2	1	1	0	7	1
PhD Enrolled in year 5	-	-	1	1	-	-	1	1	-	-	2	2
Scholarship	5	4	10	7	19	0	11	4	10	2	55	17

Funding. GS-ITC benefits from co-financially supporting several projects: Higher Education Improvement Project (HEIP), ARES, ... The projects finance international mobilities and research activities of doctoral students. The list of sources of funding is given below.

List of sources of Funding

Sources of Funding	Number of Beneficiaries	Number of Beneficiaries (Female)
ARES	6	0
ARES-COMBOdIA	2	2
BGF	4	0
BGF-ITC	13	9
CCCA	1	0
HEIP	10	2
IRD	1	1
ITC	3	2
ITC Erasmus+	1	1
KIT-ITC	1	0
MoE	1	0
NIPTIC	1	0
NPIC	11	0
Total	55	17

Cotutelle and Partnership Programs. Among these, 34 PhD students (15 females) registered in cotutelle (double-degree) programs with partner universities in France and Belgium. In the cotutelle programs, PhD students shall spend at least 10 months in each university in Cambodia (ITC) or in France or Belgium. The list of PhD students in cotutelle with partner universities is given in the following Table.

Number of PhD students in cotutelle with partner universities.

Partner Universities	2017-18		2018-19		2019-20		2020-21		2021-22		Total	Female
	Total	F										
INSA Rennes			2	1			2	0			4	1
Université de Nantes	1	1					1	0			2	1
Université Toulouse III-Paul Sabatier			1	0							1	0
INSA Toulouse									1	1	0	0
INP Toulouse			1	0	1	0	1	0	1	0	3	0
SupAgro Dijon									1	1	0	0
Montpellier SupAgro			1	1	1	1			2	2	2	2
Université de Montpellier									1	1	0	0
Université Grenoble Alpes			1	0					1	0	1	0
Sorbonne Université					1	1					1	1
ENSC Rennes					1	1					1	1
IMT Mines Albi					1	0					1	0
Université de Rennes 1									1	0	0	0

Université de Mons			2	0			1	0			3	0
Université de Namur			1	0					1	0	1	0
Université Libre de Bruxelles							1	1			1	1
Université de Liège							3	3	1	0	3	3
Total	1	1	9	2	5	3	9	4	10	5	34	15

Graduation. In the academic year 2020-2021, there were 6 doctoral students requested to have their doctoral defense. However, only 4 students, all were in cotuelle programs, met the criteria and defended successfully (see the list below). The other 2 students need to re-enroll for the next academic year and waiting for a new defense.

List of Doctoral students who successfully defended the thesis

N°	Name	Sex	Field	Research Topic	Supervisor	Convention de cotutelle	Defense Promo.	Defense Date
1	SOK Ty	M	D-WAE	Dynamic transport of the sediment and nutrient in the Mekong River Basin and the role of the Tonle Sap Lake: Assessment coupling data and modelling approaches	1. Dr. OEURNG Chantha 2. Dr. SANCHEZ-PEREZ José Miguel	INP Toulouse, France	1	2021
2	SONG Layheang	M	D-WAE	Impact of land use on surface runoff and soil erosion: multi-scale assessment of teak tree plantation management in a tropical humid mountainous agro-ecosystem	1. Dr. OEURNG Chantha 2. Dr. BOITHIAS Laurie 3. Dr. RIBOLZI Olivier	Université Toulouse III-Paul Sabatier, France	1	2021
3	KONG Phutphalla	M	D-MIT	Visual Attention: Top-down and Bottom-up Information Relative Importance	1. Dr. PO Kimtho 2. Prof. GOSSELIN Bernard 3. MANCAS Matei	Université de Mons, Belgium	1	2021
4	SROY Sengly	F	D-FTN	Assessment of the nutritional value and contaminants of ten species of freshwater fish and fish powder from Tonle Sap Lake in Cambodia	1. Dr. IN Sokneang 2. Prof. AVALLONE Sylvie	Montpellier SupAgro, France	1	2021

PhD students in co-supervision with partner universities. There are also some PhD students co-supervised by ITC and partner-university professors yet registered only in partner universities (France and Belgium). They received financial supports from ARES-CCD, AUF, BFG, ITC and etc. By March 2022, there are 6 PhD candidates who finished such programs.

No	Name	Sex	Dept.	Receiving University	Since	Specialty	Year Finished
1	KET Pinnara	F	GRU	Uni. De Liège	2014	Agricultural Science	2019
2	LY Sokny	F	GCA	Uni. De Liège	2014	Agricultural Science and Biological Engineering	2020
3	DONA Valy	M	GIC	UCL	2015	Natural Language Processing	2020
4	KAN Kuchvichea	M	GCI	ULB	2015	Civil Engineering	2020
5	MORM Elen	F	GCA	ULB	2017	Food Engineering	2021
6	HOR Sivmey	F	GCA	Montpellier SupAgro	2017	Food Engineering	2021

3.3.5. Others Activities

Missions

None of mission can be completed due to the pandemic Covid-19.

Implementation of Partnership Program under HEIP

The Higher Education Improvement Project (HEIP) supports the Graduate School of ITC in terms of improving institutional management, improving curriculum and quality of Master programs, developing new Master programs, and improving human resources, via partnering with international universities. Under the HEIP, we have established 5 Partnership Agreements that support graduate programs at ITC with the following partner universities:

- Chulalongkorn University (CU), Thailand, supporting on the establishment of Master of Materials Science and Structures
- Kasetsart University (KU), Thailand, supporting on the improvement Master of Agro-industrial Engineering
- Institut Mines Télécom (IMT) and Ecole Nationale Supérieure d'Informatique pour l'Industrie et l'Entreprise (ENSIIE), France, supporting on the development of Master of Data Science and Master of Mechatronics, Information and Communication Engineering
- ENSEEIHT-INP Toulouse, France, supporting on improving management of Graduate School (doctoral program)
- Institut Teknologi Bandung (ITC), Indonesia, supporting on improvement of Master of Energy Technology and Management.

We also work on improv website and communication materials, and operational guidelines such as faculty manual, student manual, etc.

3.3.6. Difficulties and Challenges

In the academic year 2021-2022, we face several difficulties and challenges.

- Covid-19 mainly impacts all international mobilities of faculty staff and students. It interrupts almost all aspects of the training programs at both master and doctoral levels. As a consequence, a significant number of students cannot defend their thesis as scheduled and some needed to request for a delay for another year due to slow progress in research. Moreover, master program of Data Science cannot be launched due to impossibility and restriction of foreign and local mobilities.
- The fund to support research activities is inadequate.

PhD students in cotutelle programs have different schedules to come to ITC. This is difficult to arrange coursework for them.

3.3.7. Conclusion

For this academic year, 7 full-time master programs are operated (with five research-based programs). The number of enrollments increases by 32%, if compared to academic year 2020-2021. However, around half of our full-time master students are scholarship recipients (47% of them received full or partial scholarships). In academic year 2020-2021, 48 M2 students (among 70 M2 students) or 69% graduated successfully. From this academic year until 2024, we implement the 5 partnership programs under HEIP to improve institutional management, improve curriculum and quality of Master programs, develop new Master programs, and improve human resources.

For doctoral programs, the number of enrollments increases by 2% (54 to 55 enrollments), compared with academic year 2020-2021. Among these, 34 (15 females) doctoral students registered in cotutelle programs with French and Belgian partner universities. In academic year 2020-2021, 4 doctoral students (all in cotutelle) graduated successfully. However, we still face some challenges: the shortage of scholarships and research funds to support students, the laboratory is not yet fully capable for research uses, and different student's mobility's schedules, which complicates the course arrangement at ITC's side.

The sanitary crisis caused by Covid-19 complicates all operations, both at management and program levels. Almost all international mobilities have been postponed or cancelled due to travel restrictions. Master program of Data Science cannot be launched as planned.

3.4. Training Program during Covid-19 Pandemic

- Number and rate of graduates for the last 3 years is presented in below table:

Year		Technician (T2)	Engineer (I5)	Master (M2)
2020-2021	Number of students	243	603	71
	Number of graduates	190	572	48
	% of graduates	78.2%	94.9%	67.6%
2019-2020	Number of students	240	582	60
	Number of graduates	192	541	46
	% of graduates	80.0%	93.0%	76.7%
2018-2019	Number of students	275	576	48
	Number of graduates	220	538	39
	% of graduates	80.0%	93.4%	81.3%

According to above table, rate of graduates from the engineer program is not affected by the pandemic and that of technician program is slightly affected by the Covid-19 pandemic. This can be interpreted by the beneficiary of the final-year internship with industries. Most of final-year students were still able to do their internship during the pandemic.

However, graduation rate of M2 students is around 77% in 2019-2020 and 68% in 2020-2021. These rates are low compared to the rate before the pandemic (the reference year 2018-2019) which is approximately 81% of graduates. This can be translated by nature of Master program at ITC that needs laboratory or in-situ research data. But these activities were postponed or canceled by the closure of the institute and limitation of travel for field works/samples collection. In addition, the arrival of some research equipment was late or delayed.

- Academic Year 2021-2022 commenced on 11 October 2021 for senior students from 3rd to 5th Year. Second year students started their 1st semester from 1st November 2021, about 3 weeks late compared to other senior students.
- For the prevention of Covid-19 community spread, only small groups of students (Laboratory Practice) were allowed to enter ITC campus and the laboratories for the 1st semester. Lectures and tutorials were given online.
- The national exam of grade 12 students had been postponed to 27 December 2021. So the Entrance Exam to recruit 1st Year Engineer students was organized online on 7 February 2022. In total, there are 3392 candidates applied for this examination in which 3342 registered to ITC Phnom Penh and 50 registered to ITC Tbong Khmum Campus. It is noted that date, time, subject and exam system are the same for all candidates (Phnom Penh and Tbong Khmum Campus). Number of candidates, successful candidates and waiting list is presented in table below.

Number of	ITC-Phnom Penh		ITC-Tbong Khmum		Grand Total	Female
	Total 1	Female	Total 2	Female		
Candidate	3342	1308	50	21	3392	1329
Successful Candidate	1703	609	25	12	1728	621
Waiting list	392	188	11	5	403	193
Enrolled in I1	1615	586	30	13		

- Enrollment of Successful candidates and waiting list is undergoing till 9 March 2022. So, first year students will start their 1st semester classes from 14 March 2022.
- Most of teaching and learning class are on campus (face to face) from May 2022.

In conclusion, the implementation of the academic activities and other activities have been continuously working and progressing despite the Covid-19 pandemic.

4. Capacity Building and Professor Dispatch

4.1. Capacity Building (2021-2022)

4.1.1. Long-term overseas capacity building for lecturers and students

Year after year, the number of lecturers and students taking postgraduate training abroad increases remarkably. The academic year 2021-2022 is a proof of this. Indeed, the ITC has 27 lecturers (3 post-doc, 20 PhDs, 4 Masters) and 55 students (3 engineering degree, 38 Masters, 13 PhD students and 1 post-doc). They are located in different partner institutions around the world. For more information, please see annex 8 and 9.

4.1.2. Short-term overseas capacity building for lecturers and students (2021-2022)

Within the framework of international cooperation, 43 lecturer missions and 7 student missions (a total of 46 missions) were carried out abroad. It is important to note, however, that this year's further training, due to the spread of Covid-19, was mainly carried out online. For more information, please see annex 10 and 11.

It is clear that further training missions for ITC lecturers are essential to ensure the quality of teaching. For students, they allow them to gain new scientific experiences with foreign professors.

4.1.3. Local capacity building for lecturers and students in the form of seminars (2021-2022)

In addition to the training missions abroad, thanks to the cooperation with ministries, NGOs and other partners in Cambodia, our teachers and students from different departments have participated in 15 training courses in the form of local academic seminars organized by these different partners.

Such training would allow teachers and students to acquire new knowledge and to have exchanges with trainers. In addition, it is an opportunity for lecturers and students to interact with participants from different organizations. Details can be found in annex 12.

In addition, it should be noted that we have other seminars organized by the University Industry-Linkage (UIL) which are not included in above annex.

4.2. Professor dispatch at ITC (2021-2022)

For this academic year 2021-2022, we have 5 mobilities of teachers from abroad:

- Prof. PONHOT Jean Philippe, Université de Liège, 27/05-03/06/2022
- Prof. FADEL Maurice, INP Toulouse, 02/06/2022
- Prof. Christophe LEYS, Université Libre de Bruxelles, 2-6/05/2022
- Prof. HENG Samedi, Université de Liège, 10-14/01/2022
- Prof. Yann Charles, Université de Paris Sorbonne (UP 13), 21-30/11/2021
- Prof. Emmanuel CHAPUT, Toulouse INP, 28 mars au 1^{er} avril 2022

Details can be found in annex 13.

5. Research and Innovation

5.1. Background of Research and Innovation at ITC

Institute of Technology of Cambodia (ITC) contributes to maintain sustainable development and decrease the inequalities within our society through its internal functioning and opening-up to foreign countries and the way their students get admitted. ITC enjoys numerous cooperative agreements with European, Regional, and local Universities. These agreements help improve the quality of the educational program, create new degrees, and enable collaboration in new research projects and mobility of researchers, lecturers and students. ITC also enjoys privileged relations with a great number of Cambodian companies and multinationals which have branches throughout Cambodia.

Beside the education as engineer and technician, ITC also committed to promote the research activity by gathering the alumni, offering Master and PhD degree program locally and internationally through partnership programs, approaching the industries and local enterprises, and collaborating researches both local and international universities. To promote research activities, ITC has created 2 statuses, i.e., contracted lecturer-researcher with 50% of their time contributed to research (established on 31 May 2010) and full-time researcher (established on 18 June 2012). Further, ITC's first **Research and Innovation Center (RIC)** was established which is supported by JICA on July 14, 2015. In 2017, five research units have been established: (1) Energy Technology and Management (ETM), (2) Food Technology and Nutrition (FTN), (3) Mechatronics and Informatics Technology (MIT), (4) Materials Science and Structure (MSS), and (5) Water and Environment (WAE).

To sustain the research quality as well as to evaluate and orientate the research activities, RIC organizes the meeting of all lecturer-researchers/full-time researchers semi-annually at the beginning and at the end of academic year. In addition, the monthly meeting has been internally conducted by research unit and quarterly meeting has been conducted with participated by RIC management team. The main objective of the meeting is to recall the statuses, contracts, and evaluation criteria for researcher performance. At the same way, Head of research unit as well as RIC management team can solve the issue immediately as well can advise to researchers who have slow progress. In this academic year, under the constraint of covid-19 pandemic, the meeting has been conducted virtually. Prior to the meeting, all researchers are required to submit their research progress and challenges in the form of PowerPoint to their Unit Head followed by their presentations and new projects granted.

This chapter is made to report the information related to research and innovation that have been conducting, especially for academic year 2021-2022 to a very important scientific council of ITC. The scientific council composed of the Direction Board, Director and deputy directors of RIC, Deans of faculties and a representative from each Department chaired by Director General of ITC, is in charge of orientation and evaluation of scientific research and teaching program of the institute.

5.2. Research and Publication

5.2.1. Research Project and Researcher

With regard to the engineering field and commercialization of research, ITC has employed up to 113 researchers in this 2021-2022 academic year (this number includes also those who hold administration positions but also conduct research). This number as well as that of research project is constantly increased since 2010:

- 2010-2011 (12 researchers/12 projects),
- 2011-2012 (16 researchers/17 projects),
- 2012-2013 (18 researchers/23 projects),
- 2013-2014 (27 researchers/28 projects),
- 2014-2015 (36 researchers/28 projects),
- 2015-2016 (47 researchers/35 project),
- 2016-2017 (63 researchers including 14 fulltime researchers/51 projects),
- 2017-2018 (81 researchers including 14 fulltime researchers/53 projects),
- 2018-2019 (91 researchers including 14 fulltime researchers/77 projects),
- 2019-2020 (89 researchers including 22 fulltime researchers/97 projects),
- 2020-2021 (109 researchers including 25 fulltime researchers/101 projects),
- 2021-2022 (112 researchers including 37 fulltime researchers/90 projects).

Figure 12 presents the evolution of researcher numbers between 2010-2011 and 2021-2022. Importantly, the number of full-time researchers increased remarkably in 2021-2022 (updated by May 2022) due to the support from HEIP projects, BGF and MoEYS, and others supports.

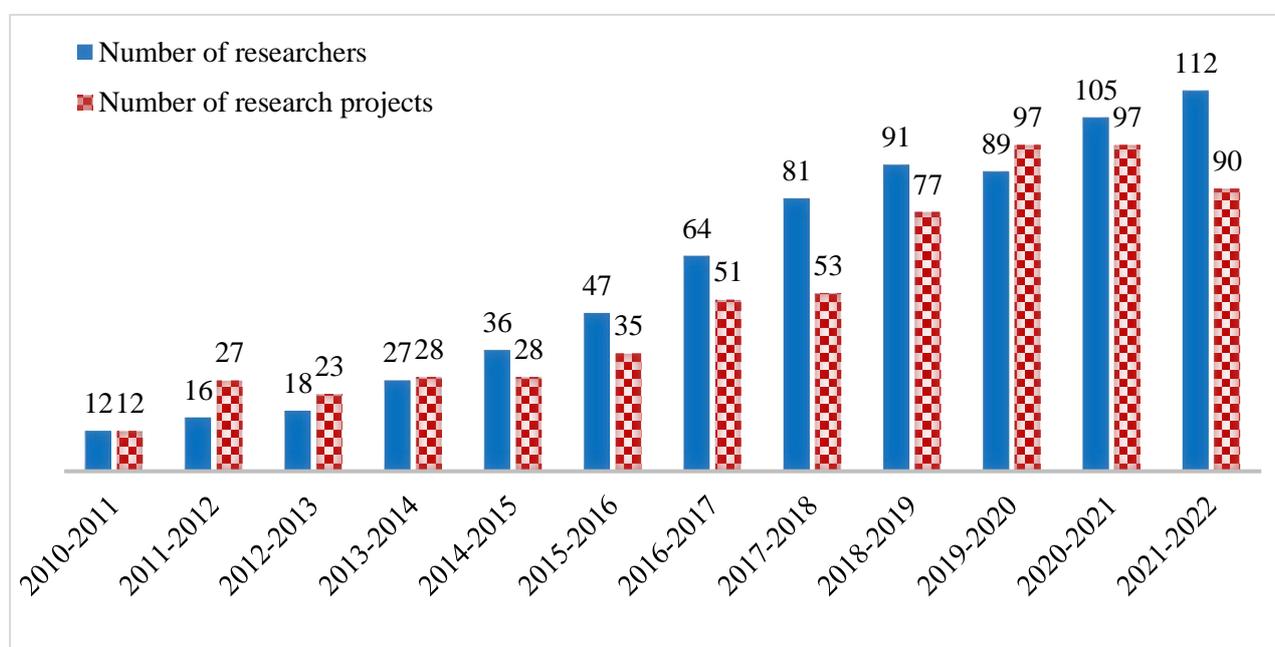


Figure 12. Number of researchers since 2010-2011 to 2021-2022 academic year (updated by May 2022).

5.2.2. Research Project and Researcher by Research Unit for 2021-2022

This academic year (2021-2022), 90 projects are on-going and implemented by 112 Researchers classified into three categories: Senior researchers¹, Lecturer-researcher, and full-time researchers.

- Energy Technology and Management-ETM (14 projects): 18 Researchers including 08 Senior researchers, 04 Lecturer-Researchers, and 06 full-time Researchers.
- Food Technology and Nutrition-FTN (18 projects): 25 Researchers including 06 Senior researchers, 09 Lecturer-Researchers, and 10 full-time Researchers.

¹ Senior researchers refer to those under management teams and group direction who have not been contracted as researchers but have been conducting researches on their own projects.

- Mechatronics and Information Technology-MIT (14 projects): 19 researchers including 05 Senior researchers, 05 Lecturers-researchers, and 09 full-time researchers.
- Material Sciences and Structure-MSS (17 projects): 25 Researchers including 13 Senior researchers, 05 Lecture-Researchers, and 07 full-time Researchers.
- Water and Environmental-WAE (27 projects): 25 researchers including 08 Senior researchers, 12 Lecturer-Researchers, and 05 full-time Researchers.

Figure below presents the number of projects and the number of researchers by research unit (2021-2022). The fact that some unit (FTN), the number of researchers is higher than the number research projects is due to the number of full-time researchers (10 fulltime researchers in FTN) conducting their PhD under some research projects amount the 18 projects only.

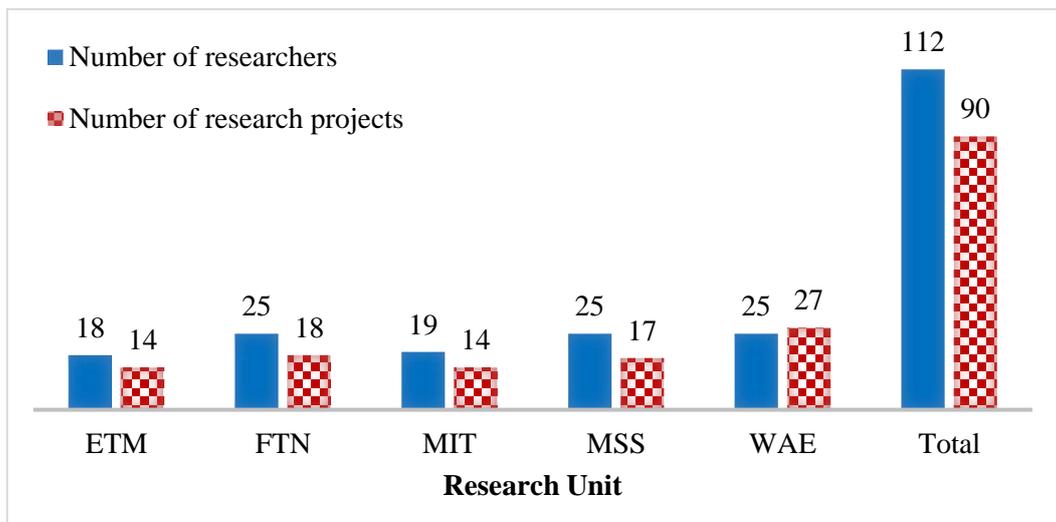


Figure 13. Research projects by each research unit in 2021-2022 (updated by May 2022).

Researches are conducted with the support and/or under the collaboration with ARES-CCD (Belgium), AgroSup Dijon (France), AUF, JST/JICA (Japan), Cambodia Climate Change alliance (Cambodia), AUN/Seed-Net JICA, JSPS (Japan), Kanazawa University (Japan), Ambassade de France, INSA de Rennes (France), ACIAR (Australia), CDRI (Cambodia), USAID (United States of America), US-Airforce (United States of America), Takashi Foundation (Japan), Kurita Foundation (Japan), United Kingdom Trust Fund, Pierre Fable (France), Research Institute for Development (IRD-France), The French Agricultural Research for Sustainable Development (CIRAD) and EU, and Ministry of Environment (Cambodia) and Higher Education Improvement Program (Cambodia) etc.

Through the collaboration with Japanese partners, a grand research project has been awarded to ITC entitled "*Establishment of conservation platform for Tonle Sap Lake, Cambodia*". This project required the participation of 40 researchers in which 23 from GRU and GCA of ITC, and RUPP, and other 20 Japanese partners (Tokyo Institute of Technology, Yamagata University, Institute for Global Environmental Studies), in collaboration with Ministry of Environment, Ministry of Water Resources and Meteorology and Tonle Sap Authority. Under the support of JICA, totally 42 Laboratory Based Enducation-LBE (26 projects completed, and 16 projects on-going) projects for strengthening engineering education and research for industrial development in Cambodia have been awarded to implement from 2019-2023.

5.2.3. Classification of Research Project by Unit

Research projects have been classified according to the partners involved in the implementation of the project. Projects are classified into National, Regional and International cooperation levels (Figure below). National cooperation stands for collaboration and partners within local institutions and SMEs, whereas regional cooperation covers the cooperation within Asian countries, and International cooperation includes all other countries outside Asian.

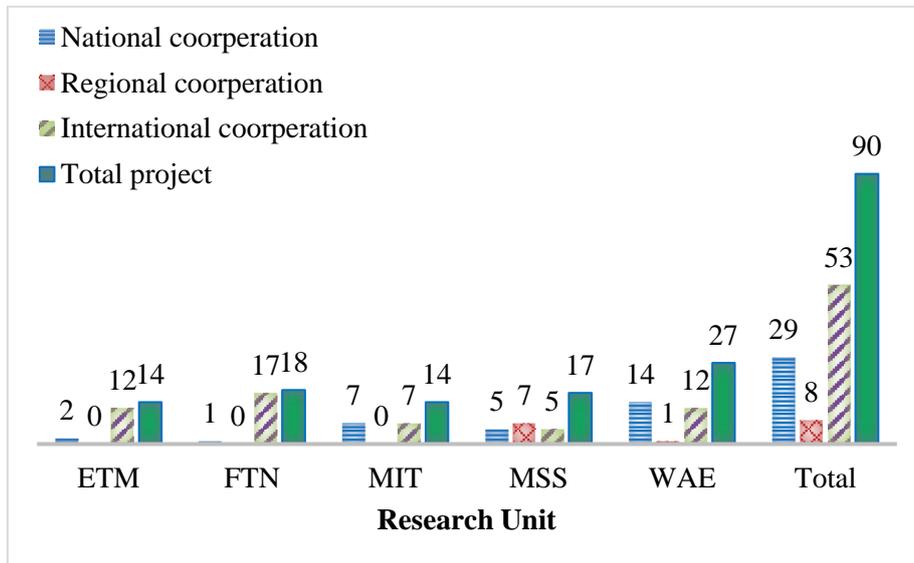


Figure 14. Classification of research project by research unit in 2021-2022 (updated by May 2022).

The projects are also classified into two types: Basic research project, Applied and development research, Start-up and Tech-transfer (Figure below). In our terms, Basic research is an approach to knowledge-specific that seeks to expand knowledge in a field of study. Applied and development research are those research activities, which focus on providing innovative or practical solutions to a specific problem and contribute to development at any scale. Among the 90 on-going projects, there are 29 Basic researches, and 61 Applied and development researches. Start-up² and Tech-transfer³ are under RIC development plan for 2030.

² Start-up refers to an organization or a process of forming or managing business that uses innovation as the core of its business model under uncertainty conditions and has risks, yet high potential to growth fast (source: Techo Startup Center).

³ Tech-transfer projects refer to the research projects that could lead to the process of commercialization by technology licensing or Intellectual Property (IP) rights transferred.

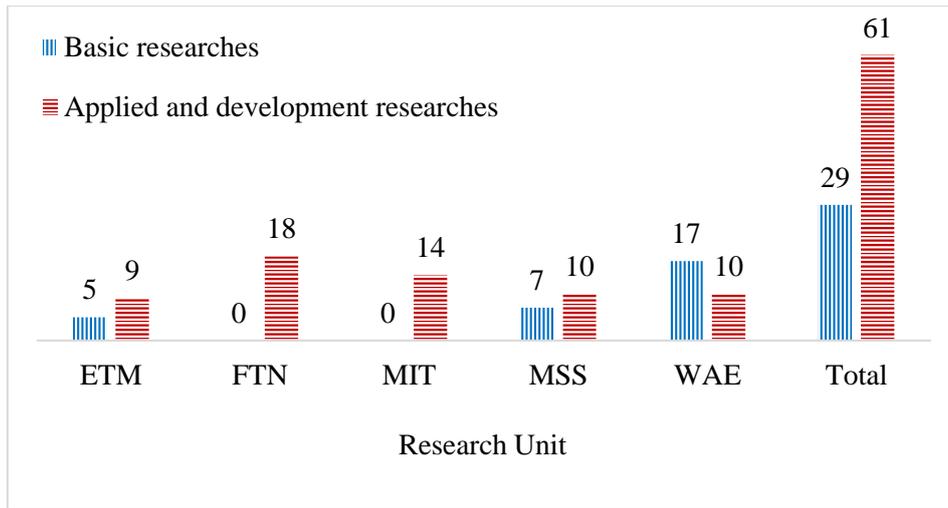


Figure 15. Classification of project types by research unit in 2021-2022 (updated by May 2022).

5.2.4. Publication

In term of scientific journal publication from 2010 to 2022, researchers published their research articles of 274 international published (or accepted) papers and 108 in local published (or accepted) papers (Figure 16). Indexed papers refer to the publication in international journal and non-indexed papers refer to the publication in Techno-Science Research Journal of ITC and any other non-indexed local journal. The summary of publications by each unit from 2010 to 2022 was plotted in Figures 17 and 18. In addition, the number of international publications versus number of researchers in 2022 was plotted, while this data was from January to May 2022 (Figure 19).

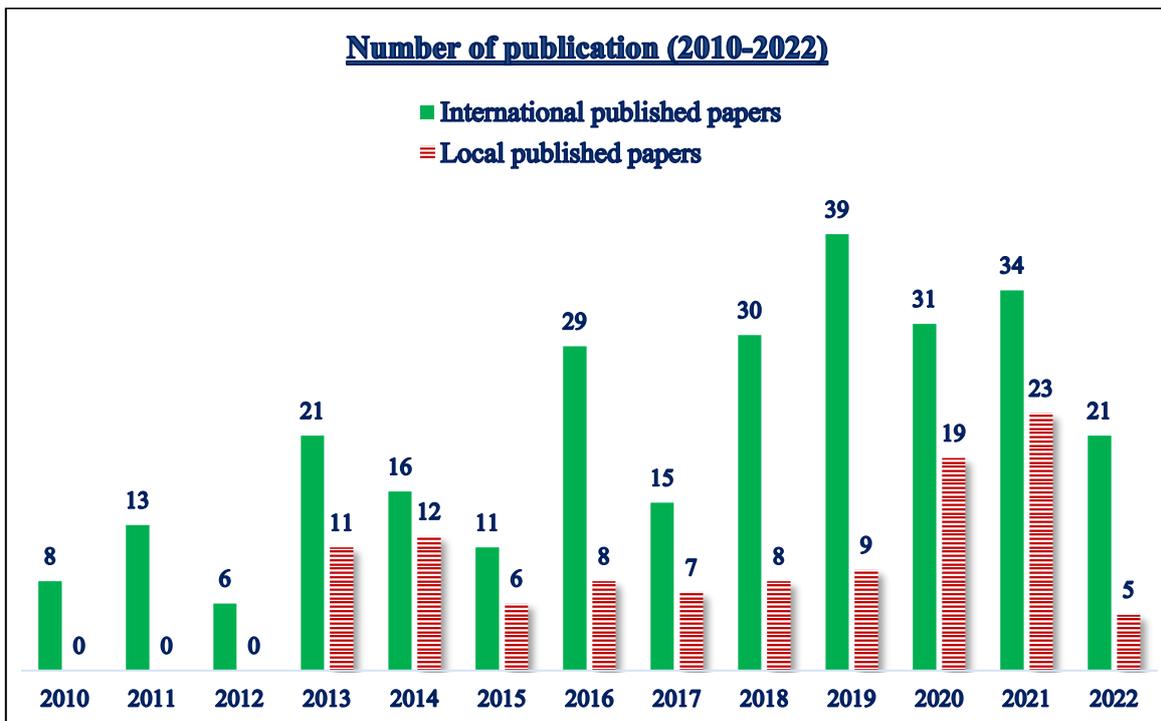


Figure 16. Number of international and local publications from 2010 (updated by May 2022).

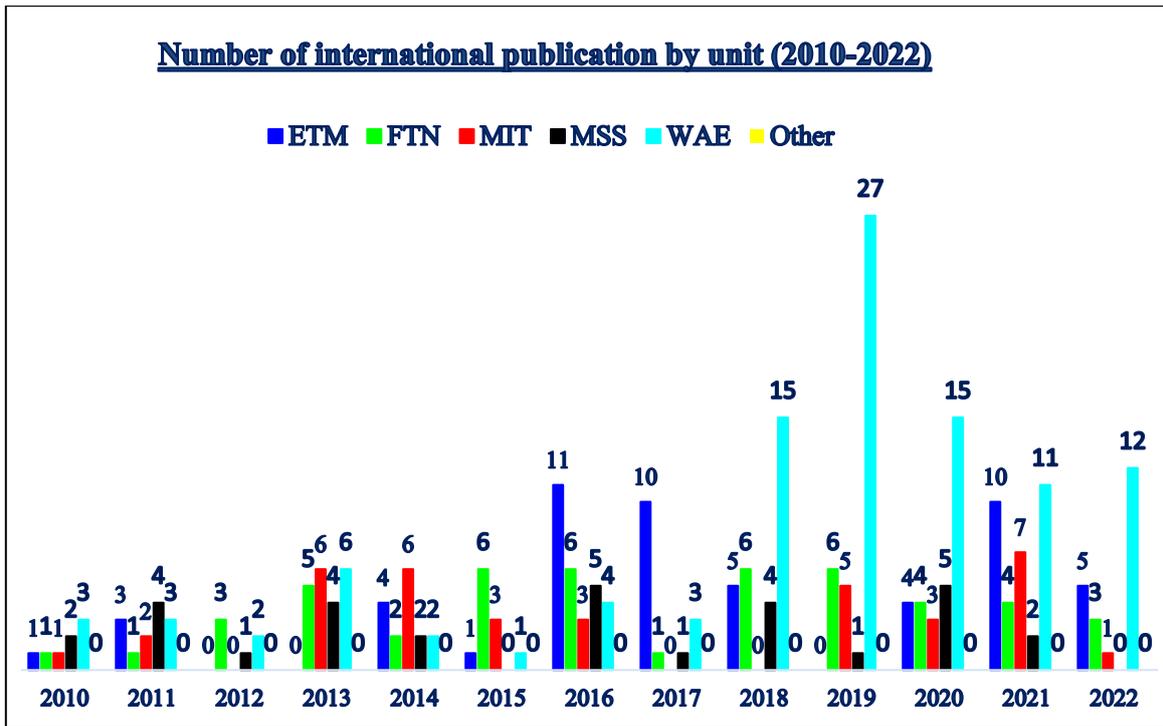


Figure 17. Number of international publications by each unit from 2010 (updated by May 2022).

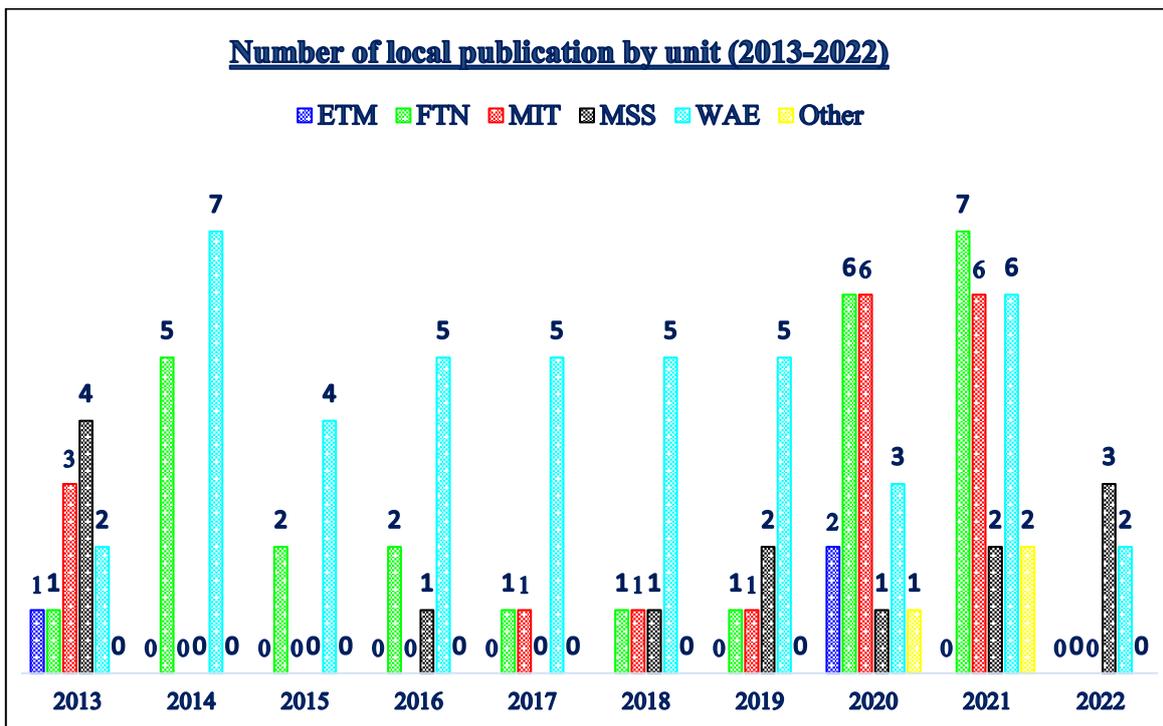


Figure 18. Number of local publications by each unit from 2013 (updated by May 2022).

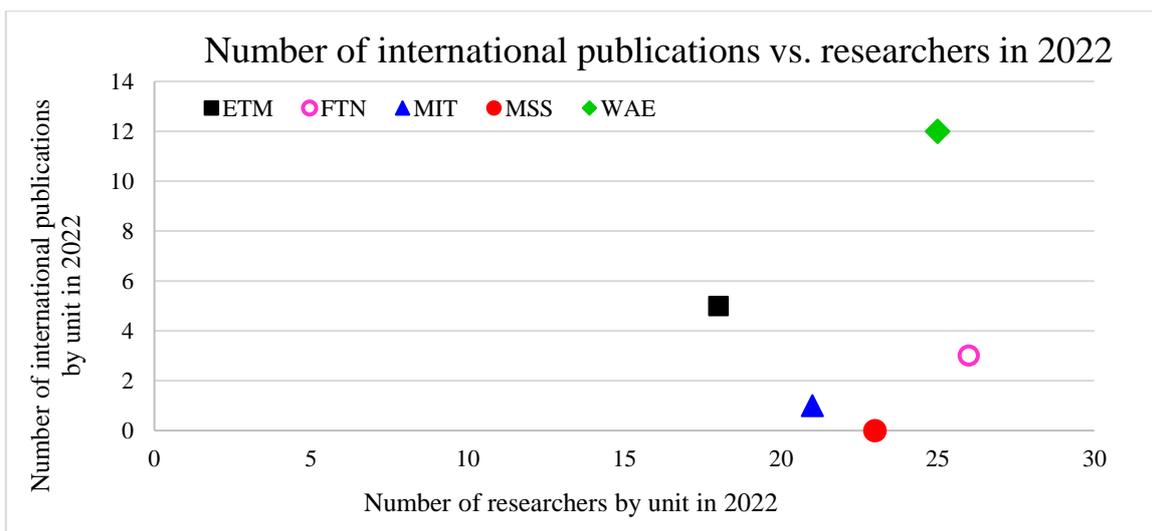


Figure 19. Number of international publications vs. number of researchers in 2022 (updated by May 2022).

5.3. High Impact Research and Innovation Projects

5.3.1. SATREPS Project: « Establishment of Conservation Platform for Tonle Sap Lake, Cambodia »

5.3.1.1. Introduction

SATREPS stands for Science and Technology Research Partnership for Sustainable Development. This project is funded by the Japan International Cooperation Agency (JICA) and Japan Science and Technology Agency (JST). SATREPS is a 5-year project starting from April 2016 to March 2021. However, it is extended to March 2022 due to COVID-19 pandemic. The main institutions of the projects are: (1) Tokyo Institute of Technology, Japan, and (2) Institute of Technology of Cambodia (ITC), Cambodia. Besides these, there are also Institute for Global Environmental Strategies (IGES, Japan), Yamagata University (YU, Japan), Tonle Sap Authority (TSA, Cambodia), Ministry of Water Resources and Meteorology (MOWRAM, Cambodia), Ministry of Environment (MOE, Cambodia), Ishikawa Prefectural University (Japan), Toyama Prefectural University (Japan), Iwate University, and University of Tokyo (Japan).

5.3.1.2. Objectives

The project aims to develop a water environment analytical tool for Tonle Sap Lake (TSL) and establish an environmental conservation platform through the elucidation of the lake and the tool development. The long-term project objectives (for the next 10 years, until 2025) are as follows:

- To establish state-of-the-art research-oriented structures and facilities in ITC
- To promote science-based management to the government of Cambodia
- To develop Platform for Aquatic Ecosystem Research (PAER) and make it one of the benchmarks in freshwater ecology and management studies in Southeast Asia

5.3.1.3. Research Participants

This project requires the participation from researchers and government staffs from various ministries. There are 56 members in Cambodia including :

- ITC : 23 Researchers (15 PhD, 8 Master) and 33 students (10 Master's students and 23 Bachelor students);
- Ministry of Environment: 5 persons;
- Tonle Sap Authority: 10 persons
- Ministry of Water Resources and Meteorology: 6 persons;

There are also 47 members (30 PhD, 1 Master, 3 PhD students, 3 Master's students and 10 Bachelor students) from Japan (Tokyo Tech, Ishikawa Prefectural University, Toyama Prefectural University, Shimane University, University of Tokyo, Yamagata University, Iwate University, Institute for Global Environment Strategies).

5.3.1.4. Working Group

There are 7 working groups (WG) in this project as the followings:

- WG1: Hydrology and hydrodynamics
- WG2: Sediment and water quality
- WG3: Chemical pollution
- WG4: Pathogens and phytoplanktons
- WG5: Modeling and integration
- WG6: Risk assessment and scenarios analysis
- WG7: Social implementation

5.3.1.5. Outcomes for the Societies

- Development of Water Environment Analytical Tool of TSL
- Creation of Platform for Aquatic Ecosystem Research (PAER)
- Promotion of Science and Engineering
- Maintaining and updating the environmental database about TSL
- Quantification of environmental impacts on TSL and its marginal regions
- Quantification of the impact of global climate change in the region
- Support the establishment of environmental quality standards of the lake
- Making materials for environmental management and education.

5.3.1.6. The 6th International Symposium

The 6th International Symposium on Conservation and Management of Tropical Lakes, was jointly and virtually held with the 3rd International Conference on Tropical Limnology (TROPLIMNO III) from 25th -26th November 2021 (Figure below). The main theme was “Environmental Conservation Platform for Tropical Inland Waters: Science, Policy, and Impact”.

The joint event was hosted and organized by the Platform for Aquatic Ecosystem Research, co organized with the Southeast Asian Limnological Network (SEALNet), Institute of Technology of Cambodia (ITC), Institute for Global Environmental Strategies (IGES), Tokyo Institute of Technology (Tokyo Tech), Research Center for Limnology – National Research and Innovation Agency of Indonesia (RCL-BRIN). Together, the event was collaborated with Ministry of Environment, Cambodia, Tonle Sap Authority, Cambodia, Ministry of Water Resources and Meteorology, Cambodia, Universiti Sains Malaysia, Malaysia, and International Lake Environment Committee Foundation (ILEC), Japan. The event was financially supported by JICA and JST through the Science and Technology Research Partnership for Sustainable Development (SATREPS) project entitled “Establishment of Environmental Conservation Platform for Tonle Sap Lake, Cambodia” together with some sponsors from IRD through WatHealth and 4C project, Campus France and IFC, and Shimadzu.

The main objective of this event was to bring together leading academics and scientists, policy makers, lake managers, students and other professionals in the field of tropical limnology to exchange information, share knowledge and their experience and lessons learned in integrated lake basin management. As a joint activity, the organizers aimed to expand and sustain the Platform for Aquatic Ecosystem Research in the tropical lakes of Southeast Asia, which is an outcome of the SATREPS Project in Tonle Sap Lake.

There were more than 100 participants coming from various institutions and countries such as Cambodia, The Philippines, Indonesia, Malaysia, Japan, France, etc. Forty-eight of presentations were presented by students, researchers, professors, and many researchers coming from various institutions.

Besides that, there were 6 parallel sessions covering 4 different topics included 1) Ecosystem and Biodiversity of Tropical Inland Water; 2) Ecohydrology, Biochemical and Physical Processes in Tropical Aquatic Ecosystems; 3) Data Mining, Knowledge Management, Decision Support System for ILBM, Including Remote Sensing, GIS, and Related Tools; 4) Information Sharing and Stakeholder’s Engagement, Social Impact Assessment, and Nature-Based Solutions (Nbs).

The event was finished successfully with video/photo winner contestant announcement together with six best student presentations award. The event also brought multiple lake management stakeholders from Japan and other countries to discuss on the above topics, to provide science-based evidence, to address the challenges in the integrated lake basin managements as well as to urge all relevant stakeholders to work together, and to translate the research finding into a simple message that can be communicated in the communities, so that the effective measure can be done effectively to mitigate pollution and protect ecosystem and thus protect human health, animal, and environment.



Figure 20. The 6th International Symposium on Conservation and Management of Tropical Lakes.

5.3.1.7. Project Completion

Five project purposes have been set and achieved in the project such as monitoring points, monitoring variables, publication, scenario, and analytical tool. The project published 117 international journals which is almost double compared with original plan. However, the analytical tool has been completely developed but it has not been used by policy level yet. Furthermore, we have published two technical books and two policy guidelines.

We have created PAER platform (Platform Aquatic Ecosystem Research) which will play important role on research of Tole Sap Lake after the project ends. The platform will become the information hub which can be linked with the international researchers and collaboration partners for future research. In addition, we have two advance laboratories which one of them will be upgraded into ISO 17025.

5.3.2. SATREPS Project: « Establishment of Risk Management Platform for Air Pollution in Cambodia »

5.3.2.1. Introduction

Cambodia is a developing county which has the economic growth 7% of GDP for the last few years. Meantime, the transportation, factory, resident, and tourist are significantly increased in South-East Asia. Social infrastructure is often inadequate in these countries, environmental pollution being severe and hygiene being poor. Environmental stress, such as an increased number of traffic is evident, exceeding the allowable limit of the infrastructure, and deteriorating environmental pollution and causing sanitation problems.

Various social infrastructures as an excellent water supply system has been constructed in Cambodia. Because of the rapid growth of the urban areas as the capital city of Phnom Penh, have

increase of environmental issues as noise, waste and air pollution. Air pollution is one of the global and local issue because all the urban, industrial and agricultural area have air pollutions from various sources as traffic, construction, fuel combustion and agriculture residue burning and forest fire. Because the pollutant spreads crossing borders, it is also a global issue. The airborne infection issues as COVID-19 also suggesting the importance of indoor air quality management. However, this actual situation is not being investigated at this moment.

The proposal has been accepted on May 20, 2021 with the budget of 4.5 MUSD. The implementation period is expected to be 1 July 2022 – 31 June 2027.

5.3.2.2. Goal and Objective of the project

Overall goal: To contribute to the creation and establishment of safe and comfortable living environment for residents and tourists from the viewpoint of air pollution, which leads to sustainable economic growth of Cambodia. The objectives of the project aim:

- To establish the structure/system to evaluate the present status and characteristics of air pollution in Cambodia
- To build the online network of monitoring sites with data management system
- To establish the structure/system to evaluate environmental risks
- To develop human resource, which is necessary for operation of the risk management platform for air pollution

5.3.2.3. Research Participants

Japanese counterparts:

- Kanazawa University
- Nagasaki University
- Osaka Ohtani University
- Partical Plus Co., Ltd.

Cambodian counterparts:

- Institute of Technology of Cambodia
- University of Health and Science
- National University of Management
- Ministry of Environment
- Ministry of Education Youth and sport

5.3.2.4. Working groups

The 4 working groups are:

- Group 1: Overall management
- Group 2: Data sampling and monitoring setting up
- Group 3: Environmental risk assessment
- Group 4: social implementation

5.3.2.5. Activities work plan for five years

1. The structure/system to evaluate the present status and characteristics of air pollution in Cambodia

- Understand status and characteristics of air pollution in Cambodia.
- Understand transboundary influences of air pollution.
- List emission sources up and prepare emission inventory.
- Visualize emission sources.
- Develop a low-cost and less-maintenance PM monitoring technology that can provide advanced information

2. Online network of monitoring sites with data management system

- Fundamental information for building the online network is surveyed and summarized.
- Preliminary test of the online monitoring network is conducted.
- The online monitoring network is built and started.
- Manage the monitoring and related environmental data.

3. The structure/system to evaluate environmental risks

- Extract macroscopic potential health risk factors
- Extract microscopic potential health risk factors.
- Examine scenarios for the mitigation of potential health risk.
- Prepare a risk data base for air pollution

4. Human resource, which is necessary for operation of the risk management platform for air pollution

- Determine the management policy of platform and roles of each participating organization.
- Propose action plans of the risk management platform of air pollution.
- Propose measures to mitigate potential health risks caused by air pollutants.
- Conduct advanced researches under the international collaboration and expand the human network between researchers over the world.

5.3.3. Higher Education Improvement Projects

With the 7.92M USD grant from the Government of Cambodia for Higher Education Improvement Projects-HEIP (World Bank Loan Project), there are 23 research projects collaborated with industries and 2 research projects support policy. The research proposals are divided into two rounds:

- Round one consists of 11 research projects collaborated with industry (window 1) and 1 research project supports policy (window 2). There are 3 research projects collaborated with industry and led by female.
- Round two consists of 12 research projects collaborated with industry and 1 research project supports policy (window 2). Among the 13 research projects of round 2, there are 5 research projects led by female.

There are 12 research proposals approved (from December 2019 up to April 2020) for implementation in round 1 while 13 research projects in round 2 were approved in March 2021 (Table below). The budget for round one is about 4.72M USD due to the large projects and large equipment needed for laboratory capacity building purpose; however, the budget for round two is about 3.02M USD since the duration is short time of research activities.

Table 12. Proposals selected for World Bank loan of Cambodian government grant (HEIP).

No	PI	Sex	Unit	Win.	Research title	Remark
1	Dr. Kim Bunthern	M	MIT	1	Applied Control and Automation for Agriculture in Cambodia (ACAAC)	Implement
2	Dr. Pec Rothna	M	MIT	1	Toward Production Innovation via FabLab-ITC	Implement
3	Dr. Thoun Kosorl	M	MIT	1	Initiative towards electrical and electronic products testing and certification by EMC Lab	Implement
4	Dr. Suong Malyna	F	FTN	1	Biotechnology for Integrated Pest Management towards pesticide reduction in Cambodia	Implement
5	Dr. Tan Reasmey	F	FTN	1	Development of Fermentation Process of Cambodian Soy Sauce	Implement
6	Dr. Hin Raveth	M	MSS	1	Chemical strengthening of large-scale glass pieces for construction and other engineering applications	Implement
7	Dr. Vai Vannak	M	ETM	1	Development of a virtual Cambodian power system – Towards an Innovation Micro-Grid in Cambodia	Implement
8	Dr. In Sokneang	F	FTN	1	Valorization of high-value dry food products (agricultural products including herbal and spices) and other by-products in Cambodia	Implement
9	Dr. Mith Hasika	M	FTN	1	Improvement and development of rice-based products toward the growth of SMEs/Industries in Cambodia	Implement
10	Mr. Valy Dona	M	MIT	2	Ancient Manuscript Digitization and Indexation	Implement
11	Dr. Bun Kimngun	M	MSS	1	Development and optimization of ceramic tile using Cambodian clays incorporating with industrial wastes	Implement
12	Dr. Yos Phanny	M	MSS	1	Cambodian Natural Rubber Composites with Different Type of Minerals Fillers for Floor Mat Shock Absorbing Applications	Implement
13	Dr. Or Chanmoly	M	ETM	1	Applied geophysics for investigating hydrocarbon potential and study of depositional environment at Block VIII, Kampong-som Basin, onshore of Cambodia	Implement
14	Dr. Eng Chandoeun	M	ETM	1	Quality assurance of concrete pile integrity and soil properties investigation in Phnom Penh city using	Implement

					seismic and electrical resistivity tomography approaches	
15	Dr. Bun Saret	M	WAE	1	Development of Eco-friendly and Low-cost Wastewater Treatment System as an On-site Product	Implement
16	Dr. Kret Kakda	M	ETM	1	Investigation the production potential of the Cambodian offshore reservoir considering effects of phase behavior and rock-fluid interaction	Implement
17	Dr. Houg Peany	F	FTN	1	Valorization of agricultural by-products in Cambodia through extractions and formulations of essential oils and bioactive compounds	Implement
18	Ms. Hang Leakhena	F	WAE	1	Development of a Biofilter System Model to Control of Air Pollution toward Industrial Application	Implement
19	Dr. Song Layheang	M	WAE	1	Development of Climate Data Information System for Cambodia	Implement
20	Dr. Peng Chanthol	F	FTN	1	Improvement and development of fish and meat products for better preservation using innovative technology	Implement
21	Dr. Oeung Chantha	M	WAE	2	Strengthening flood and drought risk management and early warning system in lower Mekong basin of Cambodia	Implement
22	Dr. Ket Pinnara	F	WAE	1	Integrated approach of precise irrigation and sustainable Soil management to improve crop water productivity in Cambodia through ITC soil laboratory development: the focus on rice farming	Implement
23	Mr. Kong Sela	M	FTN	1	Development of cooking oil processes for commercialization	Implement
24	Dr. Doung Piseth	M	MSS	1	Development of a Biofilter System Model to Control of Air Pollution toward Industrial Application	Implement
25	Dr. Heu Rina	F	WAE	1	Development of Climate Data Information System for Cambodia	Implement

Most of the projects will be completed at the end of 2023. With HEIP project, there are 9 laboratories for research purpose will be created, and 10 prototypes will be developed from the research projects. Two laboratories will be upgraded into ISO 17025 (Physic-chemical and Chemical contaminant laboratory and Environmental Microbiology and Chemistry Laboratory). The expected papers to published at the end of the project is 39 international peer review journals. More important outcome of the project is the staff upgrading from bachelor to Master (7), from Master to PhD degree (11).

5.3.4. Laboratory-Based Education (LBE) Project

5.3.4.1. Project Title

Project on Strengthening Engineering Education and Research for Industrial Development in Cambodia.

5.3.4.2. Objectives

The project for Strengthening Engineering Education and Research for Industrial Development in Cambodia (LBE Project) started in April 2019 to strengthen educational and research capabilities of ITC through introducing Laboratory-Based Education (LBE) to ITC, promoting collaborative partnership between ITC and other three universities and enhancing university-industry linkage, and thereby to contribute to producing qualified engineers to promote the development of industries in Cambodia.

5.3.4.3. Outputs of Project

Output 1 : Capabilities of ITC to implement Laboratory Based Education (LBE) are developed.

Output 2 : Capabilities of ITC to strengthen capacities of other universities in LBE are developed.

Output 3 : University-Industry linkage is enhanced at ITC

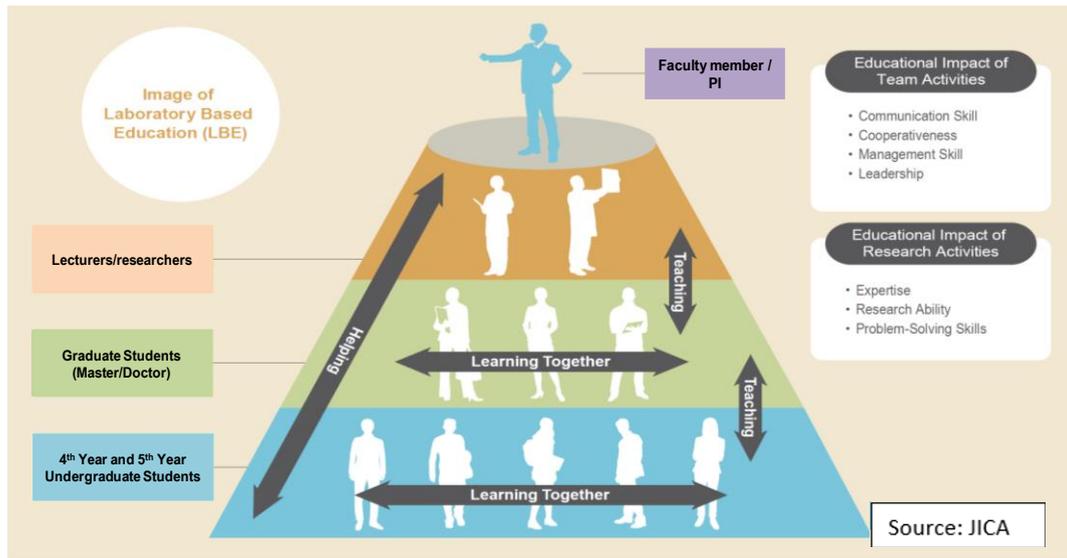
5.3.4.4. Laboratory-Based Education (LBE)

LBE is a holistic educational approach. In Japan, LBE is commonly implemented for undergraduate final year and post graduate students in fields of engineering and science. It focuses on transfer of knowledge and practical skills through research involvement and research team members with different levels work closely together under the supervision of the lab leader, a faculty member.

LBE also emphasizes partnership with industries.

Through LBE, students are able to improve not only technical skills and knowledge but also problem-solving skills and soft skills in communication, presentation, leadership, management and so on.

Thus, LBE is expected to nurture human resources with capacity to contribute to lead the development of engineering technology in academic and industrial sectors in Cambodia.



5.3.4.5. Progress of Project (2019.4 ~ 2022.3)

1) LBE

- 42 research proposals among 51 applications in total were accepted for LBE Grant within Batch 1-4 with the total amount around 750,000USD (See Annex 14).
- 68 students have acquired Bachelor degree, 17 students have acquired Master's degree and 1 student has acquired PhD under LBE research by October 2021
- 84 papers have been accepted to international and national journals and conference proceedings.

2) Partnership with Local Universities

- 2 graduates from bachelor programs NUBB completed Master's Program of ITC and became government staffs in NUBB in 2021.
- SRU involves in 1 LBE research team and NUBB involves in 2 LBE research teams in 2022.
- A lecturer who moved to SRU from ITC to improve engineering education in SRU is going to get a scholarship for PhD study in Japan under the project in 2022.

3) Industry Linkage

- Project and University-Industry Linkage (UIL) office constantly provide Intellectual Property (IP) Seminars every year.
- University Industry Cooperation Center (UICC) of NUBB was established.
- Strategic plan, policy and system of UIL have been discussing.
- ITC-Industry Open House 2022 was conducted and more than 150 persons from about 60 companies/organizations participated.
- Project coordinates discussions and consultations with industries.
- Faculty of Geo-resource and Geotechnical Engineering (GGG) and Project conducted "SEM Open Day for Japanese Companies" to introduce a new laboratory for analysis.

5.3.4.6. Other impact by Project

1) Upgrading Facilities and Activities (Around 630,000USD)

Many collaborative activities were postponed and delayed under COVID-19, as mobility of researchers has been banned. Therefore, the Project bore expenses to accelerate LBE activities as well as collaborative activities with Japanese universities and industries under COVID-19 such as:

- Upgrading network in ITC campus (infrastructure)
- Upgrading electricity facility on the 6th floor of Building I
- Improving research environment for students and researchers (LBE rooms)
- Research equipment for Water Environment
- Improving IT environment by upgrading servers in ITC, SRU, and NUBB
- Establishing Nanostructure and Chemical Analysis Laboratory
- Other equipment

2) Subscription of Insurance for Faculty Members and students during Academic Activities

Recognition of insurance for academic activities is very low in Cambodia while most of engineering schools and faculties require for students to buy an insurance in other countries. Project has negotiated with insurance companies in Cambodia to make customized insurance for ITC students and faculty members. Tokyo Marine Holdings (FORTE as representative in Cambodia) has agreed on providing special insurance for academic activities and most of LBE research team members have been insured.

3) International conference

Faculty of Geo-resource and Geotechnical Engineering (GGG) organized the 1st International Conference on Earth Resources and Geo-Environmental Technology 2022 (EraGET2022) with the Project.

More than 240 researchers, students, and persons from industries participated including 50 from other 8 countries such as Japan, Indonesia, Thailand, Myanmar, India, United Arab Emirates and Australia.

5.3.4.7. Future Activities between 2022 to 2024

Project will develop followings:

- LBE Guideline for ITC
- LBE Certificates Criteria for Graduates
- Application Guideline for Patent at ITC

Project will focus on following activities:

- Dissemination of LBE within ITC, and to partner universities, industries and society
- Support on development of policies on research and extension services of ITC
- Support on development of rules and a system of UIL
- Development of connections to Japanese companies and Japanese universities
- Further development of ITC as an internationally recognized engineering university
- Discussion on implementation of LBE at partner universities

5.3.5. AFD/EU Projects

The AFD research projects are to support Master Program of Urban Water and Sanitation Engineering and are implemented with the financial support of the European Union and administered by AFD (Table below).

There were in total 9 projects (8 from WAE and 1 from FTN) implemented from January 2020 to December 2021. Furthermore, 3 new projects (the last three projects in Table below) have just been awarded and are implementing from June 2022 to May 2023.

Table 13. AFD Research Project for 2021-2023.

No.	PI	Sex	Dept.	Unit	Research title
1	Dr. TY Boreborey	F	GCA	WAE	Arsenic Removal from Groundwater using ECAR Technology: Case Study at Koh Thom, Kandal, Cambodia
2	Dr. DOUNG Ratha	M	GRU	WAE	Impact of Climate and Land use Change on Hydrology Pattern in the Coastal Zone of Cambodia
3	Dr. Khoeurn Kimleang	F	GCA	WAE	Application of Low-cost Adsorbents in Wastewater Treatment
4	Mr. LUN Sambo	M	GRU	WAE	Formulizing the Design Criteria for the Piped-water System in Cambodia
5	Dr. CHAN Rathborey	M	GRU	WAE	Spatio-temporal Assessment of Surface Water Quality Affected by Urban and Aquaculture Wastewater: Case Study in Tamouk Lake Area
6	Dr. PENG Chanthol	F	GCA	WAE	Antibiotic-Resistant Bacteria in Water Environment
7	Dr. HEU Rina	F	GRU	WAE	Assessment of Silicon (Si) in Water and Surface Sediment in Tonle Sap

					Lake: an Implication for Highly Productive Ecosystem
8	Mr. KIM Lengthong	M	GRU	WAE	Assessment Flood Risk on Urban Areas due to Flow Alteration of Lower Mekong River Urban Development
9	Dr. TAN Reasmey	F	GCA	FTN	Micropollutant Removal by Powdered Activated Carbon Injected at the Flocculation-coagulation-settling Step in Drinking Water Treatment Plants
10	Dr. HEU Rina	F	GRU	WAE	Investigating the Effects of Algae Bloom in Tonle Sap Lake Source Water on Water Supply Treatment Efficiency
11	Dr. BUN Saret	M	GRU	WAE	Occurrence and Distribution Analysis of Microplastics in Different Environment Mediums of Cambodia
12	Dr. TAN Reasmey	F	GCA	FTN	Removal of Diclofenac and Caffeine from Different Water Sources using Activated Carbons Made from Different Wastes

5.3.6. Capacity Building Project Linked to Innovation (FoodSTEM)

5.3.6.1. Introduction

FoodSTEM (Training a new generation of entrepreneurs in sustainable agriculture and food engineering) is an EU co-funded project by Erasmus + Capacity Building in the field of Higher Education program designed to build partnership between Cambodian and European universities, and to create a favorable condition in the 4 Cambodian partners universities for the emergence of student entrepreneurship and micro or small enterprises. This project is coordinated by the Institute of Technology of Cambodia, a higher education institution (HEI) in Cambodia that trains students in science, technology and engineering.

5.3.6.2. Goals

With the support of 3 European HEIs, FoodSTEM project aims at building the capacity of 4 major public universities in Cambodia in order to create a new generation of food chain entrepreneurs, with a strong emphasis on safety, quality and sustainability.

5.3.6.3. Partners

- 4 Cambodian Universities: Institute of Technology of Cambodia (ITC), Royal University of Agriculture (RUA), Royal University of Law and Economics (RULE), University of Battambang (UBB).
- 3 European partners: Institut Agro/Supagro Montpellier, Toulouse INP (Purpan and ENSAT), and Université de Liège.

5.3.6.4. Project's Activities

With the aim of “FoodSTEM” project in building the higher education capacity in order to train a **new generation of entrepreneurs in sustainable agriculture and food engineering**, the project was organized into 8 work packages (WP):

- **WP1:** Project preparation
- **WP2:** Improve academic programs through e-learning courses development in 4 Cambodian partner university (ITC, RUA, UBB, and RULE)
- **WP3:** Create a new pathway of Master program “Project Management and Entrepreneurship” at RULE university
- **WP4:** Upgrade management skills and technical facilities for pre-incubation of students’ projects “Agri-foods Innovation Challenges” in ITC, RUA, and UBB
- **WP5:** Provide capacity building on food safety management by creating Food Safety Labs in ITC, RUA, and UBB
- **WP6:** Project management
- **WP7:** Project quality monitoring
- **WP8:** Dissemination and exploitation

5.3.6.5. Expected and Achieved Outputs

FoodSTEM project is expected to have four main outcomes as the followings:

- **8 E-learning courses** dedicated to the Agri-Food chain are developed at bachelor/engineering/master level and included in the curriculum of the Cambodian partner Universities. These courses are focused on entrepreneurship, product development, food market, factory design, sustainable processing, supply chain management, etc.
- With the e-learning courses developed during the project, a new pathway of the Master program “**Project Management and Entrepreneurship in Agri-Food**” will be implemented at RULE by 2022.
- The project will organize **3 innovation challenges** in the agri-food sector for students and young entrepreneurs. The winners of the challenges will earn some prizes and be pre-incubated in one of the partner universities in Cambodia to develop their idea.
- **A capacity building program:** during the project the Agri-food and food safety labs, and 4 e-learning classrooms will be set up in Cambodian partner universities. Various training session for e-learning courses development and labs management will be organized for Cambodian lecturers, researchers, technicians, and students.

To date, under the framework of the F-STEM project, some of the activities were achieved as the following:

- i) Preparation (set up the project and committees), this working package activity has already been completed. The project management unit (PMU) is recruited, and well structured. A kick-off meeting was organized with the principal stakeholders of the field of agriculture and food sectors (20-23/01/2021).

- ii) Improvement of academic programs through e-learning courses development, which response to the current health sanitation crisis due to Covid-19.
- E-learning equipment and e-learning classrooms were set up at 4 Cambodian University partners: the Institute of Technology of Cambodia (ITC), the Royal University of Agriculture (RUA), the Royal University of Law and Economics (RULE), and the National University of Battambang (NUBB).
 - 4 e-learning courses (i.e. Entrepreneurship, Food Market, Food Product Development, and Agri-Food supply chain) have already validated the content. The development of the e-learning of these courses are in progress. These 4 courses expected to be ready and experiment in a new pathway of Master Program at RULE by October 2022. Another, 4 course are at the stage of syllabus development.
 - 18 of Cambodian lecturers from Cambodian university partners (ITC, RUA, RULE, and NUBB) have been building their capacity in e-learning course development for higher education (i.e engineer degree, and Master degree).
- iii) Upgrade management skills and technical facilities for pre-incubation of student projects in ITC, RUA, and NUBB.
- 2 Innovation Challenge has been carried out at ITC, and RUA, the 3rd Innovation challenge will be carried out at NUBB, between June-August 2022.
 - 3 Agri-Food Processing laboratory has been set up at ITC, RUA, and NUBB to support the students in prototyping their food product, and the practical work in the Food product development course.
- iv) Provide capacity building on food safety management in ITC, RUA, and NUBB (Food Safety laboratory): 3 Food safety laboratories was set up at the 3 Cambodian universities (ITC, RUA, and NUBB).
- v. Project management: Grant management guide has already been written (Attachment 6) and shared with all partners through the F-STEM Drive and Website. 23 Operational committee and 4 steering committee meetings between PMU and all involved partners.
- vi. Dissemination and exploitation: communication plan of the project, logo, stickers, leaflet, press articles of the project, Facebook page, and website are developed were conducted.

5.3.6.6. Impact to Society

- The project improves the quality of higher education and enhance its relevance for the labor market and society.
- The project is strongly connected to the needs to raise agriculture and food transformation to the best international standards by providing qualified and innovative work force to the market.
- The project includes the development of e-learning classes and the Quality and Safety Lab to control products all along a food chain.

5.4. Research Promotion and Collaboration

Creation of Research Unit

Based on the approval from the council administration 2015-2016 ITC has clustered the researchers in different units according to field of expertise and research. The researchers in each unit have been discussed and below is the way forward for each research unit.

5.4.1. Energy Technology and Management (ETM Unit)

Cambodia Context

Cambodia has enjoyed an average rate of economy growth of about 7% per annum during the last decade. To insure sustainable and inclusive high growth, the country has set to promote industrial development for economic diversification, strengthening competitiveness and promoting productivity. Consequently, the country has experienced steep increases in energy demand and consumption. For sustainable development of the country, Energy Security is extremely important, requiring the development of energy sector infrastructure and human resources to match the pace of socio-economic progress. The Rectangular Strategy-Phase IV pointed out that one of the remaining challenges of diversification and value creation in industry and service sector is high energy price (electricity rates) compared to neighboring countries. Until recently, Renewable Energy cost has drastically decreased within short period of time, especially for solar photovoltaic and onshore wind energy. Expanding the share of renewables in the country energy mix, along with diversification and utilization of locally available resources, implementing energy efficiency and energy conservation measures; would be key for the advancement of energy sector in Cambodia.

The Research Unit

The research unit, dedicated to energy technology and management of energy, brings an expertise with international recognition in specific areas in connexion with Cambodian needs, contributing to the exploration of conventional energy resources and the development of new and renewable energy and energy efficiency and conservation; through researches, collaborations with international partners, private sectors and relevant government agencies and development of competent human resources. The prioritised areas of research and collaboration including but not limited to the conversion of biomass and agricultural waste and by-products into energy, solar PV and thermal energy, Wind energy, innovative smart grid, micro-grid for remote area, energy consumption measurement and analysis, energy management system, simulation of large energy system, and the exploration of conventional energy resources.

Vision

To be leading contributor in supporting national energy security through research and innovation, knowledge creation and technology transfer with focus on energy sources diversification, efficient use of energy and environmental friendliness.

Mission

- Producing competent human resources in energy related fields.
- Conducting researches in new and renewable energy, energy conversion and recovery, energy conservation, saving and management, and exploration of conventional energy resources to address local and regional issues.
- Closely collaborating with related Ministries, national and international partners and private sectors.
- Disseminate research findings and transfer technologies to the society

Research Topics

The multidisciplinary team addresses scientific issues in the following sectors:

- New and Renewable Energy: Biomass, Solar PV, Solar PV/T, and Wind Turbine with a focus on design and modelling of processes, fuel and emissions measurements, lab and pilot scale equipment;
- Energy Efficiency and Conservation: Heat recovery, Waste to energy, thermal systems optimization, energy consumption measurement and modelling;
- Smart grid: connexion from renewable sources and optimization of grid electricity distribution and micro-grid for remote areas.
- Energy Management: energy management system, modelling and optimization of large energy systems.
- Exploration of conventional energy resources: depositional environment and reservoir characterization, mapping of hydrothermal alteration, geological mapping and investigation of hydrocarbon potential

Projects and Research Topics

The list of projects and research topics that are implementing in ETM unit shows in the table below. For more detail information refers to a table in Annex 15.

Table 14. Research topics in ETM unit for the academic year 2021-2022.

No.	Name of PI (FAMILY First name)	Sexe	Project/Research Topic	Funding source	Period	Collaboration scale * N = National R = Regional I = International	Project Type* 1= Basic 2 = Applied & Development 3 = Start-up 4 = Tech- transfer
1	Dr. Or Chanmoly	M	Applied geophysics for investigating hydrocarbon potential and study of depositional environment at Block VIII, Kampong-Som Basin, onshore of Cambodia	HEIP	2021- 2023	I	1
2	Dr. Vai Vannak	M	Design and Installation of Off-Grid PV System for Clean Water and Electricity Supply in Ta Mat Primary School, Cambodia	JASTIP	2021- 2022	I	2

3	Dr. Vai Vannak	M	Development of a Virtual Cambodian Power System-Towards an Innovation Micro-Grid in Cambodia	HEIP	2020-2024	I	2
4	Dr. Kret Kakda	M	Integration of Landsat-8, ASTER, and Sentinel-2 for mapping of mineral prospective, hydrothermal alteration and geological structures for porphyry copper and epithermal gold deposits in the north Cambodia.	JICA-LBE	2021-2023	I	2
5	Dr. Vongchanh Kinnaleth	F	Investigation of mixing ratio of biomass and wasted cooking oil used as binder for producing solid fuel for community use in Cambodia	JICA-LBE	2020-2022	N	2
6	Dr. Yos Phanny	M	Investigation on Source and Reservoir of Geothermal, Te Tek Pos Hot spring, Kompong speu Province	JICA-LBE	2020-2022	I	2
7	Dr. Kret Kakda	M	Investigation the production potential of the Cambodian offshore reservoir considering effects of phase behavior and rock-fluid interaction	HEIP	2021-2023	I	2
8	Dr. Vai Vannak	M	Planning and Operation of Active Distribution Systems	JICA-LBE	2021-2023	N	2
9	Dr. Chan Sarin	M	Pushing Energy Efficiency in Cambodia	CCCA3	2020-2022	I	2
10	Dr. Eng Chandoeun	M	Quality Assurance of Concrete Pile Integrity Soil Properties Investigation in Phnom Penh City using Seismic and Electrical Resistivity Tomography Approaches	HEIP	2021-2023	I	2
11	Dr. Vongchanh Kinnaleth	F	Study on impact of heat stress to human productivity and economic in Cambodia	CCCA3	2020-2023	I	1
12	Dr. Vai Vannak	M	Study on the Impact of Phase Reconfiguration in Unbalanced Distribution System	ZE	2021-2022	I	1
13	Dr. ENG Chandoeun		Geological and geophysical studies of hydrocarbon potential in Tonle Sap Basin, Onshore Cambodia	LBE	2021-2023	I	1
14	Dr. ENG Chandoeun		Depositional Environment and Reservoir Characteristic of Outcrop in oil and gas Prospect, Northern Tonle Sap Lake, Onshore, Cambodia	LBE	2020-2022	I	1

Researchers

Dr. CHAN Sarin (Head of ETM Research Unit), Ph.D. in Engineering, Institute of Technology Bandung, Indonesia and Keio University, Japan
Renewable energy, waste heat recovery and heat-activated cooling system

Dr. OR Chanmoly (Deputy-Director of RIC), Ph.D. in Petroleum Production Engineering, Kyushu University, Japan
Enhanced oil recovery; reservoir engineering; CO₂ sequestration; biomass to energy

Dr. AM Sokchea, Ph.D in Energy Engineering, France
Energy Power System

Dr. VONGCHANH Kinnaleth, Ph.D. Institute of Technology Bandung (ITB) and Hokkaido University (HU)
Energy Efficiency, Renewable energy, Biomass energy, Drying, Heat Stress

Dr. BUN Long, Ph.D. in Electrical Engineering, INP Grenoble, France
Power system, renewable energy system, fault diagnosis

Dr. CHRIN Phok, Ph.D. in Electrical Engineering, Université Paul Sabatier, Toulouse, France
Renewable energy, frugal engineering, asynchronous generator

Dr. VAI Vannak, Ph.D. in Electrical Engineering, Université Grenoble Alpes, France
Power distribution system planning, Rural electrification, Optimization

Dr. ENG Chandoeun, Ph.D. in Geophysics, Kyushu University, Japan
Biomass Energy, Oil and Gas Energy and Mineralogy

Dr. KRET Kakda, Ph.D in Geophysics, Kyushu University, Japan
Geophysical exploration: to explore physical properties of the subsurface of the Earth for exploring fossil fuel and ore mineral, which uses physical methods including seismic, magnetic, electrical and resistivity methods.

Dr. CHEA Samneang, Ph.D, Kyushu University
Enhanced oil recovery (EOR), Carbon capture and storage (CCS), Sedimentology and stratigraphy, Geological mapping

Mr. ETH Udaya, Master degree, Chulalongkorn University, Thailand
Renewable energy, Power system analysis, Energy efficiency, Rural electrification, control system

Mr. KHON Kinsrornn, Ph.D student, Power system, University of Toulouse III
Power System, Microgrid, Optimization, Planning

Ms. HENG Muoy Yi, Ph.D student, Geophysics, ITC
Geophysical exploration

Ms. PECH Sopheap, Ph.D student, Geophysics, ITC
Petroleum geology

Mrs. SIO Sreymean, Ph.D student, Geophysics, ITC
Applied Geophysics, Mineral and Petroleum Exploration, Characteristic of Mineral Deposit and Petroleum System

Mrs Eng Samphors, Master degree, Institut Teknologi Sepuluh Nopember (ITS)
Distribution Management System, Renewable Energy Micro grid planning & Energy Storage, Distribution automation & Real time monitoring system

Mr. Heang Latin, Master degree, Institute of Technology of Cambodia
Biomass to energy, Mechanical design, Heat Stress

Mr. CHHLONH Chhith, Master degree, Institut Teknologi Sepuluh Nopember (ITS)
Fault detection, reconfiguration, restoration, load balancing on LV system, Motor drive, Renewable Energy

Academic and Research Partners

Universiti Teknologi Malaysia (UTM)
University of Liège
Université Claude Bernard Lyon 1
Kyoto University (KU)
Université Grenoble Alpes (UGA)
Kyushu University
National University of Singapore (NUS)
The Hong Kong Polytechnic University (PolyU),
Kyoto University (KU)

Non-academic partners

Ministry of Mines and Energy, Cambodia
Ministry of Education, Youth and Sports, Cambodia
Ministry of Industry, Science, Technology and Innovation, Cambodia
Cambodian Climate Change Alliance
APSARA Authority
The Energy Conservation Center Japan (ECCJ)
Asean Center of Energy (ACE)
JICA
G2Elab

Industrial Partners and NGOs

Electricité du Cambodge
GERES
ORBIT P. A Co.,Ltd
Health & Environment International Trust (HEIT)
Institut Francais pour la Performance du Batiment (IFPEB)
EnergyLab
GGGI
ATS
Sevea Consulting
EnerCam Co.,Ltd
Samnang Angkor Development Co Ltd
IMECS (CAMBODIA) CO.,LTD
SMEs involved in Solar Energy development
Angkor Resources Corp
Matlab Co., LTD

Publications of ETM researchers since 2010

From 2010 to 2022 (updated by May 2022), there are in total 75 research outputs from ETM unit classified into three categories: International publications, Local publications, and Conference and Proceedings as shown in the table below.

Table 15. Summary of number of research publications of ETM by year from 2010 to May 2022.

Publication classification/year	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	Total
International publications	3	10	6	1	4	10	11	1	4	0	0	3	1	54
Local publications	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Conference/Proceedings	11	2	1	1	4	0	0	0	0	0	0	0	0	19
Total	14	12	9	2	8	10	11	1	4	0	0	3	1	75

List of International publications

1. Hem, P., Heang, S., Eam, D., You, L., Torn, V., Eng, S., . . . Vai, V. (2022). Service Restoration in Distribution Systems with a Load Tap Changer. International Electrical Engineering Congress (iEECON), 2022, pp. 1-4, doi: 10.1109/iEECON53204.2022.9741590.1-4.
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2. Porchaing Choeng, Latin Heang, Kinnalesh Vongchanh, Sarin Chan. Experimental Investigation on Rice Husk and Bagasse Briquette Using Fish Oil as Binder. Techno-Science Research Journal 8 (2020)

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5.4.2. Food Technology and Nutrition (FTN Unit)

Cambodian Context

Although Cambodia is still mainly a rural country with 58% of the population being farmers, the processing of agricultural products is generally family-based or within informal industrial structures, with a low added value and a low level of technology, thus limiting their ability to compete in international markets. Only 10% of the industrial workers are in the food-beverage sector, a great majority (97%) of them working in micro-enterprises with no foreign investment. Besides the need of training technicians and engineers with a focus on agricultural products transformation and quality control, research centres with high level faculty staff are needed to do research on food processes, develop original and innovative products adapted to Cambodian tastes and habits (dry or fermented products), and assist the growing industrial sector in the quality and safety assessment of the food chain.

The Research Unit

The research unit Food Technology and Nutrition is established to enhance the development of food and beverage industries in Cambodia through cost-effective collaborative research and innovation programs between a diverse range of economic partners and the researchers of the Institute of Technology of Cambodia. The Research Unit promotes technical platforms and research projects to support the sectors of food and feed processing, food storage and preservation, and innovative products from agriculture and forestry. Other aspects as product design, cost-effectiveness, waste and by-products minimization, energy consumption reduction or valorisation of Cambodian biodiversity are also studied in the Research Unit. The main goal of this unit is to become a reliable center for research, training and consultancy services in food processing improvement, food fermentation, food product development and innovation, value addition of agricultural products, food nutrition, food safety, food quality analyses and food preservation in order to sustain the development of Cambodia.

Vision

To be an excellent unit for research, innovation, training and consultancy services in the field of food science and technology for sustainable development of Cambodia.

Mission

- To increase the visibility of FTN research unit
- To strengthen the researchers' capacity in food related fields to be nationally and regionally recognized
- To create standardized laboratories for research and hall technology for pilot scale
- To boost the research activities through local and international collaborations (Universities, Government, SMEs, NGOs)
- To promote technology transfer and to provide training and consultancy services to food industries and relevant stakeholders

Research Theme

- Food technology development in the Cambodian context (Solid-state and submerged fermentation, drying)
- Food product development and innovation
- Food quality and safety
- Nutritional, aromatic and antimicrobial properties of Cambodian biodiversity
- Sustainability issues of Cambodian food technology: minimization of waste and by-products, chemicals-free preservation, low energy consumption
- Volatile compounds analysis in wines and essential oils
- Contaminant analysis: pesticides, heavy metals, mycotoxins

Projects and Research Topics

The list of projects and research topics that are implementing in FTN unit shows as shown in the table below. For more detail information refers to a table in Annex 16.

Table 16. Research topics in FTN unit for the academic year 2021-2022.

No.	Name of PI (FAMILY First name)	Sexe	Project/Research Topic	Funding source	Period	Collaboration scale * N = National R = Regional I = International	Project Type* 1= Basic 2 = Applied & Development 3 = Start-up 4 = Tech-transfer
1	Dr. SUONG Malyna	F	Biotechnology for Integrated Pest Management towards pesticide reduction in Cambodia	HEIP	2019-2023	I	2
2	Dr. IN Sokneang	F	Valorization of high-value dry food products (agricultural products including herbal and spices) and other by-products in Cambodia	HEIP	2019-2023	I	2
3	Dr. MITH Hasika	M	Improvement and development of rice-based products toward	HEIP	2019-2023	I	2

			the growth of SMEs/Industries in Cambodia				
4	Dr. TAN Reasmey	F	Development of Cambodian Soy Sauce by Fermentation Method	HEIP	2019-2023	I	2
5	M. KONG Sela	M	Development of Cooking Oil Processes for Commercialization	HEIP	2021-2023	I	2
6	Dr. PENG Chanthol	F	Improvement and development of fish and meat products for better preservation using innovative technology	HEIP	2021-2023	I	2
7	Dr. HOUNG Peany	F	Valorization of agricultural by-products in Cambodia through extractions and formulations of essential oils and bioactive compounds	HEIP	2021-2023	I	2
8	Dr. SUONG Malyna	F	Sustainable Rice Production within an Agroecology Framework (HEALTHYRICE)	IRD	2019-2022	I	2
9	Dr. PO Kimtho	M	FOODI (MSc course in Food Processing and Innovation)	Erasmus + KA2	2019-2022	I	2
10	Dr. IN Sokneang	F	Training a new generation of entrepreneurs in sustainable agriculture and food engineering (FoodSTEM)	Erasmus +	2019-2022	I	2
11	Dr. HOUNG Peany	F	Agroecology and Safe Food System Transitions (ASSET)	EU/AFD and GRET	2020-2025	I	2
12	Dr. PENG Chanthol	F	Reducing Foodborne Pathogen Contamination of Vegetables in Cambodia: Innovative Research, Targeted Interventions, and Impactful, Cambodian-Led Engagement	USAID	2020-2024	I	2
13	Dr. TAN Reasmey	F	Development of Cambodian Fermented Cucumbers by using Freeze-Dried Lactic Acid Bacteria with their Potential Use as Aromatic and Bacteriocin-producing Starters	LBE-JICA	2021-2023	I	2
14	Dr. YOEUN Sereyvath	M	ASEAN Network for Green Entrepreneurship and Leadership/ ANGEL	Erasmus +	2021-2024	I	2
15	Dr. TAN Reasmey	F	Removal of diclofenac and caffeine from different water sources using activated carbons made from different wastes	AFD	2022-2023	I	2
16	Dr. SROY Sengly	F	Assessment on nutritional profiles, storage stability and sensory evaluation of dried fish powder made by low-value small fish species	LBE-JICA	2022-2023	N	2
17	Ms. CHIN Lyda	F	Impact of initial composition and processing techniques on aromatic quality of mango	BGF & MoEYS	2021-2024	I	2

Researchers

Dr. PHAT Chanvorleak (Head of FTN Research Unit), Ph.D in Food Chemistry, Chung-Ang University, Anseong, South Korea

Food chemistry, Food Contaminant Analysis, Agrochemical Analysis, Mycotoxin Analysis

Dr. TAN Reasmey (Deputy Director of RIC), Ph.D in Bioengineering, Tokyo Institute of Technology, Japan

Food Biotechnology (Vegetable and cereal fermentation), Food Product Development and Innovation, Food and Water Microbiology, Anaerobic Digestion

Dr. SUONG Malyna (Deputy Director of RIC), Ph.D in Bioengineering, University de Montpellier II, France

Plant Biodiversity, Microbiology, Genetic Engineering

Dr. IN Sokneang (Dean of Faculty of Chemical and Food Engineering), Ph.D in Science and Processes of Food and Bio-products, AgroParisTech, Paris, France

Food Safety and Risk Assessment, Nutrition, Food Processing

Dr. MITH Hasika, Ph.D in Food Science, Université de Liège, Belgium.

Plant's Essential Oils/Extracts, Antimicrobials, Antioxidants, Food Microbiology, Food Preservation and Processing, Agro-Food Industry Management

Dr. YOEUN Sereyvath, Ph.D in Science, Chonnam National University, South Korea

Biotechnology, Organic Compounds Analysis (Pesticides and others)

Dr. HOR Sivmey, Ph.D in Biochemical and Physicochemical of Food, SupAgro Montpellier, France

Post-harvest Quality, Transformation of Tropical Fruits

Dr. HOUNG Peany (Deputy of UIL), Ph.D in Chemical Science and Engineering, Tokyo Institute of Technology, Japan

Chemical Engineering

Dr. SROY Sengly, Ph.D in Nutrition and Food Science, Montpellier SupAgro University, France

Food Nutrition, Food Processing and Food Development

Dr. MORM Elen, Ph.D in Chemical Engineering (Transfer, Interfaces and Processing), Free University of Brussels, Belgium

Drying of Agricultural Crops and Herbal, Bioethanol

Mrs. HENG Soukim, Master in Food Science, Kasetsart University, Thailand

Food processing, nutrition in food, food safety and microbiology in food

Mrs. MOM Vattana, Master in Food Science, Kasetsart University, Thailand

Food processing, Food product development

Mr. KONG Sela, Master in Chemical Engineering, Gadjah Mada University, Indonesia

Chemical Engineering

Ms. SIENG Sreyvich, Master in Chemical Engineering, Gadjah Mada University, Indonesia
Chemical Engineering

Ms. NAT Yukleav, Master in Chemical Engineering, Sirindhorn International Institute of Technology, Thammasat University, Thailand
Chemical Engineering

Mr. HENG Oudam, Master of Biotechnology, Royal Melbourne Institute of Technology (RMIT) University, Australia
Genetics and proteomic technology, Next generation sequencing

Ms. LORN Da, Ph.D candidate in Agrofood Biotechnology, AgroSup-Dijon/UBFC, France
Aroma Extraction, Lactic Acid Fermentation, Food Enzymes

Ms. YIN Molika, Ph.D candidate in Agro-food Industry, Institute of Technology of Cambodia, Cambodia
Food Product Development and Sensory Evaluation

Mr. NGET Sovannmony, Ph.D candidate in Meat Preservation, Ecole Nationale Vétérinaire Oniris, France
Meat Preservation, Chemical Contamination in Food, Nutrient Analysis in Food

Ms. CHIN Lyda, Master in Agro-Industrial Product Development, Kasetsart University, Thailand
Food processing, Food product development

Mrs. THANH Channmuny, Master in Health and Food Science, University of Montpellier, France
Food science, Food microorganism

Ms. PHAL Sivchheng, Master in Environment Design, Kanazawa University, Japan
Environmental Design

Mr. LY Luka, Master in Agro-Industrial, Institute of technology of Cambodia, Cambodia
Food processing, Quality control

Mr. SAY Manith, Master of Science in Food Technology, Khon Kaen University, Thailand
Snacks production, Frying process

Ms. OEUM Kakada, Master of Science in Basic Science, Chungnam National University, South Korea
Cell Biology, Microbiology, Cancer Biology, Cell cycle, Immunology, and Entomology

Ms. MAO Socheata, Master in AgroFood Chain, UMR LEREPS/ENSFEA, France
Volatile compound analysis

Academic and Research Partners

Tokyo Institute of Technology, Japan
Yamagata University, Japan
Université de Liège, Belgium
Université de Bruxelles, Belgium
SupAgro-Montpellier, France

AgroSup-Dijon, France
Polytech Lille, France
Institut National Polytechnique de Toulouse (INP Toulouse), France
French Agricultural Research Centre for International Development (CIRAD), France
Institut de recherche pour le développement (IRD), France
Aix-Marseille Université, France
Université Claude Bernard Lyon 1, France
Kasetsart University, Thailand
Hanoi University of Science and Technology (HUST), Vietnam
Chung-Ang University, South Korea
Chonnam National University, South Korea

Non-academic partners

Ministry of Education, Youth and Sports, Cambodia
Ministry of Industry and Handicraft, Cambodia
Ministry of Commerce, Cambodia
General Secretariat of the National Science and Technology Council, Ministry of Planning
National Productivity Centre of Cambodia (NPCC), Cambodia
Ministry of Environment, Cambodia
Tonle Sap Authority, Cambodia
Department of Agro-industry, Ministry of Agriculture, Forestry and Fisheries, Cambodia
Ministry of Rural Development, Cambodia

Industrial Partners and NGOs

LyLy Company Co. Ltd
Cambodia Brewery Limited
Baca-Villa Productions Co Ltd
Cambodia Beverages Company
Mee Chiet
Eche Ngov Heng Food Production of Kampot Co., Ltd
Kang Sosedo Enterprise
Phnom Penh Safe Food
Healthy Food Enterprise
Dara Food Enterprise
DKSH
Indochina Rice Mill Limited
Food Enterprise
Confirel
Golden Silk
Rosmeric Paper
Chaktomuk Pest Services Co., Ltd (Orkin Cambodia)
Ringacam
Khmer Fresh Milk Co., Ltd
Bodia Spa

Selected publications of FTN researchers since 2010

From 2010 to May 2022, there are in total 130 research outputs from FTN unit classified into three categories: International publications, Local publications, and Conference and Proceedings as shown in the table below.

Table 17. Summary of number of research publications of FTN by year from 2010 to 2022.

Publication classification/year	2022 *	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	Total
International publications	3	4	4	6	6	1	6	6	2	5	3	1	1	44
Local publications	-	7	9	1	1	1	2	2	3	0	0	0	0	26
Conference/ Proceedings	18	9	14	7	9	0	0	0	0	0	0	0	0	38
Total	21	20	27	14	16	2	8	8	5	5	3	1	1	130

*data in 2022 is from January to May. (-) local publication for 2022 is not yet known at this time.

International publications

1. Yin, M., Weil, M., Avallone, S., Lebrun, M., Conejero, G., In, S., & Bohuon, P. (2022). Impact of cooking and drying operations on colour, curcuminoids and aroma of *Curcuma longa* L. *Journal of Food Processing and Preservation*, e16643. (IF : 2.190)
DOI: <https://doi.org/10.1111/jfpp.16643>
2. Phuong, H., Masse, A., Dumay, J., Vandanjon, L., Mith, H., Legrand, J., & Arhaliass, A. (2022). Enhanced liberation of soluble sugar, protein, and R-phycoerythrin under enzyme-assisted extraction on dried and fresh *Gracilaria gracilis* biomass. *Frontiers in Chemical Engineering*, 21. (IF:4.204)
DOI: <https://doi.org/10.3389/fceng.2022.718857>
3. Masson A.S., Vermeire M.L., Leng V., Simonin M., Tivet F., Thi H. N., Brunel C., Suong M., Kuok F., Moulin L., & Bellafiore S. (2022). Enrichment in biodiversity and maturation of the soil food web under conservation agriculture is associated with suppression of rice-parasitic nematodes. *Agriculture, Ecosystems & Environment*, 331,107913. (IF : 5.567)
DOI: [10.1016/j.agee.2022.107913](https://doi.org/10.1016/j.agee.2022.107913)
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DOI: <https://doi.org/10.48048/tis.2021.10>
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8. Anal, A. K., Perpetuini, G., Petchkongkaew, A., Tan, R., Avallone, S., Tofalo, R., ... & Waché, Y. (2020). Food safety risks in traditional fermented food from South-East Asia. *Food Control*, 109, 106922.

9. Hor, S., Léchaudel, M., Mith, H., & Bugaud, C. (2020). Fruit density: A reliable indicator of sensory quality for mango. *Scientia Horticulturae*, 272, 109548.
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Local publications

1. Y. Nat, P. Houg, S. Lay, 2021. Effect of Ultrasound-Assisted Extraction Condition on Extraction of Bioactive Compounds from Khmer White Turmeric (*Curcuma Zedoaria*). The Bulletin of Cambodian Chemical Society 12.
2. S. Yoeun, S. Ly, F. Kuok, 2021. Alcohol-Based Hand Rub Analysis by High Performance Liquid Chromatography. The Bulletin of Cambodian Chemical Society 12.
3. S. Hoeun, S. Lay, P. Houg, S. In, 2021. Impact of Blanching and Drying on Bioactive Compounds of Black Turmeric. The Bulletin of Cambodian Chemical Society 12.

4. S. Lay, P. Houg, S. In, 2021. Effects of Solvent and Time on Extraction of Bioactive Compounds from Cambodia Black Turmeric Using Ultrasound-Assisted Extraction. *Techno-Science Research Journal* 9.
5. M. Yin, S. Heng, S. Rem, L. Chin, 2021. Development of Spicy Sweet Chili Sauce. *Techno-Science Research Journal* 9.
6. M. Yin, W. Ratphitagsanti, N. Therdthai, 2021. Changes on Qualities of Gluten-free Chalky Rice Breadstick during Storage. *Techno-Science Research Journal* 9.
7. S. Chuon, M. T. Chanto, R. Tan, C. Peng, 2021. Isolation and Characterization of Lactic Acid Bacteria from Soy-based Products. *Techno-Science Research Journal* 9.
8. L. Ly, M. T. Chanto, C. Peng, R. Tan, 2020. Market study of soy sauces in Cambodia. *Techno-Science Research Journal*, 2020, Volume 8, 64–68.
9. S. Kai, S. Yeoun, C. Phat, 2020. Analysis of pesticide residues in sediment from Chhnok Tru, Kampong Chhnang using different extraction methods. *Techno-Science Research Journal* 8.
10. D. Vantha, C. Peng, H. Mith, 2020. Detection and susceptibility of antibiotic-resistant *Enterococcus* spp. in fermented and pickled vegetables. *Techno-Science Research Journal* 8.
11. C. Phat, S. Rann, P. Teav, S. Soeung, F. Kuok, E. G. Mariquit, W. Kuriniawan, H. Hinode, 2020. Assessment of pesticide residues in surface water, sediment, and fish from Chhnok Tru, Kampong Chhnang. *Techno-Science Research Journal* 8.
12. S. Hoeun, E. Mom, S. In, 2020. Optimization of white pepper (*Piper nigrum* L.) processing by enzymatic activity. *Techno-Science Research Journal* 8.
13. V. Phoem, S. Ly, H. Mith, 2020. Cambodian Rice Liquor Development using *Rhizopus oryzae*, *Saccharomyces cerevisiae* and alpha-amylase. *Techno-Science Research Journal* 8.
14. S. Yoeun, 2020. High Performance Liquid Chromatography: Principle and Basic Application. *The Bulletin of Cambodian Chemical Society* 11.
15. P. Ek, F. Kuok, W. Kuriniawan, E. G. Mariquit, H. Hinode, C. Phat, 2020. Preliminary study on chemical pollutants in Tonle Sap Lake, Cambodia. *The Bulletin of Cambodian Chemical Society* 11.
16. R. Kong, S. Lun, P. Kang, C. Soeng, L. Blanchot, S. Kim, M. Leti, B. Fabre, H. Mith, 2020. Optimization of extraction and analysis of physico-chemical properties and chemical compositions of fatty oils extracted from kernel seed of different mango (*Mangifera indica* L.) varieties. *The Bulletin of Cambodian Chemical Society* 11.
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25. S. Yuk, W. A. Baraoidan, J. L. Auresenia, 2015. Optimization of the Biodegradation of 17- α -ethynylestradiol (EE2) using Response Surface Methodology. *Techno-Science Research Journal* 2.
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Conference/Proceedings

1. M. Bunthan, S. Kong, M. Say, Y. Nat, C.P. Tan, R. Tan, 2022. Preliminary Study of Oil Extraction from Soybean Seeds by Hydraulic Pressing Technique. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
2. S. Soem, P. Yong, V. Mom, H. Mith, 2022. Determination of Proximate Composition of Different Rice Varieties Available in Phnom Penh. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
3. P. Yong, S. Soem, V. Mom, S. Phal, H. Mith, 2022. Characterization of Physico-chemical Properties and Microbiological Quality of Khmer Rice Vermicelli Collected from Battambang Province. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
4. C. Tep, O. Heng, C. Peng, 2022. Evaluation the Affect of Physical-chemical Factors on Concentration of Lactic Acid Bacteria Containing on Khmer Fermented Fish and Meat (Nem). *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
5. L. Set, C. Peng, S. Sroy, H. Mith, S. Yoeun, 2022. Microbial Loads Analysis in Ready-to-Eat Fermented Fish and Meat Collected from Producers in Battambang Province. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
6. S. Khut, C. Peng, O. Heng, D. Caruso, 2022. Survey on Knowledge, Attitude, and Practices of Farmer on Antibiotic Usage and Resistance and Investigation of Water's Physicochemical Quality in Pangasius Specie Aquaculture. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
7. M. Hor, V. Heng, S. Khut, S. Pa, O. Heng, D. Caruso, C. Peng, 2022. Preliminary Status of Physicochemical and Microbiological Quality of Water in Cage and Pond Mono-giant Snakeheads Culture System in Cambodia. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
8. S. Song, P. Houn, S. Lay, S. In, 2022. Determination of Essential Oil and Bioactive Compounds in Cambodia Herbal Rhizomes. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
9. S. Hoeun, S. Sok, S. In, 2022. Impact of Blanching and Drying on Color and Bioactive Compounds of Black Ginger. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.

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11. M. Net, S. Kong, M. Say, S. Chea, R. Tan, 2022. Transforming a Waste from Tofu and Soymilk Production into Cookies for Achieving Zero-Waste. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
12. P. Chhay, S. Lay, P. Houng, 2022. Effect of Hydro Distillation Time on Essential Oil Accumulation Extracting from Rice Paddy Herbs. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
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15. S. E. Ly, S. Kong, Y. Nat, R. Tan, 2022. Preliminary Study on Extraction of Soybean Oil Using Ultrasound-assisted Extraction. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
16. V. Leng, Y. Nat¹, S. Kong, M. Say, R. Tan, 2022. Preliminary Study of Extraction Conditions of Sacha Inchi Oil using Conventional Solvent Extraction. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
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18. L. Thourn, S. Yoeun, C. Phat, M. Suong, 2022. Analytical Methods for Pesticide Residues in Paddy Rice and Soil Using Gas Chromatography Mass Spectrometry (GC-MS): A Review. *The 11th Scientific Day, Institute of Technology of Cambodia*, Phnom Penh, Cambodia.
19. A. H. Yusoff, M. S. W. Azmi, C. S. Chang, A. F. Sulaiman, A. N. M. Nor, R. Tan, M. F. Ahmed, 2021. Vertical distribution of heavy metals in core sediments from Kelantan River off Tanah Merah, Kelantan, Malaysia. In *IOP Conference Series: Earth and Environmental Science* (Vol. 842, No. 1, p. 012037). IOP Publishing.
20. S. Lay, P. Houng, 2021. Optimization of Ultrasound-Assisted Extraction of Phenolic Compounds from Cambodia Black Turmeric. *The 14th AUN/SEED-Net Regional Conference on Chemical Engineering 2021 (RCChE2021), In Conjunction with 1st International Conference on Innovation in Chemical Engineering & Technology (ICICET 2021)*, Selangor, Malaysia.
21. T. Or, M. Lim, D. Sang, M. T. Chanto, R. Tan, 2021. Improving Removal Efficiency of Natural Organic Matter from Drinking Water Treatment Plant by Powder Activated Carbon Injection in Coagulation Process. *The 6th International Symposium on Conservation and Management of Tropical Lakes, In Conjunction with The 3rd International Conference on Tropical Limnology (TROPLIMNO III)*, Phnom Penh, Cambodia.
22. L. Meak, S. Khoun, T. Mao, C. Phat, 2021. Assessment of Pesticides Residue in Groundwater in Kampong Thom, Cambodia. *The 6th International Symposium on Conservation and Management of Tropical Lakes, In Conjunction with The 3rd International Conference on Tropical Limnology (TROPLIMNO III)*, Phnom Penh, Cambodia.

23. S. Yoeurm, S. Khuon, C. Phat, S. Yeoun, 2021. Assessment of Pesticides Residues in the Farm Soils and Sediment from Chhnok Tru, Kampong Chhnang. *The 6th International Symposium on Conservation and Management of Tropical Lakes, In Conjunction with The 3rd International Conference on Tropical Limnology (TROPLIMNO III)*, Phnom Penh, Cambodia.
24. V-D. Pham, S. In, S. Sroy, M. Soeung, M. Nishiyama, S. Heng, H. Mith, S. Nget, T. Watanabe, 2021. Assessment of Heavy Metal(loid) Accumulation and Sources in Six Edible Fish Species of Tonle Sap Lake, Cambodia. *The 6th International Symposium on Conservation and Management of Tropical Lakes, In Conjunction with The 3rd International Conference on Tropical Limnology (TROPLIMNO III)*, Phnom Penh, Cambodia.
25. C. Phat, S. Yoeun, M. Ouk, K. Kun, F. Kuok, B. Ty, W. Kurniawan, E. G. Mariquit, H. Hinode, 2021. Assessment of pesticide contamination in vegetable and water from Chhnok Tru floating communities of Tonle Sap Lake. *The 35th Congress of the International Society of Limnology (SIL2021)*, Gwangju, Republic of Korea.
26. R. Tan, C. Be, C. Peng, P. Ung, K. Miyanaga, Y. Tanji, 2021. Investigation of Multidrug-Resistant Bacteria in Tonle Sap Lake, Tonle Sap River, Mekong River, and Wastewater. *The 35th Congress of the International Society of Limnology (SIL2021)*, Gwangju, Republic of Korea.
27. P. Ung, K. Seang, S. Keo, R. Tan, K. Miyanaga, Y. Tanji, 2021. Assessment of Microbiological Water Quality in Tonle Sap River and Kob Srov Lake in Phnom Penh, Cambodia. *The 35th Congress of the International Society of Limnology (SIL2021)*, Gwangju, Republic of Korea.
28. S. Sok, P. Thach, K. Miyanaga, R. Tan, 2020. Development of a Package Containing PAC and $\text{Ca}(\text{OCl})_2$ for Drinking Water Treatment of Lake Water. *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
29. S. In, S. Nget, S. Heng, D. V. Pham, M. Nishiyama, H. Mith, T. Watanabe, 2020. Bioaccumulation of heavy metals and trace elements in six fish species from Tonle Sap Lake, Cambodia. *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
30. T. Yann, K. Miyanaga, R. Tan, 2020. The effectiveness of different types of polyaluminum chloride (PAC) and aluminum sulfate (alum) with $\text{Ca}(\text{OCl})_2$ dosing for treatment surface water of Tonle Sap River. *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
31. C. Phat, K. Kun, V. Pheap, S. Yoeun, E. G. Mariquit, W. Kuriniawan, H. Hinode, 2020. Assessment of Pesticide Residues in Surface Water and Fish from Chhnok Tru, Kampong Chhnang. *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
32. K. Ngoun, G. Chhun, R. Tan, 2020. Optimization of Young Mango Fermentation and Effect of Different Preservation Methods on its Shelf-life. *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.

33. C. Nong and S. In, 2020. The effect of blanching on curcumin content and chemical composition of essential oils of dried Turmeric (*Curcuma longa*). *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
34. S. Hoeun, S. Meas, E. Morm, S. In, 2020. Production of White Pepper from Ripe Pepper Berries (*Piper nigrum* L.). *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
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36. T. Kong, S. Hean, R. Tan, 2020. Development of Fermented Young Melon using Isolated Lactic Acid Bacteria. *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
37. C. Sam, S. Nget, S. Heng, S. In, M. Nishiyama, T. Watanabe, H. Mith, 2020. Determination of Antibiotic Resistance of Enterococcus spp. Isolated from Drinking Water Collected from Stoung District. *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
38. B. Bun, S. Nget, S. Heng, S. In, N. Maseteru, T. Watanabe, H. MitH, 2020. Investigation on Antibiotic Resistance of Escherichia coli Isolated from Drinking Water Collected in Stoung District. *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
39. S. Sat, S. Nget, S. Heng, S. In, M. Nishiyama, T. Watanabe, H. Mith, 2020. Study on Antibiotic Resistance of Pseudomonas aeruginosa Isolated from Drinking Water Collected from Three communes in Kampong Thom Province. *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
40. S. Phuong, M. T. Chanto, C. Peng, K. Miyanaga, R. Tan, 2020. Detection of Antibiotic-Resistant Bacteria in Water Environment of Tonle Sap Area and Wastewater. *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
41. L. Ly, M. T. Chanto, C. Peng, R. Tan, 2020. Price Evaluation and Quality Control of Different Soy Sauces Sold in the Markets. *The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCChE-2020), Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
42. C. Heang, S. Keo, C. Hok, K. Kong, C. Phat, F. Kuok, E.G. Mariquit, W. Kuriniawan, H. Hinode, 2019. Analysis of pesticide residues in surface water in Chhnok Tru community of Tonle Sap Lake. *The 4th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
43. K. Kong, C. Hok, C. Heang, S. Keo, C. Phat, F. Kuok, E.G. Mariquit, W. Kuriniawan, H. Hinode, 2019. Assessment of pesticide residues in surface water of Tonle Sap Lake, Cambodia

- during rainy season. *The 4th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
44. I. Yoneda, S. Ang, M. Nishiyama, H. Mith, R. Khanal, S. In, T. Watanabe, 2019. Spatial distribution of *E. coli* concentration in the Tonle Sap Lake during low water level season. *The 4th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
 45. M. Nishiyama, H. Mith, S. Nget, S. Say, S. In, J. Pu, T. Watanabe, 2019. Investigation of antimicrobial resistance of Enterococci collected from drinking water in Tonle Sap Lake, Cambodia. *The 4th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
 46. S. Keo, M. Svay, P. Ung, 2019. Characterization of Tonle Sap River water quality as influent by untreated domestic wastewater. *The 4th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
 47. E.S. Leaksmy and T. Reasmey, 2019. Study the Effectiveness of Different Natural Coagulants for Turbidity Removal from Tonle Sap River Water. *The 4th International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
 48. C. Phat, F. Kouk, E.G. Mariquit, W. Kuriniawan, H. Hinode, 2019. Analysis of Pesticide Residues in Surface Water in Chnok Tru Floating Community of Tonle Sap Lake during Low Water Season. *The 12th Regional Conference on Chemical Engineering (RCChE 2019)*, Ho Chi Minh City, Vietnam.
 49. K. Hin, L. Thourn, V. Leng, S. Chheong, F. Tivet, F. Kuok, 2018. Effect of Conventional plough-based Tillage (CT) and Direct Seeding Mulchbased Cropping Systems (DMC) on Soil Chemical and Mineralogical Properties in Kampong Thom. *The 11th Regional Conference on Environmental Engineering 2018 (RCEnvE-2018), Jointly held with The 3rd International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
 50. O. Heng, F. Kuok, V. Hul, L. Khun, S. Ol, L. Kong, T. Hoem, J. Cappelle, P. Dussart, V. Duong, 2018. Identification of bat species and astrovirus contained in samples from bat in Cambodia. *The 11th Regional Conference on Environmental Engineering 2018 (RCEnvE-2018), Jointly held with The 3rd International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
 51. C. Peng, P. Ung, K. Miyanaaga, R. Tan and Y. Tanji, 2018. Response of Bacterial Community in Sewage Influent to Antibiotic Treatment. *The 11th Regional Conference on Environmental Engineering 2018 (RCEnvE-2018), Jointly held with The 3rd International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
 52. S. Chheun, C. Peng, R. Tan, C. Vann, S. Un, S. Aun, S. Penh, P. Ung, K. Miyanaaga, Y. Tanji, 2018. Monitoring of Antibiotic-Resistant Bacteria in Tonle Sap River, Mekong River, and Wastewater in Dry Season. *The 11th Regional Conference on Environmental Engineering 2018 (RCEnvE-2018), Jointly held with The 3rd International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
 53. S. Penh, K. Miyanaaga, P. Ung, R. Tan, S. Un, S. Aun, S. Chheun, Y. Tanji, 2018. Study the Effects of PAC Coagulant and $\text{Ca}(\text{OCl})_2$ on *Escherichia fergusonii* and T4 Phage. *The 11th Regional Conference on Environmental Engineering 2018 (RCEnvE-2018), Jointly held with The 3rd International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
 54. C. Phat, F. Kuok, E. G. Mariquit, W. Kuriniawan, H. Hinode, 2018. Pesticide Residues in Sediment and Fish from Chnok Tru Floating Community of Tonle Sap Lake. *The 11th Regional Conference on Environmental Engineering 2018 (RCEnvE-2018), Jointly held with The 3rd*

International Symposium on Conservation and Management of Tropical Lakes, Phnom Penh, Cambodia.

55. P. Ung, S. Un, S. Chheun, S. Aun, S. Penh, S. Sann, R. Tan, K. Miyanaga, Y. Tanji, 2018. Analysis of Total Bacterial Concentration and Microbial Community in Waters Used by Floating Villagers, Tonle Sap Lake. *The 11th Regional Conference on Environmental Engineering 2018 (RCEnvE-2018), Jointly held with The 3rd International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
56. S. Aun, R. Tan, S. Un, S. Chheun, S. Penh, C. Peng, P. Ung, K. Miyanaga, Y. Tanji, 2018. Monitoring the Pathogenic Bacteria in Mekong River and Tonle Sap River. *The 11th Regional Conference on Environmental Engineering 2018 (RCEnvE-2018), Jointly held with The 3rd International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.
57. S. Rann, C. Phat, F. Kuok, E. G. Mariquit, W. Kuriniawan, H. Hinode, 2018. Assessment of Pesticide Residues in Surface Water at Chhnok Trou Floating Community, Tonle Sap Lake. *The 11th Regional Conference on Environmental Engineering 2018 (RCEnvE-2018), Jointly held with The 3rd International Symposium on Conservation and Management of Tropical Lakes*, Phnom Penh, Cambodia.

5.4.3. Mechatronics and Information Technology (MIT Unit)

Cambodian Context

The booming of the IT and communication sector in Cambodia enables to transfer large amount of data from every single part of the territory at low cost. At the same time, agriculture, climate and weather authorities, public health institutions, energy firms, town councils...produce a growing number of data with the support of smartphones or data acquisition devices. The processing and the correct use of this information is a challenge in Cambodia under the threat of epidemics, climate change or air pollution events where fast processing and fast reactions are required.

On another hand, the food, mining and manufacturing industries do also require data science – for quality control -, but also actions and corrections, therefore an academic expertise in automatics and control, robotics, embedded objects are likely to trigger the development of cheap, smart devices (smartphones apps, small robots, controllers) for SMEs focused on high technology but with small capital investment.

Vision

To be center of excellence in Intelligent Mechatronics and Intelligent Decision Support System.

Mission

To advance applied multidisciplinary research of Mechatronics, Artificial Intelligence, Telecommunication, and Aerospace through national and international collaborations for fostering national academic community and serving society.

The Research Themes

The combination of the different areas: information science and mechatronics allows developing specific topics related to the Cambodian context as:

- Aerospace and Space Engineering
- Artificial Intelligence
(Machine Learning, Deep Learning, and Optimization)
- Intelligent Mechatronics
- Telecommunication and Internet of Things
- Operation Research
- Supply Chain Management

Projects and Research Topics

The list of projects and research topics that are implementing in MIT unit as shown in the table below. For more detail information refers to a table in Annex 17.

Table 18. Research topics in MIT unit for the academic year 2021-2022.

No.	Name of PI (FAMILY First name)	Sexe	Project/Research Topic	Funding source	Period	Collaboration scale * N = National R = Regional I = International	Project Type* 1= Basic 2 = Applied & Development 3 = Start-up 4 = Tech- transfer
1	Dr. SRANG Sarot	M	Development of Nanosatellite for Demo	MoEYS	2021- 2024	N	2
2	M. SRANG Sarot	M	Development of Small Rocket for Experiment	MoE	2021- 2022	N	2
3	Dr. THOURN Kosorl	M	Initiative Towards Electrical and Electronic Product Testing and Certification by EMC Laboratory	HEIP	2019- 2023	N	2
4	Dr. THOURN Kosorl	M	Non-intrusive appliance load monitoring and diagnostics in residential homes	JICA	2020- 2022	I	2
5	Dr. THOURN Kosorl	M	ASEAN Factory 4.0	Erasmus	2020- 2023	I	2
6	Dr. VALY Dona	M	Ancient Manuscript Digitization and Indexation	HEIP	2020- 2023	N	2
7	M. SOK Kimheng	M	Building trustable and privacy aware IoT systems using blockchain and smartvcontracts	Governm ent of Cambodi a + ARES- CCD	2017- 2022	I	2
8	M. TEP Sovichea	M	Power quality monitoring based on the deployment of sensors in the grid and parameter measurement	Governm ent of Cambodi a + BGF	2020- 2022	I	2
9	M. YONRITH Phayuth	M	Indoor mobile robot localization using multisensor data fusion	MoE	2021- 2022	N	2

10	M. KEO Chivorn	M	Flight controller and structural design for fixed-wing unmanned aerial vehicle (UAV)	AOARD	2022-2024	I	2
11	M. BAN Sam	M	Developing Countries' Transportation Enhancement through the Application of Physical Internet Paradigms	Government of Cambodia + ARES-CCD	2019-2022	I	2
12	Dr. KIM Bunthern	M	Applied Control and Automation for Agriculture in Cambodia (ACAAC)	HEIP	2019-2023	N	2
13	M. HEL Chanthan	M	Toward Production Innovation via FabLab-ITC	HEIP	2019-2023	N	2
14	Dr. VALY Dona	M	Proof-of-Concept of Applying Blockchain Technology for Decentralized Identification Management of Medical System	LBE-JICA	2021-2022	I	2

Researchers

Dr. SRANG Sarot (Head of MIT research unit), Ph.D. in Engineering, Tokyo Institute of Technology, Japan

Instrumentation, estimation, control and robotics, dynamic modelling, simulation, Artificial Intelligence.

Dr. PEC Rothna, Ph.D. in Communication Engineering, Tokyo Institute of Technology, Japan.
Digital Signal Processing; radio communication; microwave and RF systems

Dr. PO Kimtho, Ph.D. in Communication Engineering, Tokyo Institute of Technology, Japan.
Digital Signal Processing; radio communication; microwave and RF systems

Dr. SIM Tepmony, Ph.D. in Information Science, Electronics and Communications, Telecom Paris, France
Markov theory; statistics; probability; maximum likelihood

Dr. THOURN Kosorl, Ph.D. in Electromagnetic Wave, Tokyo Institute of Technology, Japan
Computational methods for electromagnetics, electromagnetic compatibility, wave propagation, pattern recognition, image processing, computer vision

Dr. VALY Dona, Ph.D. in Image Processing and Deep Learning for Text Recognition from *Image*, Louvain University, Belgium.

Dr. KIM Bunthern, Ph.D. in Electrical Engineering, INP Toulouse, France
Control system, robotics, renewable energy, automation, energy generation system

Mr. HEL Chanthan, Master in Telecommunication, Chulalongkorn University, Thailand
Wireless communication, Technology for agriculture

Dr. KONG Phutphalla, a Ph.D. candidate in Computer Engineering from University of Mons (UMONS), Belgium.

Mr. CHHORN Sopheakra, Master in Electrical and Energy Engineering from Chulalongkorn University, Thailand.

Research interested: "Measurement instrument, Internet of Thing and Medical device"

Mr. KUY Movsun, Master in Mobile Technology, Institute of Technology of Cambodia

Mr. Chin Chan Daraly, Master in Telecommunication Networking from Chulalongkorn University, Thailand.

Mr. TEP Sovichea, M.Sc in Electronic System for Embedded and Communication Applications, INPT-ENSEEIH, Toulouse, France

Research interest: "digital circuit design, PCB design and manufacturing, Internet of things, wireless sensor node, smart grid communication, industrial networks"

Mr. SOK Kimheng, Ph.D. candidate in Cybersecurity, Blockchain and Smart Contract, University of Namure, Belgium.

Mr. KEAN Jeudi, Ph.D. candidate in Telecommunication Engineering, INP-ENSEEIH Toulouse, France

Mr. BAN Sam, Ph.D. candidate in Supply Chain Management, IMT-Albi, France

Mr. KEO Chivorn, Master in Industrial and Mechanical Engineering from Institute of Technology of Cambodia, Cambodia.

Mr. YONRITH Phayuth, Master in Mechatronics, Information and Communication Engineering, Institute of Technology of Cambodia.

Mr. CHIN Chan Daraly, Master in Telecommunication Engineering, Chulalongkorn University (CU), Thailand.

Mr. PICH Reatrey, Master degree in cybersecurity, International College of King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand.

Mr. BUN Menghorng, Master degree in ICT for Embedded Systems, Sirindhorn International Institute of Technology, Thammasat University (SIIT-TU).

Academic Partners

Tokyo Institute of Technology, Japan

Toyohashi University of Technology, Japan

INP Toulouse, France

Institut Mines-Telecom, France

University of Namur, Belgium.

Non-academic partners

Asian Office of Aerospace Research and Development
Ministry of Education, Youth and Sports, Cambodia

Ministry of Water Resources and Meteorology, Cambodia
 Ministry of Rural Development, Cambodia
 Ministry of Industry and Handicraft, Cambodia
 Ministry of Public Works and Transport, Cambodia
 Ministry of Environment
 JICA, Japan
 Institut Pasteur du Cambodge

Industrial Partners and NGOs

Solar Green Energy Co., Ltd. Cambodia

Selected publications of MIT researchers since 2010

From 2010 to May 2022, there are in total of 98 research outputs from MIT unit classified into three categories: International publications, Local publications, and Conference and Proceedings as shown in the table below.

Table 19. Summary of number of research publications of MIT by year from 2010 to 2022.

Publication classification/year	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	Total
International publications	1	4	3	2	8	2	6	2	5	4	0	1	0	38
Local publications	-	6	6	1	2	1	0	0	0	1	0	0	0	17
Conference/ Proceedings	9	3	3	2	4	2	6	8	3	1	1	0	1	43
Total	10	13	12	5	14	5	12	10	8	6	1	1	1	98

International publications

1. Phutphalla Kong, Matei Mancas, Bernard Gosselin, Kimtho Po, "DeepRare: Generic Unsupervised Visual Attention Models", MDPI (prepare to publish soon)
2. Chan Daraly Chin, Chanthan Hel, Rothna Pec, "Fab Lab Initiative in Higher Education: Digital Solutions Diverted to Traditional Farming in Cambodia Context," 2021 6th International STEM Education Conference (iSTEM-Ed), IEEE, 2021
3. Thura Peu, Sopeak Yean, Boreth Sethy and Sarot Srang, "PD Controller and Dynamic Compensation Design for a DC Motor based on Estimated Parameters," 2021 International Conference on Advanced Mechatronics, Intelligent Manufacture and Industrial Automation (ICAMIA). Indonesia.
4. Sophyn Srey, Vongchivorn Chhour and Sarot Srang, "Lumped Parameter Estimation of a Low-Cost DC Motor for Position Controller Design," 2021 International Conference on Advanced Mechatronics, Intelligent Manufacture and Industrial Automation (ICAMIA). Indonesia.
5. Sai Thavath, Bunrong Proeung, Sovichea Tep, Sopheaktra Chhorn, Rothna Pec, Vichhey Nall, Pinnara Ket, Chantha Oeurng, and Chanthan Hel. "Prototyping of Smart Irrigation System

- Using IoT Technology." In 2021 7th International Conference on Electrical, Electronics and Information Engineering (ICEEIE), pp. 1-5. IEEE, 2021.
6. Sarot Srang, Sopagna Ath, and Masaki Yamkita, "Newton-Euler Based Dynamic Modeling and Control Simulation for Dual-Axis Parallel Mechanism Solar Tracker, " *Advances in Science, Technology and Engineering Systems Journal* . Vol. 5, No. 5, 709-716, 2020.
 7. Vannak VAI., Sopheaktra CHHORN, Roza CHHIM, TEP Sovichea, and BUN Long. "Modeling and Simulation of PV Module for Estimating Energy Production under Uncertainties." In 2020 8th International Electrical Engineering Congress (iEECON), pp. 1-4. IEEE, 2020
 8. Valy, Dona, Michel Verleysen, and Sophea Chhun. "Data Augmentation and Text Recognition on Khmer Historical Manuscripts." In 2020 17th International Conference on Frontiers in Handwriting Recognition (ICFHR), pp. 73-78. IEEE, 2020.
 9. M. Asim, R. Pec, T. H. Im, Y. S. Cho, "Cell Search Techniques for Underwater Acoustic Cellular Systems." *IEEE Access*, vol. 7, pp. 106019-106033, 2019.
 10. Sarot Srang and Sopagna Ath, "Dynamic Modelling and Simulation for 2DOF Parallel Mechanism Solar Tracker," *IEEE/ASME International Conference on Advanced Intelligent Mechatronics*, 2019. Hong Kong
 11. Phutphalla Kong, Matei Mancas, Nimol Thuon, Seng Kheang, and Bernard Gosselin. "Do deep-learning saliency models really model saliency?". In 2018 25th IEEE International Conference on Image Processing (ICIP), pages 2331-2335. IEEE, 2018.
 12. M. S. Khan, R. Pec, C. H. Park, and Y. S. Cho "Random Access Preamble Design for High-Velocity User in Millimeter-Wave Cellular Networks," *IEEE Access*, vol. 6, pp. 66047-66054, 2018.
 13. R. Pec, M. S. Khan, M. Asim, and Y. S. Cho, "Random Access for Underwater Acoustic Cellular Systems," *Sensors Journal*, 18 (2): 432, 2018.
 14. M.A. Jasper, R. Pec, Y.S. Cho, "An efficient handover measurement technique for millimeter-wave cellular communications," *IEICE Transaction on Communication*, vol. 101-B (2), pp. 592-602, 2018.
 15. Chhorn Sopheaktra, and Arporn Teeramongkonrasmee. "A portable USB-controlled potentiostat for paper-based electrochemical applications." In 2018 15th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (ECTI-CON), pp. 321-324. IEEE, 2018.
 16. Kesiman, Made Windu Antara, Dona Valy, Jean-Christophe Burie, Erick Paulus, Mira Suryani, Setiawan Hadi, Michel Verleysen, Sophea Chhun, and Jean-Marc Ogier. "Benchmarking of document image analysis tasks for palm leaf manuscripts from southeast asia." *Journal of Imaging* 4, no. 2 (2018): 43.
 17. Kesiman, Made Windu Antara, Dona Valy, Jean Christophe Burie, Erick Paulus, Mira Suryani, Setiawan Hadi, Michel Verleysen, Sophea Chhun, and Jean-Marc Ogier. "ICFHR 2018 competition on document image analysis tasks for southeast asian palm leaf manuscripts." In 2018 16th International Conference on Frontiers in Handwriting Recognition (ICFHR), pp. 483-488. IEEE, 2018.
 18. Valy, Dona, Michel Verleysen, Sophea Chhun, and Jean-Christophe Burie. "Character and text recognition of khmer historical palm leaf manuscripts." In 2018 16th International Conference on Frontiers in Handwriting Recognition (ICFHR), pp. 13-18. IEEE, 2018.

19. Valy, Dona, Michel Verleysen, and Kimheng Sok. "Line segmentation for grayscale text images of khmer palm leaf manuscripts." In 2017 Seventh International Conference on Image Processing Theory, Tools and Applications (IPTA), pp. 1-6. IEEE, 2017.
20. R. Pec, M. S. Khan, C. H. Park, and Y. S. Cho, "A design of synchronization signal for efficient handover in small-cell networks with 3D beamforming," IEEE VTC, Sydney, June 2017.
21. R. Pec, C.H. Park, Y.S. Cho, "Efficient handover measurement technique for small-cell networks using a virtual cell synchronization signal," Wireless Communication and Mobile Computing, vol. 16, pp. 3408-3422, 2016
22. R. Pec, J.H. Choi, C.H. Park, Y.S. Cho, "Synchronization method for LTE-based machine-type communication in low-power cellular IoT," International Journal of Distributed Sensor Networks, vol. 12, No. 8, pp. 1-14, 2016.
23. M.N. Lee, R. Pec, K.S. Kim, C.H. Park, Y.S. Cho, "An interference rejection combining technique for an SFBC-OFDM system with multiple carrier frequency offsets," IEICE Transaction on Communication, vol. E99-B, no. 2, pp. 481-487, 2016.
24. Burie, Jean-Christophe, Mickaël Coustaty, Setiawan Hadi, Made Windu Antara Kesiman, Jean-Marc Ogier, Erick Paulus, Kimheng Sok, I. Made Gede Sunarya, and Dona Valy. "Icfhr2016 competition on the analysis of handwritten text in images of balinese palm leaf manuscripts." In 2016 15th International Conference on Frontiers in Handwriting Recognition (ICFHR), pp. 596-601. IEEE, 2016.
25. Valy, Dona, Michel Verleysen, and Kimheng Sok. "Line segmentation approach for ancient palm leaf manuscripts using competitive learning algorithm." In 2016 15th International Conference on Frontiers in Handwriting Recognition (ICFHR), pp. 108-113. IEEE, 2016.
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5.4.4. Materials Science and Structure (MSS Unit)

Cambodian Context

Cambodia has a long history of engineering skills in materials and structures. Looking back at Angkorian times, the Khmer empire built a considerable amount of constructions in bricks and stone such as religious buildings, bridges, dams (barray). Some of these heritage buildings now are in unstable conditions because of the deterioration of the materials and the damages of structures. The preservation of Khmer heritage is an important issue for or rich cultures and also the tourism industry. Currently, Cambodian universities are producing human resources with both science and practical capacity to do research and preservation their heritages, which is an important step to reach solutions.

In the present days, new challenges have to be met: the construction sector has boomed in 2016 with a total investment of 8.5 b\$. There are over 900 high-rise buildings (more than 5 floors), the majority of them in Phnom Penh and Kompong Som. The fast evolution of Cambodian cities causes issues of quality (qualified human resources, redefining building standards) and of sustainability (depletion of local resources in construction materials).

Research in materials science and structure for improvement of manufacturing local value-added products and construction needs are steps towards development in eco-friendly concrete or building components adapted to local resources. Furthermore, study and reinforce the stability of embankments, dams, slopes, especially in a context of variable conditions of soils between the rainy and the dry season are also parts of materials science and structure.

Materials science and structure is not limited to the building industry, as there are also big challenges in recycling or recovering materials from waste, replacing polymers from fossil origin with natural polymers, and producing sustainable products from local materials.

Materials Science and Structure Research Unit was established to build up researcher group with the same skill and work with other researcher groups as interdisciplinary to create new materials and structures which serve for various applications.

The Research Unit

The Material Sciences and Structure Research Unit focuses on the innovation and trends in construction material, especially with low carbon impact materials and light structures, including geotechnical engineering, underground structures, minerals, polymers, ceramics and alloys to address specific Cambodian needs.

The whole set of available natural materials in Cambodia (silk, wood, agricultural by-products, starch, bamboo, clay, limestone, natural rubber) is also reconsidered to produce sustainable goods and products. The Research Unit works among an international network on heritage preservation with a specific dedication on materials science (stones, bricks, iron, and other alloy components). An important effort is made on modelling and simulations with high standards numerical tools associating mechanics, heat transfer and fluid mechanics.

Vision

MSS Research Unit will be nationally and internationally recognized for one of the first destination for education and research in materials and structure by industries and academic institutions. MSS Research Unit will be a source for technical innovation transfer, scientists and engineers.

Mission

- To strengthen research capacity in field of materials and structure
- To enlarge and improve Materials and Structure laboratory
- To boost the research activities through local and international collaborations (Universities, Government, SMEs, NGOs)
- To promote technology transfer and provide training and consultancy services
- To increase national and international publications
- To host scientific events

Research Theme

- Using numerical modelling and experimental analysis of infrastructure and materials
- Polymer composites and plastic waste recycling, eco-materials for construction (concrete, binder), alloy and traditional ceramic

- Failure analysis of steel structure
- Soil improvement for various applications using binder and waste products
- Slope stability analysis and deep excavation
- Heritage preservation (structure, source of rock...)

Projects and Research Topics

The list of projects and research topics that are implementing in MSS unit as shown in the table below. For more detail information refers to a table in Annex 18.

Table 20. Research topics in MSS unit for the academic year 2021-2022.

No.	Name of PI (FAMILY First name)	Sexe	Project/Research Topic	Funding source	Period	Collaboration scale * N = National R = Regional I = International	Project Type* 1= Basic 2 = Applied & Development 3 = Start-up 4 = Tech-transfer
1	AUN Srean	F	Air Pollution Monitoring in Phnom Penh	In kind	2019-2023	I	1
2	BUN Polyka	F	Upgrading the quality of Cambodian ceramic using Kandal clay with incorporation of rock dust for application of brick	HEIP	2020-2023	R	2
3	KETH Kannary	F	Managing the interdisciplinary collaboration in construction 4.0: ITC's workshop case	ARES-Cambodia	2021-2024	I	1
4	MUT Mesa	M	Composite 3D Printing based on Filament Developed from Natural Fiber: Mechanical properties of matrixes	LBE	2020-2022	N	2
5	YOS Phanny	M	Cambodian natural rubber/different minerals composites for floor mat shock absorbing application	HEIP	2020-2023	R	2
6	YOS Phanny	M	Physical Properties and Mineralogy of Ancient Brick from Temples at Sambor Prei Kuk area, Kampong Thom, Cambodia	LBE	2022-2023	N	1
7	YOS Phanny		Polyethylene (PE) Waste Recycling for Asphalt Concrete Pavement Application	MoE	2019-2022	N	1
8	DOUNG Piseth	M	Initiative on the development of wind load for design of building structures in Cambodia	HEIP	2020-2023	N	1
9	Long Makara	M	Sustainable building design integrated life-cycle assessment (LCA), for best strategies to design the green	ARES-Cambodia	2021-2025	I	1

			residential building in Phnom Penh, Cambodia				
10	DOUNG Piseth	M	Steel ring damper for seismic application - collaboration with King Mongkut's University of Technology Thonburi	KMUTT	2020-2022	R	2
11	DOUNG Piseth	M	Evaluation of Mechanical Behavior of Post-Installed Bundled Reinforcement Used for Concrete Connections	LBE	2022-2023	R	2
12	TO Dara	M	Design and built a lightweight chassis of mini electric vehicle	LBE-JICA	2021-2022	N	2
13	PROK Narith	M	Durability of concrete beam strengthened with fibwrap® system and on fiber composite laminate	Fyfe Asia Pte Ltd	2020-2022	R	2
14	PROK Narith	M	Effectiveness of Tyfo® Fibr Anchors with the Tyfo Fibrwrap Systems	Fyfe Asia Pte Ltd	2021-2022	R	2
15	SEANG Sirisokha	F	Hydrothermal alteration, Mineralization, Fluid inclusion, Geochemistry, and Geochronology of Porphyry Cu-Mo-Au Prospect in Kampot and Ratanakiri, Cambodia	LBE-JICA	2020-2022	R	2
16	HIN Raveth	M	Chemical Strengthening of Large-scale glass Pieces for Construction and Other Engineering Applications	HEIP	2020-2024	I	2
17	TAING Kimnenh	F	Green BIM - Analysis of BIM approach for designing a bioclimatic building	ARES	2020-2024	I	1

Researchers

Dr. YOS Phanny (Head of MSS Research Unit), Ph.D. in Materials Engineering, Kyushu University, Japan Polymers, composite material.

Dr. CHHIT Sao Sameth, Ph.D in Material Engineering, University of Ghent, Belgium Material Sciences

Dr. HIN Raveth, Ph.D in Material Engineering, University of Rennes 1, France Mechanical behaviour of Materials, Mechanics and Civil Engineering

Dr. HAN Virak, Ph.D in Civil Engineering, KOCHI University, Japan Civil engineering materials, concrete, modelling

Dr. BUN Kim Ngun, Ph.D. in Materials Engineering, Universiti Sains Malaysia Materials science, ceramics

Dr. SEANG Chan Sopheak, Ph.D. in Engineering, INSA de Rennes, France
Non destructive testing, numerical Analysis, welding

Dr. PROK Narith, Ph.D in Civil Engineering, KOCHI University, Japan
Soil-structure interaction; earthquake; tsunami

Dr. RATH Sovann Sathya, Ph.D in Civil Engineering, KOCHI University, Japan
Self-compacting concrete

Dr. SRY Vannei, Ph.D in Materials Engineering, Tokyo Institute of Technology Japan
Mechanical properties of Fiber

Ms. BUN Polyka, Master in Applied Sciences, Université Libre de Bruxelles, Belgium
Simulation of thin wall structures

Dr. DOUNG Piseth, Ph.D in Civil Engineering, Tokyo Institute of Technology, Japan
A study on performance evaluation of box column connections with internal diaphragms in steel frames

Dr. MAO Piseth, Ph.D in Earth Resources Engineering, Kyushu University, Japan
Evaluation of Stability and Its Countermeasures of Underground Longwall Coal Mine under Shallow and Weak Geological Conditions in Indonesia

Dr. SEANG Sirisokha, Ph.D in Economy Geology, Kyushu University, Japan
Earth mineral

Dr. BOEURT Sophea, Ph.D in Rock Mechanics Engineering, Hokkaido University, Japan
Variation of permeability of rocks due to transient disturbance in Axial Stress or Pore Pressure

Mr. MUT Mesa, Master of Materials and structures, Institute of Technology of Cambodia, Cambodia
Numerical Study of Rail Stresses Induced by Wheel-rail Contact using Abaqus

Dr. LIM Sovanvichet (Master coordinator of Materials and Structure), Ph.D in Civil Engineering, INSA-RENNE, France
Modélisation du comportement des connexions dans les structures mixtes acier-béton, soumises à des sollicitations statiques dans des conditions normales de service ou dans des conditions d'incendie

Dr. SIV Easeng, Ph.D in Materials Science, Paris 13 University, France
Experimental mesoscale investigation of interface migration in polycrystalline copper

Ms. KETH Kannary, Master, University of Liège, Belgium
Feasibility of primary school in Phnom Penh by using recycled materials

Ms. TAING Kimninh, Master, University of Liège, Belgium
Analyse et modélisation des données d'un bâtiment pour l'évaluation de son comportement thermique

Mr. Long Makara, Master, University of Liège, Belgium
Rammed Concrete with Recycled Fine Aggregates

Academic and Research Partners

Universitat de Girona, Spain
INSA de Rennes, France
Université de Paris 13, France
Ecole des mines d'Alès, France
Université Paul Sabatier, Toulouse, France
Kochi University, Japan
Chulalongkorn University, Thailand
Kyoto University, Japan
Ecole Française d'Extrême Orient, France
National Museum, Cambodia
Universiti Sains Malaysia

Non-academic partners

Ministry of Education, Youth and Sports, Cambodia
Ministry of Public Works and Transport, Cambodia
Ministry of Culture and Fine Arts, Cambodia
Ministry of Mines and Energy, Cambodia
Ministry of Environment, Cambodia
General Directorate of Rubber, Cambodia

Industrial Partners and NGOs

Dassault Systèmes, France
Minebea (Cambodia) co.ltd
Edotco Cambodia Co.,Ltd
Nikko-Kinzoku (Cambodia) Co.,Ltd
Fyfe Asia Pte Ltd, Singapore
Pierre Fabre

Selected Publications of MSS researchers since 2010

From 2020 to May 2022, there are in total 53 research outputs from MSS unit classified into three categories: International publications, Local publications, and Conference and Proceedings as shown in the table below.

Table 21. Summary of number of research publications of MSS by year from 2010 to 2022.

Publication classification/year	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	Total
International publications	0	2	3	2	2	1	4	0	2	4	1	4	2	27
Local publications	3	1	0	0	0	0	0	0	0	0	0	0	0	4
Conference/ Proceedings	7	9	1	1	3	0	1	0	0	0	0	0	0	22
Total	10	12	4	3	5	1	5	0	2	4	1	5	2	53

International publications

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2. Piseth, D., Sutat, L., Eiichi, S. (2021) Tensile strength and failure mechanism of internal diaphragms in wide flange beam-to-box column connections with concrete filling. Elsevier, <https://doi.org/10.1016/j.jobbe.2020.102037> (IF: 5.138)
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4. Amirthan, T., Lahiru, D., Tharaka, D., Anjula, D., Chulantha, J., Maheshwari, W., Yoshiaki, F., Sophea, B. (2020) Stability Analysis of Slopes in Aruwakkalu Limestone Mine During Rain: A Finite Element Approach. IEEE. DOI: 10.1109/MERCon50084.2020.9185268
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2. Oeung K., **Doung P.**, Leelataviwat S., Han V., (2022). Analytical Assessment of Earthquake Energy Demand in Single Degree of Freedom Systems, *ITC Techno-Science Journal* (To be published)
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2. Sreng, L., Seang, S., Azura, A.R., Yos, P. (2022) Performance study of Cambodian Natural Rubber/Clay Composites for Shock Absorption Application: Primary Results. The 1st International Conference on Earth Resources and Geo-Environmental Technology.
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5.4.5. Water and Environment Unit (WAE Unit)

Cambodian Context

Water is a huge issue in the world and particularly in Cambodia. Although the country is crossed by the Mekong river and possesses a large fresh water lake (the Tonle Sap Great lake), Cambodia is vulnerable to the succession of annual floods and droughts with severe episodes. Many problems

arise due changes in land use, natural resources exploitation and climate change. Moreover, there is concern with current and future situation of intensive use of ground water for irrigation in the dry season, sea water intrusion in the coastal areas, heavy metals release due to mining activities, non-point source pollution from agriculture, soil erosion, air pollution, and urbanization with no waste water treatment. Besides regional water environmental issues, the quality of water is low in rural areas or low-income urban environments with contamination of crops, faecal contamination and strong arsenic concentration in ground water in the Lower Mekong area.

Research plays a pivotal role in environmental protection by providing the knowledge to better understand and manage issues such as climate change and water quality & availability. In parallel, the development of innovative and environmentally friendly technologies can offer sustainable economic opportunities through the responsible management of both natural and man-made resources. Often, environmental challenges go beyond national frontiers and require a coordinated approach in ASEAN and at global level.

Vision

Our vision is to become a well-known knowledge hub to provide the scientific research information on utilization and management of water and environment for sustainable development in the region.

Purposes

- To bring together institutional-wide centers and researchers to tackle national, regional and global water and environmental issues through multi and interdisciplinary research under Research and Innovation Center.
- To develop and offer graduate program on Science in Water and Environmental Engineering that support to country development and benefit to civil society.
- To provide knowledge, skill, tool, and awareness pertaining to water and environmental quality and human-environment interactions in order to improve and sustain the function of environmental systems, protect human health and economic growth.

Mission

- Conducting multi-disciplinary and interdisciplinary both basic and applied research on the utilization and protection of the environment, minimization and treatment of pollution particularly to the water resources, hydrological and ecological systems.
- Developing, demonstrating and disseminating new finding and methodology supporting to science and engineering for the environmental management and monitoring, disaster management, ecological restoration, treatment and disposal of pollution.
- Collaborating on the local and global scale in research and education to protect the precision resources that comply with national policy and SDG to sustain human life.
- Educating and training personnel for management, supervision and operation of water resources and environmental systems.

Research Theme

The research unit Water and Environmental Engineering is established to address the needs of Cambodia in this very large field. Research activity is needed:

1. **Hydrology and Water Resources Management:** Hydrological Modeling and Analysis, Hydrogeological Analysis, Groundwater and surface water interaction, Water Balance, Soil Erosion, River Bank Erosion and failure, Land Use Change, Environmental Modelling, Watershed Carrying Capacity, GIS and Remote Sensing, Hydraulic Structure ...
2. **Climate Change and Disaster Risk Management:** Weather Forecasting, Weather Forecasting, Climate Change Modeling, Climate Change Downscaling, Climate Change Impacts, Climate Change Vulnerability and Adaptation, Tropical Meteorology, Flood/Drought Management, other hazards...
3. **Urban Water Supply, and Wastewater Treatment:** Drinking Water Assessment and Treatment, Pollution Management, Waste Water Treatment, WASH, Water Treatment Technology, Microbiology, Water Quality Modeling, Water Biochemistry...
4. **Coastal and Marine Environment (CME):** Seawater Intrusion, Coastal Processes and Sediment Transport, Coastal Wetland Ecosystem, Sea Surface Current, Sea Grass and Coral Protection, Wave Impact on Coastal and Offshore Structures, Coastal Karst Landforms, Coastal Geology, Coastal Flood Management...
5. **Soil and irrigation:** Soil-Plant-Water Relation, Agricultural Water Management, Soil Quality...
6. **Urban Environmental Management:** Air Pollution Management, Solid Waste Management, Hazardous Waste Management, Environmental Health and Risk Assessment...

The research Unit Water and Environmental Engineering has strong interactions with a worldwide community of researchers and stakeholders focused on climate change, environmental disasters prevention, as well as companies involved in waste management, water supply, wastewater and sanitation.

Projects and Research Topics

The list of projects and research topics that are implementing in WAE unit as shown in the table below. For more detail information refers Annex 19.

Table 22. Research topics in WAE unit for the academic year 2021-2022.

No	Name of PI (FAMILY First name)	Sex	Project/Research Topic	Funding source	Period	Collaboration scale * N = National R = Regional I = International	Project Type* 1= Basic 2 = Applied & Development 3 = Start-up 4 = Tech-transfer
1	Dr. OR Chanmoly	M	SATREPS: Establishment of Risk Management Platform for Air Pollution in Cambodia	JICA-JST	2022-2027	I	2
2	Dr. OM Romny	M	SATREP: Establishment of Environmental platform of Tonle Sap Lake	JICA-JST	2016-2022	I	2

3	Dr. BUN Saret	M	Addressing Water Scarcity in a Rural Community of Cambodia through Groundwater Use	LBE-JICA	2020-2022	R	2
4	Dr. CHHIN Rattana	M	Collaborative Research Platform to Manage Risk and Enhance Resilience of Coral Reef in Southeast Asia	APN	2019-2021	I	1
5	Dr. DOUNG Ratha	M	Water Evolution and Vulnerability Under Global Changes in Coastal Catchments of Cambodia	IRD	2019-2022	I	1
6	Dr. CHHOUN Kong	M	Understanding and Managing the Cambodian Floodplains, The Preks of Kandal Province		2019-2022	I	1
7	Dr. CHAN Rathborey	M	Spatio-temporal assessment of surface and groundwater quality affected by urban wastewater: case study in Tamouk Lake Area	EU/AFD	2020-2021	N	1
8	Dr. HEU Rina	F	Assessment of Silicon (Si) in water and bottom sediment in Tonle Sap Lake: an implication for highly productive ecosystem.		2020-2021	N	1
9	M. KIM Lengthong	M	Assessment of Flood Risk on Urban Areas due to Flow Alteration of Lower Mekong and Rapid Urban Development		2020-2021	N	1
10	Dr. TY Boreborey	F	Arsenic removal from groundwater using ECAR treatment technology		2020-2021	N	1
11	Dr. DOUNG Ratha	M	Impact of climate and land use change on hydrology pattern in the Coastal Zone of Cambodia		2018-2021	N	1
12	Dr. PENG Chanthol	F	Antibiotic-resistant bacteria in wastewater and their impact on receiving freshwater system		2020-2021	N	1
13	Dr. KHOEUN Kimleang	F	Application of Alternative Bio-adsorbents in Wastewater Treatment		2020-2021	N	1
14	M. LUN Sambo	M	Formulizing the design criteria for the piped-water system in Cambodia		2020-2021	N	1
15	Ms. AUN Srean	F	Air pollution in Phnom Penh/East Asia-Nanoparticle monitoring network (EA-Nanonet)	Kanazawa University	2011-Present	I	1
16	Dr. HANG Leakhena	F	Development of a bio-filter system model to control air pollution toward industrial application	HEIP	2021-2023	I	2
17	Dr. HEU Rina	F	Improving Sustainable Water Supply and Sanitation in Cambodia: Case of Tonle Sap Lake's Floating Villages		2021-2023	N	2

18	Dr. KET Pinnara	F	Integrated approach of precise irrigation and sustainable soil management to improve crop water productivity in Cambodia through ITC soil laboratory development: the focus on rice farming		2021-2023	N	1
19	Dr. BUN Saret	M	Development of Eco-Friendly and Low-Cost Wastewater Treatment System as an On-Site Product		2021-2023	N	2
20	Dr. CHHUN Kong	M	Development of Climate Data Information System for Cambodia		2021-2023	I	2
21	Dr. OEURNG Chantha	M	Strengthening Flood and Drought Risk Management and Early Warning System in Lower Mekong Basin of Cambodia		2021-2023	N	2
22	Ms. MOUN Ratha	F	Termite bioturbation in Cambodia-From Characterization to Application (PhD project)	ITC and BGF	2019-2022	I	1
23	Dr. SONG Layheang	M	Impact of Land Use Change and Climate Change on Surface Runoff and Suspended Sediment in the Mekong Basin (PhD project)		2019-2022	I	1
24	Dr. SOK Ty	M	Dynamic Transport of the Sediment and Nutrient in the Mekong River Basin and the Role of the Tonle Sap: Assessment Coupling Data and Modelling Approaches (PhD project).		2019-2022	I	1
25	Dr. PENG Chanthol	F	Aquaculture in Cambodia: Sustainability and Risk Prevention (AquaCam)	French Embassy	2020-2022	I	1
26	Dr. CHAN Rathborey	M	Development of Electrocoagulation Reactor Integrated Sedimentation for Turbidity and Color Removal from Industrial Wastewater	LBE-JICA	2021-2023	N	2
27	Dr. KET Pinnara	F	Prototype of Low-cost and Smart In-vessel Composter for converting Spent Mushroom Substrates to Bio-Organic Fertilizer	LBE-JICA	2021-2022	N	2

Researchers

Dr. PENG Chanthol (Head of WAE Research Units), Dr. Eng. in Life Science and Technology, Tokyo Institute of Technology, Japan.

Food and Environmental Microbiology, Water Quality Monitoring

Dr. CHHOUN Kong, Ph.D. in Environmental Engineering, University of the Philippines-Diliman and Tokyo Institute of Technology, Japan.

Environmental Hydrology, integrated water resources management, watershed hydrology

Dr. ANN Vannak, Ph.D in Water Science and Technology, Universitat de Girona, Spain

Water-Soil-Plant-Microorganism Interactions and Biodiversity, Hydrologic processes in a river basin, Climate change-related topics

Dr. DOUNG Ratha, PhD in Environmental Engineering, University of Philippines Diliman (UPD) and Tokyo Institute of Technology (TIT), Japan

Hydrogeology; groundwater modeling; coastal aquifer management

Dr. KET Pinnara, Ph.D. in Agricultural Science and Biological Engineering, University of Liege-Gembloux Agro-Bio Tech, Belgium

Irrigation water saving for crop production

Dr. OEURNG Chantha, Ph.D in Water Resources Engineering, INP, Université de Toulouse, France

Hydrological modelling, Irrigation and Watershed Management

Dr. PEN Sytharith, Ph.D in Environmental engineering, Hokkaido University, Japan

Bed instability in suspended load dominated environments

Dr. TY Bore Borey, Ph.D. in Environmental Engineering, University of the Philippines-Diliman and Hokkaido University, Japan

Leaching, Wastewater Treatment, Water and Wastewater Treatment, Ion Exchange Resins

Dr. EANG Khy Eam, Ph.D. in Sustainable Resources Engineering, Hokkaido University, Japan.

Environmental Geochemistry, Water Environment, Hydrogeology, Geochemical Modeling and Solute Transport, Sustainable Resources Management, Geomechanics and Rock Slope Stability

Dr. KHOEURN Kimleang, Ph.D. in Sustainable Resources Engineering, Hokkaido University, Japan.

Water and Wastewater Treatment, Mine Water and Remediation, Heavy Metal Leaching and speciation, Extraction, Sorption-Desorption Processes, Environmental Chemistry, Geochemical Modeling, Environmental Pollution and Waste Management

Mr. LUN Sambo, Master in Geological Engineering, Gadjah Mada University (UGM), Indonesia

Groundwater management and evaluation, Water Supply and Sanitation

Dr. SOK Ty, PhD in Functional Ecology and Environment (Double Degree) from National Polytechnic Institute of Toulouse (INP-Toulouse), France.

Hydrology, Water Resources, Climate change and Environmental Monitoring and Assessment

Dr. SONG Layheang, PhD in Continental Surfaces and Interfaces, Hydrology, Université Toulouse III - Paul Sabatier, France.

Hydrology, Soil Erosion, Disaster and Agricultural Irrigation and Modeling.

Ms. SANG Davin, Master in Environmental Engineering, Kasetsart University, Thailand

Water and Wastewater Treatment, Membrane Technology

Mr. KIM Lengthong, Master in Water Resources and Environmental Engineering University of Peradeniya, Sri Lanka

Hydrology, Hydraulic model, Hydrodynamics model, Hydrologic model

Ms. MUON Ratha, Master in Environmental and Water Resource Engineering, University of Peradeniya, Sri Lanka

Soil science, Water management, Wastewater management

Dr. HEU Rina, Dr. Eng. in Civil and Environmental Engineering, Tokyo Institute of Technology, Japan.

Water Quality and Environmental Assessment, Water Treatment Technology, Environmental Ecosystems, Water Supply and Sanitation

Dr. Chan Rathborey, Dr. Eng. in Environmental Engineering, Kasetsart University, Thailand and Tokyo Institute of Technology, Japan.

Wastewater Monitoring, Wastewater and Solid Waste Treatment

Mrs. CHANTO Monychot Tepy, Master in Environmental Design, Kanazawa University, Japan

Water Quality and Pollution, Biological Wastewater Treatment, Environmental Biotechnology, Microbial Community Analysis, Environmental and Food Microbiology

Mr. CHAN Ratboren, M. Eng. in Environmental Engineering, Kasetsart University, Thailand.

Water Quality Assessment, Water and Wastewater Treatment, Membrane Bioreactor, Antibiotics Treatment.

Mrs. HANG Leakhena, M. Eng. in Environmental Engineering, University of The Philippine Diliman, Philippines.

Indoor/Outdoor air pollution

Ms. DOEURN Seyha, Master's degree in Environmental Management, Kyoto University, Japan

WASH (Water, Sanitation and Hygiene), Drinking Water Quality, Water Supply and Wastewater Characterization

Academic Partners

Royal University of Agriculture, Cambodia

Royal University of Phnom Penh, Cambodia

Tokyo Institute of Technology, Japan

Tokyo University of Agriculture and Technology, Japan

University of Girona, Spain

Université de Toulouse, France

Université de Liège-Gembloux, Belgium

CARE, Ho Chi Minh City, Vietnam

Guilin University of Technology, China

Wuhan University, China

Kanazawa University, Japan

Kyoto University, Japan

Chulalongkorn University, Thailand

University of Nantes, France

CNRS, France

IRD, France

Non-academic partners

Ministry of Education, Youth and Sports, Cambodia
 Ministry of Water Resources and Meteorology, Cambodia
 Ministry of Rural Development, Cambodia
 Ministry of Industry and Handicraft, Cambodia
 Ministry of Public Works and Transport, Cambodia
 Ministry of Environment, Cambodia
 JICA, Japan
 JST, Japan
 AFD, France
 APN, Japan
 Etc.

Industrial Partners and NGOs

Phnom Penh water supply Authority
 SAFEGE
 BORDA
 GRET
 B2G
 Weventure

Selected publications of WAE researchers since 2010

From 2010 to May 2022, there are in total of 162 research outputs from WAE unit classified into three categories: International publications, Local publications, and Conference and Proceedings as shown in the table below.

Table 23. Summary of number of research publications of WAE by year from 2010 to 2022.

Publication classification/year	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	Total
International publications	12	11	15	27	15	3	4	1	2	6	2	3	3	104
Local publications	2	6	3	5	5	5	5	4	7	2	-	-	-	46
Conference/ Proceedings	-	14	-	-	-	-	-	-	-	-	-	-	-	14
Total	14	31	18	32	20	8	9	5	9	8	2	3	3	162

(-) stand for missing information.

International publications

1. Wai, M.P.; Chem, V.; Eang, K.E.; Chhin, R.; Siev, S.; Heu, R. Accessing the Impact of Floating Houses on Water Quality in Tonle Sap Lake, Cambodia. *Sustainability* 2022, 14, 2747. <https://doi.org/10.3390/su14052747> (IF:3.25)
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- R., Tang, Y., Huot, H., Dussès, D., Bottinelli, N. (2022). The impact of termites on soil sheeting properties is better explained by environmental factors than by their feeding and building strategies, *Geoderma*, 412: 115706. <https://doi.org/10.1016/j.geoderma.2022.115706> (IF: 6.11)
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5.5. Research Facilities

Due to the international collaboration (Embassy of France, ARES-CCD, AUF), ITC is able to launch the teaching activities and research. From 2010-2011, ITC has received a number of new equipment from Japanese government. Other equipment has been supported during 2014-15 due to the research project financed by ARES-CCD. These equipments will facilitate the research activities, teaching and strengthen the cooperation activities with industries. It is important to note that the SATREPS project, approximately 1.5 M\$ are reserved for the purchase of new equipment for research. About 90% of research equipment has been delivered to ITC. In this 2019, ITC received 350 MRIels from the government of Cambodia through the ministry of education, youth and sport for research facility. Furthermore, ITC also received 7 M\$ from the government of Cambodia under the World Bank loan. Table below presents the laboratory by research unit.

Table 24. Laboratories of ITC by research unit.

Research unit	Name of laboratory
ETM	<ul style="list-style-type: none"> • Power Lab • Energy Lab • Thermal Lab • Fluid Mechanics Lab • Internal Combustion Engine Lab • Biomass Energy Lab
FTN	<ul style="list-style-type: none"> • Food Microbiology Lab • Food Chemistry Lab • Physicochemical and Analytical Chemistry Lab • Organic Chemistry and Biochemistry Lab • Food Processing Lab • Hall Technology • Chromatography Lab (ASS, HPLC and GC-MS) • Plant Biotechnology Lab
MIT	<ul style="list-style-type: none"> • Computer Lab • Networking Lab • Mobile Develop Lab
MSS	<ul style="list-style-type: none"> • Materials Science and Engineering Lab • Geotechnical Lab • Civil Engineering Lab (Asphalt Lab, Materials Engineering Lab and Soil Mechanic Lab) • XRD and XRF Lab

WAE	<ul style="list-style-type: none"> • Hydrology and Hydraulics Lab • Water Quality Lab (Water Chemistry, Water Supply) • Soil Lab • Topography Lab • GIS and Remote Sensing Lab
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5.6. Research and Innovation Dissemination

5.6.1. Techno-Science Research Journal

Techno-Science Research Journal is a peer reviewed Journal that is hosted and published by Research and Innovation Centre (RIC) of ITC. In 2013, Techno-Science Journal was released its first volume containing 11 research papers that have been published, and its recently published volume 9 of 20 papers in 2021 (**Error! Reference source not found.**). By contributing from institutional stakeholders, faculty staffs and researchers mainly from Chemical Engineering and Food Technology, Civil Engineering, Electrical and Energy Engineering, Geo-resources and Geotechnical Engineering, Industrial and Mechanical Engineering, Information and Communication Technology, and Rural Engineering, the number of research papers submitted to this journal is increased year by year. Until December 2021, there were 9 volumes of Techno-Science Journal with a total paper of 100 research papers have been published. For the upcoming Vol 10 (issue 1) to be released in June 2022, we already have 5 papers accepted and additional papers are in list of editorial process. To disseminate the research output, the research findings in those research papers have been organized to share in national and international conferences. Furthermore, each volume of our journal has been printed out about more than 100 hard copies circulated to relevant institutions and stakeholder among our network.

For the improvement of our journal, the editorial boards have been working harder. Our commitment is to be indexed our journal in ACI (ASEAN citation index) by the ASEAN Committee in 2023. From our commitment and efforts, it is hopeful that in the near future the Techno-Science Research journal will be indexed by ACI.

5.6.2. RIC Website

Research and Innovation Center (RIC) of ITC has published an own website (<https://ric.itc.edu.kh/>) supported by ARES-CCD since 2018. This website is created with two main purposes, to provide descriptive information on research units as well as RIC research potential and to facilitate the communications (external and internal). Data management and record including online researcher application form has been established and used from 2018-2019 then the online permission request for researchers has been updated in 2019-2020. In 2020-2021, under KPI improvement part of HEIP project, RIC website has been updated especially on researcher profile and KPI. With this update, researcher does not require to complete KPI excel file at the end of academic year anymore, the system can generate KPI based on the input data in the researcher profile.

5.7. Report of International Consultant for improving the governance of RIC

Under HEIP, ITC has hired an internal consultant to define the proper plan for research and development at ITC. The four-month assignment of the consultant is to characterize the research environment at ITC, and develop the strategy development plan as well as the research operation manual.

The consultant has developed a practical operation manual (OM). The main objective of OM is to guide new researchers, especially fresh graduated from oversea and become researcher, to well understand about how to work as a researcher at ITC. The career path of OM shows researchers how they will be in the future through the academic tract. Moreover, it is such kind of orientation document for researcher, where, who and how to be contacted for troublesome.

The consultant has interviewed with internal and external stakeholders for understanding the research environments in Cambodia as well as at ITC. The findings are framed using SWOT analysis framework. The framework uses strengths, weaknesses, opportunities and threats to frame the analysis findings.

Strengths in this framework describe what the ITC excels at and what separate it from other institutes in the country and the region; they help the ITC to achieve its objectives. **Weaknesses** stop the ITC from performing at its optimum level; they hinder the achievement of its objectives. **Opportunities** refer to favorable external factors that could help the ITC to achieve its objectives, whereas **threats** refer to factors that have the potential to harm the ITC and that could prevent the ITC from achieving its goals as shown in Table below.

5.8. Conclusion

The structuring of research units at ITC has been a substantial move to promote the research at ITC. The research activities at ITC plays an important role. New equipment and Research and Innovation Center will facilitate the research and teaching activities. The equipment also contributes to the project development between ITC and industries as well as other partners. Due to the scientific publication and participation in conferences by researchers, the research capacity of ITC lecturers has been well recognized with the increasing ITC visibility in the field of engineering. It is noted that ITC has committed our best to finance the research activities at ITC. Since 2012, ITC has secured 20% of its annual budget for research and innovation. In addition, the commitment from the government of Cambodia has shown a lot of positive improvement to ITC as provided 7.92 MUSD for research and innovation.

Comparing to 2020-2021, we observed that the total projects decreased accordingly due to the termination of 9 AFD/EU projects and some LBE projects. Among 90 ongoing projects in 2021-2022, about 68 % of the projects are applied and development researches which contribute to social development, and strengthening the collaboration with industries. For example, one of the grant projects which is SATREPS contributes significantly to the society through the creation of Platform for Aquatic Ecosystem Research and the international symposium has been held every year to share the research outputs to stakeholders. The research results are in response to the policy of Ministry of Environment, Ministry of Water Resources and Meteorology, and Tonle Sap Authority. On the other hand, 22 research projects with private sectors have been conducted within this fiscal year. For instance, Higher Education Improvement Project (HEIP) projects, ARES-CCD projects, Pierre Fabre, Erasmus+ projects are in close collaboration with private sectors, which is in accordance with ITC perspective. Furthermore, there are many other small research projects with SMEs which are the usual practical collaboration between each department and private sectors and SMEs.

In conclusion, it is clear that most of these projects contribute mainly to the development of Cambodia through the research applications. Nevertheless, the RIC should keep improving the research governance and research environment of RIC/ITC to moving forwards.

6. National and International Cooperation

6.1. Memorandum of understanding and Memorandum of agreement

In the framework of internationalization, ITC, like other leading universities in the world, wishes to have more new local, regional and international partners, in order to develop collaborations and to enlarge its multilateral relations. As a result, for the academic year 2021-2022, 10 documents including 7 memoranda of understanding and 3 framework agreements have been signed between ITC and its partners. In this regard, it is worth noting that the support and funding from the World Bank is important and is pushing ITC to have more concrete cooperation and activities with the institutions with which we have signed the MoU. The below table illustrates these details:

No	Name of institution	Country	Date	Type (MoU/MoA)
PROTOCOLE D'ACCORD (MoU)				
1	Université de Nantes (Département de transport et infrastructure)	France	2022-05-22	Protocole d'accord/MoU
2	Siemens Digital Industries Software and steaming Cambodia	Singapour	2022-04-12	Protocole d'accord/MoU
3	The official launch of the food technology research and Innovation plaform (UNIDO)	UNIDO	2022-02-08	Protocole d'accord/MoU
4	Griffith University	Australia	2022-1-11	Protocole d'accord/MoU
5	Global Green Growth Institute (GGGI)	GGGI	2021-11-1	Protocole d'accord/MoU
6	The United Nations Development Programme	UNDP	2021-7-20	Protocole d'accord/MoU
7	Université Sorbonne Paris Nord	France	2021-7-16	Protocole d'accord/MoU
ACCORD DE COOPÉRATION (MoA)				
1	Convention de cotutelle de thèse (Université Libre de Bruxelles)	Belgium	2021-7-27	MoA
2	Cooperation Agreement on jointly supervised doctoral thesis (Université de Sorbonne)	France	2021-7-23	MoA
3	Inter-institutional Agreement (INP Toulouse)	European Commission	2021-7-16	MoA

For this year 2021-2022, despite the Covid-19 pandemic, ITC's cooperation with its partners remains good and fruitful.

6.2. Internship and visit

6.2.1. Foreign student at ITC

As part of multilateral inter-university exchanges, for this 2021-2022 academic year, due to the spread of Covid-19, there are 10 foreign students, six of whom are students of the ECAM LaSalle international program, launched on October 11, 2021, two from the GIC department and one from the civil engineering department. Detail information is shown in Annex 21.

6.2.2. Big university visits/meetings and other

For this academic year 2021-2022, as part of the strengthening of international relations, several official visits and meetings have taken place, one after the other at the ITC. The following table shows only the most important ones.

No	Nom de l'organisme ou de l'université	Pays	Date
1	Visite de l'ambassadrice indienne	Inde	2022-06-01
2	Réunion avec M. ALI Badarneh, Chef de la Division des systèmes alimentaires durables de l'agro-industrie, ONUDI et Dr. Shetty Seetharama Thombathu, Conseiller technique pour Capfish Post Harvest Fisheries Development	UNIDO	2022-05-18
3	Réunion avec M. Valentin Rodriguez, directeur adjoint et attaché culturel de l'Institut français du Cambodge	France	2022-05-13
4	Réunion avec le Comité d'Accréditation du Cambodge (ACC)	Cambodge	2022-05-12
5	Rencontre avec les chercheurs de l'IRD, impliqués dans le projet JEAI HEALTHY RICE	France	2022-05-09
6	Rencontre avec Mme Rebekah Bell, nouvelle représentante du pays chez l'Organisation des Nations Unies pour l'alimentation et l'agriculture-FAO	FAO	2022-05-09
7	Réunion de travail avec le CEO de la compagnie VOLTRA	Cambodge	2022-05-03
8	Recontre avec l'ambassadeur de la Fédération de Russie	Russie	2022-04-12
9	Réunion avec la compagnie chinoise Baosteel Canning (Cambodia) Co., Ltd	Chine	2022-04-05
10	First Meeting with Baosteel Canning (Cambodia) Co., Ltd	China	2022-04-04
11	Meeting with GTV Motor Co., Ltd	China	2022-03-21
12	Visite du maire de la ville de Metz	France	2022-2-11
13	Rencontre avec Adèle GROS MARTIAL, représentante du pays chez l'IRD	Institut de Recherche pour le	2022-2-2
14	M. Kaoru TSUDA (Jica-Cors)	Japon	2022-1-21
15	Innauguration du laboratoire Biomedical	République tchèque	2022-1-17
16	Patric Obertelli, inspecteur de la Commission des Titres d'Ingénieurs (CTI)	France	2022-1-10
17	Visite de l'entreprise Cart Tire Co., Ltd	Chine	2022-1-5
18	Visite du directeur de Département général de l'éducation de Prey Veng et Gouverneur du district PEARING	Cambodge	2021-12-21
19	M. André SPIEGEL, directeur de l'institut Pasteur du Cambodge	France	2021-12-6
20	Plantation des plantes (Cambodia-Asia) ITC-MoE	Cambodge	2021-11-30
21	Réunion HEIP-ITC-NUBB (FoodStem & LBE Project)	Cambodge	2021-11-23
22	Innauguration du laboratoire ITC-GEAR Group	Corée + Cambodge	2021-11-17
23	Visite du mine d'or de Mondoukiri	Australie	2021-10-26
24	Lancement du programme international ECAM LaSalle	France	2021-10-11
25	Rencontre avec les anciens étudiants de l'ITC ayant fini leurs études en nucléaire civil en Russie	Cambodge	2021-8-11

6.2.3. Foreign organizations on the ITC campus

As the Cambodia Institute of Technology places more emphasis on research and innovation, we have foreign organizations on our campus that are involved in different areas of research with ITC researchers. These international bodies are as follow:

1. Agence Universitaire de la Francophonie (AUF)
2. Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD)
3. Institut de Recherche pour le Développement (IRD)
4. Laboratory Based-Education (LBE)
5. Japan International Cooperation Agency (JICA)
6. Global Green Growth Institute (GGGI)

For the operation of these organizations, they have 30 people (staff, researchers and international experts) who are in full activity from different countries: United States, Australia, United Kingdom, Belgium, France, Italy, Japan and Laos.

6.3. Collaboration with industries

6.3.1. Seminars for lecturer and student

- 1) 15th Feb 2021 to 19th April 2021, 3 Lecturers from GCI and MLMUPC were joining an online workshop on ***“Ensuring Safety in the Construction Sector and Built Environment”*** organized by Queensland University of Technology, Australia.
- 2) 04th May 2021, GIM were joining online workshop on ***“Call for SDF proposals”*** organized by Skills Development Fund (SDF).
- 3) 26th June 2021, GIM were joining online workshop on ***“Get ready for Master's Degree”*** organized by Thermal Lab. The topic was about Introduction to Thermal Lab, Research topic and proposal, Application and document required, Stay motivated with your research.
- 4) 31st July 2021, GIM were joining online workshop on ***“Preparing yourself to be a research student and preparing your final year thesis”*** organized by Thermal Lab. The topic was about Final year thesis progress: Tips and communication with advisor, Oversea exchange program and progressive planning for final year thesis, Why should you join research activities as a student? And how to be one?.
- 5) On 26th – 27th August 2021, deputy head of UIL organized a two days training with topic related ***“Agri-Food Opportunity and Development in Cambodia”*** for lecturers and researchers of the Faculty of Chemical and Food Engineering. 28th August 2021, GIM were joining online workshop on ***“Practical knowledge, career path and prospect of thermal energy engineering”*** organized by Thermal Lab, GIM and AFU. The topic was about Intensive Training: MEP (GIM alumnus), Solar PV (GIM alumnus, Thermal Lab alumnus), Steam Powerplant (Thermal Lab alumnus), Automotive manufacturer industry (GIM alumnus), Panel discussion, Thermal Energy (panellists including Dr. Kong Rithy, Dr. Nguon Kollika, and Dr. Chan Sarin).

- 6) 15th September 2021, GCI and CHIP MONG were having an online webinar on **“Cement Technologies webinar”** to strengthen knowledge of Cement fabrication, store and uses for civil engineering students (120 participants).
- 7) 25th September 2021, GIM were joining online workshop on **“Thermal Lab alumni call”** organized by Thermal Lab.
- 8) 25th September 2021, GIM were organized an online training on **“Soft-skill Training”** via Zoom.
- 9) 01st October 2021, GIM were joining online workshop on **“QC 7 tools”** organized by Denso Cambodia.
- 10) 23rd October 2021, GIM were joining online training on **“A glance of energy efficiency in Cambodia”** organized by Thermal Lab and EnergyLab. The topic was about Introduction to energy efficiency (Dr. Kinnalesh Vongchanh), Training curriculum/program for energy efficiency in ITC (Dr. Kim Buntheoun), Research projects and implementing projects related to energy efficiency in ITC (Dr. Chan Sarin), Experience sharing from students (Thermal Lab Master student), Introduction to CEECOMP (Energy Consultant, Thermal Lab alumnus). Moreover, the training was a part of Clean Energy Week Cambodia and Thermal Lab PhD and Master students were selected as Clean Energy Youth Ambassador.
- 11) 23th October 2021, GIM were organized an offline workshop on **“AC training”**.
- 12) 03rd November 2021, GCI, Fyfe Asia Pte Ltd, Singapore, ITC, AiSD, BECL, NPIC, Fuxin, EEC (~150 participants) were having an online webinar on **“TYFO FIBWRAP SYSTEMS WEBINAR”** to Innovate technology of strengthening and repairing structure.
- 13) 03rd November 2021, GCI, CHIP MONG INSEE (~120 participants) were having an online webinar on **“Concrete Technologies webinar”** to enhance knowledges of concrete mixes and uses in the construction.
- 14) On 17th November 2021: UIL was organizing a research output seminar on **“Dissemination on Chemical and Food Technology toward Local Products Development in Cambodia”** for SMEs and stakeholders.
- 15) 27th November 2021, GIM were joining online training on **“Publishing a research paper”** organized by Thermal Lab. The contents of the training were about an introduction to a research paper (Mr. Dara Seyhak), Process of publishing a research paper (Dr. Hin Raveth), Preparing your manuscript and selecting a journal for your paper (Dr. Kong Rithy), Introduction to Techno-Science Research Journal (Dr. Eang Khyeam).
- 16) 20th-24th December 2021, GIM were joining online training on **“Energy audits and management”** organized by National Productivity Council, India and APO Secretariat.
- 17) 12th January 2022, GIM were joining online workshop on **“Heat Stress”** organized by Thermal Lab. The topic was about heat stress on the society, a focus on the occupational sector and sustainable solutions (Assoc. Prof. Dr. Jason Kai Wei Lee, NUS) and the updates on heat stress Cambodia project (Dr. Kinnalesh Vongchanh, ITC).
- 18) 08th January 2022, GCI and Y Chhe Group were joining an online workshop on **“Our Home 2030”**.
- 19) 19th January 2022, GCI and Greenway Asia were joining an online workshop on **“Soil stabilizer”**.
- 20) 22nd January 2022, GIM were joining online training on **“Laboratories and design tools for mechanical engineering”** organized by Thermal Lab and Materials Science and Engineering Lab. The contents of the training were about, Opening remark (Dr. Nguon Kollika), Thermal

Laboratory (Mr. Chea Vabotra, PhD student, Thermal Lab), Materials Science and Engineering Laboratory (Mr. Mut Mesa, Lecturer, GIM), Dynamic and Control Laboratory (Mr. Sarit Chanvirak, Master student, DC Lab), Engineering Design & Manufacturing Laboratory (Mr. Siev Keanan, I5 student, GIM), Closing remark (Dr. Chhith Saosameth).

- 21) 7th – 8th – 14th February 2022, deputy head of UIL, researchers and students of GCA were having an online meeting with Ms. Marlaina Ross from Casual Design (US company) to have the discussion and coordination of training on “techniques of analysis E.coli using dry compact plate and Helminth eggs using Mini-float methods”. The training offers by Casual Design expert based in US and the Training was delivered to GCA members.
- 22) 21st April 2022, deputy head of UIL, deputy director of ITC and GRU representative were joining an online symposium organized by RUN Network about sharing research among universities network and the research links to textile industry.

In total, there are 22 seminars were organized for ITC students and lecturers in order to learn the new update technology from industries and improve the capacity of ITC and lecturers at ITC on the new update technology.

6.3.2. Joining Seminar and workshop that Organized by other organization/ Ministries/Universities/ abroad

- 1) On 5th March 2021, deputy head of UIL were Joining 1st consultation workshop on “***Demand analysis of a quality infrastructure system (QIS) for agricultural products in Cambodia***” for the presentation on preliminary findings of demand analysis of a quality infrastructure system for agricultural products in Cambodia.
- 2) On 5-6th April 2021, deputy head of UIL was Joining virtual workshop on “***Application process of Joint training program between SMEs and university***”. The training program project is supported by SDF (Skills Development Fund). The workshop introduced the process of application and eligibility of applicants.
- 3) On 22nd April 2021, deputy head of UIL was joining online workshop on “***National Laboratory Testing Service***”. The workshop organized by Ministry of Industry, Science, Technology and Innovation. The main objective is to present about the testing service and operational processes at the National Laboratory.
- 4) On 19th May 2021, deputy head of UIL and ITC student were joining online event on “***Successful Career Planning***” organized by Chip Mong Insee company in collaboration with UIL-ITC. The event purpose is to promote job opportunity for engineering students in Cambodia.
- 5) On 7th June 2021, deputy head of UIL were joining event on “***CAPFish-Capture: Panel discussion on fostering food safety through partnership***”. The event provided panel discussion on linkage between university, private sectors and ministries to support the safe food system in Cambodia.
- 6) On 7st July 2021, deputy head of UIL, Mr. HEL Chanthorm and Dr. CHHITH Saosameth from GIM were joining online workshop on ***SDF (Skill Development Fund)*** program. The workshop was presented about the SDF program and support from SDF team on proposal preparation and application to get the fund.
- 7) On 26th July 2021, deputy head of UIL was joining online workshop on ***ISO/IEC 17025*** about the document preparation for ISO application for lab accreditation.

- 8) On 3rd August 2021, deputy head of UIL was joining *CapFish* workshop.
- 9) On 16th August 2021, deputy head of UIL were joining lecture on ***Industrial Network and Partnership with KMUTT (Thailand)*** about the industry collaboration structure and strategy for the case of KMUTT.
- 10) On 25th August 2021, deputy head of UIL was joining lecture on ***Industrial Network and Partnership with KMUTT (Thailand)*** about the Industry collaboration structure and strategy for the case of KMUTT.
- 11) On 20th October 2021, UIL joined Chip Mong ***Virtual Career Fair*** that to help university students to discover their potentials and explore career opportunities at Chip Mong and its business units in various industries.
- 12) From June to November, 2021, representative of UIL from GIM, joined the professional training on Production Manager organized by CJCC.
- 13) On 17th November 2021, Ggear Group and ITC did the handover ceremony of lab Lab AirCond for GIM department.
- 14) On 1st December 2021, deputy head of UIL were joining a seminar on ***IP of fabric sector*** about IP registration and framework for fabric sector in Cambodia.
- 15) On 21st to 23rd February 2022, head of UIL joined a training on intelligence marketing.
- 16) On 28th January 2022, deputy head of UIL was joining online workshop on international student mobility and higher education of age of Covid 19.
- 17) On 27th – 28th January 2022, deputy of UIL was joining online forum about entrepreneurship.
- 18) On 9th March 2022, head and deputy head of UIL and LBE representative were joining online webinar organized by UK on **Efficiency for access design challenges: Connecting academic with industry**, to know how important of the academic to industry in various fields.
- 19) On 16th March 2022, deputy head of UIL was joining online JCC seminar organized by LBE.
- 20) On 18th March 2022, deputy head of UIL was joining an event on **Entrepreneurship Ecosystem** organized by Khmer Enterprise and Seis contacts about the importance of business ecosystem and UIL.

In total, there are 20 seminars and workshops that ITC lecturer-researcher joined in order to improve the capacity.

6.3.3. Enterprise visit at ITC

- 1) 02nd February 2021, DAIKIN Malaysia and GA Aircon paid a visit to ITC in addition to participating in Handing Ceremony of VRF system to GIM.
- 2) On 25th June 2021, deputy head of UIL was having a physical meeting with Dr. Guillaume Taing from Bodia Company to discuss about the scope of collaboration agreement and tour visting to GCA laboratory.
- 3) On 27th August 2021, Krassna Management company, and Yamato Green Co., Ltd visited laboratory of GCA and RIC.
- 4) On 21th October 2021, Mr. SEIYA Ashikari and Mr. KOJINO Ohtani from Ecologie (Japanese Company) was having laboratory visit all laboratories at GCA to see the available facility (lab equipment) for the research collaboration on cricket processing.

- 5) On 6th December 2021, André SPIEGEL, director of the Institute of Pasteur visited ITC to discuss about the potential collaboration between ITC and IPC.
- 6) On 22th December 2021, deputy ambassador of Australia, Mr. Andreas Zurbrugg and 4 SMEs namely Yang Li Yi Tofu, Green Fresh Market, WoT-Natural Moringa and Kirirum Food Processing Co., Ltd. visited GCA laboratory and tried some developed food products.
- 7) On 22th December 2021, RIC member, Head and Deputy head of UIL office met with Mr. Kenji Tsuzaki from SUNWASPA Co., Ltd. to discuss on research collaboration pro of LBE Project had a meeting with SUNWASPA to discuss on “Research collaboration, exchanged internship students”.
- 8) 23rd December 2021, Chip Mong Insee paid a visit to ITC in addition to participating in lab tours and to collaborate with GCI on laboratory standards.
- 9) On 22th December 2021, deputy head of mission (DEOM), from Australian Embassy visited ITC to research for future collaboration.
- 10) On 05th January 2022, deputy director of ITC and team met with Cart Tire Co., Ltd in order to discuss on curriculum of materials science and engineering at ITC, MoU, student job opportunity and internship, collaborations, exchanged training and visiting between ITC and company.
- 11) 28th January 2022, IKEE Chip made a visit to ITC in terms of engaging in lab visits and establishing research collaborations with GCI, GTR, and GGE on plastic waste and AC recycling.
- 12) On 30th January 2022, Patric Obertelli, member of Commission des Titres d'ingénieurs visited ITC to discuss about the collaboration with ITC on the international program ECAM LaSalle.
- 13) On 5th January 2022, Head and deputy head of UIL and LBE representative were having a meeting with DENSO (Cambodia) Co., Ltd, on content about Explanation of purpose and contents of OpenHouse event to DENSO, aiming to invite DENSO to be as a presenter at the event sharing collaboration experiences with ITC.
- 14) On 6th January 2022, deputy head of UIL and representative of GRU were having meeting with researcher from SUNWASPA Co., Ltd on content about discussion on research collaboration on waste water treatment.
- 15) On 6th January 2022, deputy head of UIL was having meeting with representative from Sevea on content about get to know company and sharing ITC services to the company.
- 16) On 13th January 2022, head and deputy head of UIL and LBE representative were having a meeting with TEM Trading Co., Ltd, on content about explanation of purpose and contents of OpenHouse event to company, aiming to invite company to be as a presenter at the event sharing collaboration experiences with ITC.
- 17) On 19th January 2022, deputy head of UIL and LBE representative were having a meeting with representative from CEE Camp, on content about get to know the company profile and sharing ITC service to the company.
- 18) On 22nd February 2022, deputy head of UIL and LBE representative were having meeting with SOG Design to discuss about ITC's services related with water engineering.
- 19) On 2nd March 2022, head and deputy head of UIL were having an online meeting with Mr. KRY Sokda from TEM Trading Co., Ltd to discuss about website content for engineering jobs in Cambodia. The company wanted to link their website with ITC.

- 20) On 21st March 2022, deputy head of UIL, GIM representatives and deputy director were having a meeting with Mr. Clement Cheng from GTV Motor on the discussion about possibility of integrating an automobile engineering program to ITC under cooperation with Chinese university at Chong Chhing University.
- 21) On 4th April 2022, deputy head of UIL, deputy director of ITC and GIM representative were having a meeting with Baosteel Can Making (Cambodia) Co., Ltd to discuss about the possibility of recruiting ITC students from GIM, GEE, GGG and chemical engineering.
- 22) On 5th April 2022, deputy head of UIL and representative from GEE were having a meeting with Global Camstar Co., Ltd to discuss about training service to company staffs on electronical device and properties, and properties of cement powder (GEE and GCI).
- 23) On 11th April 2022, deputy head of UIL and GCA representative were having an online meeting with Dr. Guillaume Taing (R&D manager) from Bodia Cambodia Acropathy to discuss on possible research collaboration linked to cosmetic production using essential oils and the planing to have company visit with students and researchers to the company cosmetic production factory.
- 24) On 11th April 2022, head and deputy head of UIL and LBE were having a meeting with Cambodia Fish Farm (Japanese company) to discuss about the testing service for fish and fish powder.
- 25) On 13th April 2022, deputy head of UIL, director and deputy director of ITC were having a meeting with GM an CEO of Sumitronic Manufacturing about the company's profile and discuss on possible collaboration and visit ITC laboratory.
- 26) On 21st April 2022, deputy head of UIL and deputy director were having a meeting with GTV motor to discuss on education program and needs of ITC to integrate automobile engineering major at ITC.
- 27) On 22nd April 2022, deputy head of UIL and GEE representative were having online meeting with Dr. Nabeshima, CEO of Yamato Green Co., Ltd, to discuss on collaboration agreement for research on smart controlling system for smart agriculture of company.
- 28) On 18th May 2022, deputy head of UIL were having a meeting with Mr. Tep Sovichea from SOLAGEO company to get to know company and introduce services which providing by ITC to the company and discuss on possible collaboration between ITC and the company.
- 29) On 18th May 2022, deputy head of UIL were having a meeting with representatives of the Prince Group to discuss on organizing a career session at ITC.
- 30) On 27th May 2022, deputy head of UIL and representative of GEE were having an online meeting with Yamato Green Co., Ltd to finalize collaboration agreement on smart controlling system and discuss about food processing collaboration.

In total, there are 30 industries visited to ITC with the main objective to search for future collaboration.

6.3.4. ITC lecturers and students visit the industries

- 21st January 2021, GIM were having a visit to ISI Steel Co., Ltd with the purpose of observe what can be contents of upskilling for QC staffs.
- 21st March 2021, GIM were having a visit to ISI Steel Co., Ltd for Training Production and QC staffs on Basic Knowledge of Steel.

- On 29th July to 01st August 2021 Dr. ENG Chandoeum and other 4 researchers from GGE were having a visit to Sambo Prei Kuk National Authority to discuss challenges such as maintenance and repair of temples to reach a Memorandum of Understanding between the Faculty of Mines and Geology and Sambo Prei Kuk National Authority in Kampong Thom Province.
- On 9th September 2021, deputy head of UIL and FTN research unit visited two SMEs producing salts. An SME is located at Kompot province and the other one is located at Kompong Speu province. The purpose of the visit is to see and assess the problem of the salt processing, then developing a research project to solve the problem. The trip is supported by AFD.
- On 16th-19th October 2021, Dr. CHHUON Kong Dean of Faculty HRE and other researchers were having a visit to Link Anco water supply company in Sihanouk Ville province to conduct the linkage and collaboration between the researchers from the department of hydrology and water resources and the Anco Water Supply, To request for the location and set up field monitoring equipment's in Kbal Chhay area which is under management of the company and To plan the discussion on the proposal of MoU between to the faculty and the company so that they can support the internship and other research activities in water supply sector.
- 21st October 2021, GIM were having a visit to ISI Steel Co., Ltd for Training Production and QC staffs on Mechanical Properties of Materials
- On 26th October 2021, the top management of ITC visited Renaissance Minerals company to study observed and search for collaboration between ITC and company.
- On 23th December 2021, Head of UIL and two researchers from FIN was having a visit to Kirirum Food Production Plant in Kampong Speu Province to research and collaborate on a new mango by-products project in Kirirum Food Production Plant, such as mango oil from seed and animal feed from mango peel.
- On 24th December 2021 Head of UIL and two researchers from FIN was having a visit to La Plantation Pepper Farm in Kampot Province to do observation and conduct research on spices such as pepper and turmeric in drying solar machine at Pepper Farm in Kampot and to schedule a meeting to discuss the faculty's proposal for a Memorandum of Understanding with the company so that they can support internships and other research activities in the food and agricultural supply sector.
- 29th January 2022, GIM were having a visit to K-Cement in Kompot, with the aim of visiting the control room and waste heat recovery department.
- On 24th to 28th January 2022, dean of Chemical and Food Engineering faculty and three researchers visited the Agri-SuD international and Baca Villa at Siem reap province to search for research collaboration on processing of Turmeric.
- On 2nd February 2022, researcher-lecturer from Chemical and Food Engineering faculty visited WOT-Natural Khmer Moringa to study observed and conduct experiment on the Moringa and turmeric processing.
- On 6th – 8th April 2022, deputy head of UIL representative form GEE, GCI, and GRU were joining a visiting Yamato Green Co., Ltd at Mondulkiri to conduct a visit on smart agriculture farm of the company and discuss on collaboration and to identify collaboration topics on smart controlling system and smart irrigation system for green house vegetable planting.

- On 25th April 2022, deputy head and assistant of UIL brought GCA students of different levels to visit food processing at the Yamato Green Co., Ltd (Japanese company) to let students earn more knowledge at practical stage through student-company engagement program organized by UIL. The visit aimed to discuss with the company on possible collaboration linking to food processing.
- On 10th May 2022, deputy head and assistant of UIL were brings 8 GCA students (I3 to Master) to visit the cosmetic factory plant of Bodia Cambodian Apothecary at Kandal Province, aiming to increase engagement between students and company and helping to promote chemical engineering field at ITC. The visit aimed also to identify possible collaboration between Chemical Engineering and the company.
- On 20th – 23rd May 2022, deputy head and assistant of UIL with researcher and students from GCA were visiting bioethanol making factory of SUNWASPA Co., Ltd at Kompong Chnang province, to discuss about the education program and needs of ITC to integrate chemical and food engineering major at ITC.

In order to strengthening the collaboration with industries, ITC top management, UIL office and researcher-lecturers from faculties have been visited to industries. For 2021-2022, there are 16 visited have been organized.

6.3.5. Event Organization

- On 19th May 2021, ITC in collaboration with Chip Mong Insee organized a career fair for ITC students.
- On 20th October, 2021, ITC in collaboration with Chip Mong Group organized a career fair for ITC students.
- On 14th January 2022, ITC in collaboration with JICA, organized a career fair on “Career development program for ITC students and other university students.
- On 11th February 2022, ITC in collaboration with JICA organized an event namely: ITC-Industry Open House 2022 (Work Smart Together for Sustainable & Bright Future) with the objective to promote the services of ITC to the public and private sectors.
- On 4th May 2022, UIL were organizing career session with Chip Mong Insee to show about company profile, career journey at the company, networking session between company and ITC students to GIM and Gee students.
- On 5th – 6th May 2022, deputy head of UIL, Faculty’s staffs and RIC’s staffs were joining the 11th scientific day of ITC. UIL had facilitated with companies those joint booths exhibition and provide sponsorship to the event.
- On 11th May 2022, UIL and Cart Tire Co., Ltd (Chinese company) were organizing a career session about the company profile, career journey at the company, networking session between company and ITC’s students, joining by GIM, GCA and GGG students.
- On 18th May 2022, UIL and CAMBREW Ltd (Angkor Beer company) were organizing a career session to show about company profile, graduate trainee program, and job opportunities at the company to GIM, GCA and GEE students.

There are 8 events have been organized by UIL office and faculties of ITC. The event is mainly focus on create a connect for ITC with the private sector.

6.3.6. Project developed with SMEs and other services

- On 22nd September 2021, Department of Industrial and Mechanical Engineering had developed a project with Som Sokha Machine Shop on “Tensile test of Laminate Elastomer Bearing Pad”.
- 23th August 2021 to 23th September 2021, GEE paid a visit to Global Camstar Co., Ltd with the purposes of giving a training service on electrical systems with 4 Modules include Overview of electrical system and lighting system (4h), Electrical Socket (4h), LV Cable (4h) and Circuit Breaker (4h).
- In 2021, with the financial support of Cavac and Khmer Enterprise, faculty of Chemical and Food Engineering offered the service of technical consulting and food product development and improvement to five Food SME. In total, 10 food products were developed and improved the quality.
- 2021-Present: Research collaboration with SUNWASPA Co., Ltd (Japan company) on ethanol production, and solid/liquid waste treatment
- February-May 2022: Project contract on research and testing of helminth egg and E. Coli with Casual Design company.

From 2021 to May 2022, ITC offered 2 technical short course training to industries and got 9 projects in collaboration with industries.

6.3.7. Conclusion

The following actions of UIL by 2022 are:

- **Develop internal policy/manual:**
Policy/manual for collaboration agreement with private sectors will develop for ITC. Collect information from all faculties to develop ITC business services (extension, training, consulting): Process requirements, financial policy (e.g. overhead cost to ITC, cost to faculty), Report requirements.
- **Strengthen internal collaboration:**
Prepare internal manual for the scope/limitation of the collaboration, roles/responsibilities of UIL to facilitate the faculty. UIL representative of all faculties, RIC (expected twice a year).
- **Promote ITC business services and collaboration:**
 - Prepare poster/manual indicating all availability of ITC services in the engineering/scientific fields
 - Making a UIL-ITC Facebook page or UIL-ITC website is considering
 - Organize seminar/workshop/ career fair
 - Engage private sectors to research project
 - Prepare regular meeting with industries

However, to implement these activities, UIL will face with following challenge:

- Less support/collaboration from ITC faculty and difficult to collect database (information of activities implemented by faculty) from them. Then, it can be failed to control information/data for which in turn it is difficult to set strategic plan development for UIL correctly.
- Limited financial budget to promote/marketing ITC business services to private sectors
- No enough policies/manual yet for operating collaboration/business services. It takes much time and need supports from all faculties and direction to develop the policies/manuals
- Very small UIL full time staffs are working at UIL office comparing to the increased activities and number of private sectors contacting to ITC, this is not enough to support the customers (private sectors) well which in turn fall to have collaboration for some cases.

Annex

Annex 1. Minutes of meeting of the International Consortium Meeting on 30 March 2021.

Liste de présence à la réunion du Consortium 2022

En présentiel / On site

1. S.E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC
2. M. GIGAUDAUT Christophe, attaché de coopération et d'action culturelle de l'Ambassade de France au Cambodge
3. S. E. Dr OM Romny, directeur général de l'ITC
4. M. Ludovic PROTIN, directeur honoraire de l'ITC
5. Prof. MARTIAL Adèle, directrice Bureau IRD
6. Prof. Frédéric DEBASTE, Université Libre de Bruxelles
7. Prof. Michel VERLEYSSEN, Université Catholique de Louvain
8. M. Jeff Laflamme, Chief Technology Officer of Khmer Dev
9. Prof. Thomas VALLEE, attaché de coopération scientifique et universitaire
10. Prof. André SPIEGEL, directeur de l'Institut Pasteur du Cambodge
11. Prof. Takada JUN-Ichi, vice-président of Tokyo Tech
12. Prof. Watanabe KOICHIRO, JICA Senior Advisor
13. M. Éric REMACLE, ARES
14. Prof. Christine LEROY, ARES
15. Prof. Christine DASNOY, Université de Liège
16. Prof. Bruno DARRACQ, Université Paris-Sud, IUT d'Orsay
17. Prof. AUBERT Pascal, Université Paris-Saclay
18. Prof. Bastien VINCKE, Université Paris-Saclay
19. Prof. Yann CHARLES, Institut Galilée, Université Paris 13
20. Prof. DOSSANTOS-Usarralde Pierre, École Nationale Supérieure de l'informatique pour l'industrie et l'entreprise (ENSIIE)
21. Prof. Frédéric KUZNIK, Insa Lyon
22. Prof. Christian OBRECHT, Insa Lyon
23. Ms. Ikue EDA, Jica
24. Prof. CASAER Karolien, Global Green Growth Institute (GGGI)
-
25. Dr. CHUNHIENG Thavarith, directeur adjoint de l'ITC
26. Dr. PO Kimtho, directeur adjoint de l'ITC
27. Mr. SOY Ty, directeur adjoint de l'ITC
28. Dr. OEURNG Chantha, directeur adjoint de l'ITC
29. Prof. Bruno DAGUES, conseiller
30. M. NUTH Sothân, conseiller de l'ITC
31. Dr. SIM Tepmony, directeur de la formation du 3^{ème} cycle
32. Dr. OR Chanmoly, directeur du Centre de recherche et d'innovation
33. M. SIEANG Phen, responsable des relations internationales
34. M. CHHUON Kong, doyen de la faculté d'hydrologie
35. Dr. Nguon Kollika, chef du département de génie mécanique et industriel
36. M. LAY Heng, vice-doyen de la faculté de génie électrique
37. Dr. IN Sokneang, doyenne de la Faculté de Génie Chimique et Alimentaire
38. Dr. HAN Virak, doyen de la faculté de génie civil
39. M. KHIEV Samnang, responsable du service informatique
40. Dr. LIN Mongkulsery, vice-directeur du Centre de Recherche et d'Innovation et chef du département de Mathématiques Appliquées et Statistiques
41. Dr. BUN Kim Gnun, doyen de la faculté de Génie de Géo-Ressource et de Géotechnique
42. Dr. ENG Chandoeurn, vice-doyen de la Faculté de Génie de Géo-Ressource et de Géotechnique

En ligne / Online

43. M. Fabien MEHEUST, directeur adjoint régional de l'AUF Asie-Pacifique
 44. Prof. MAUSSION Pascal, vice-président des relations internationales, Toulouse INP
 45. Prof. CHAISERI Siree, Kasesart University
 46. Dr. CHRIN Phok, Chef du département de génie électrique et énergétique
 47. Dr. SRENG Sokchenda, Chef du département de génie Télécoms et réseau
 48. M. LY Hav, Vice-doyen de la faculté de génie civil
 49. M. YOU Vandy, chef adjoint du département de génie informatique et communication
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Accueil des participants et ouverture de la réunion

En introduction, S.E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et **Présidente du Conseil d'Administration de l'ITC**, souhaite la bienvenue à l'ensemble des membres du Consortium international d'appui à l'ITC et les remercie pour leur participation à cette réunion annuelle importante.

La Présidente du CA témoigne de toute la reconnaissance de l'ITC pour le ministère de l'éducation, de la jeunesse et des sports, ses partenaires venant des pays francophones (France, Belgique, Canada...) et aussi anglophones (Japon, Thaïlande...), puisque l'ITC est non seulement francophone mais aussi anglophone. Ce carrefour linguistique fait de l'ITC un pôle de formation des techniciens et des ingénieurs très connu dans la région parmi les pays de l'ASEAN. Tous ses sincères remerciements vont aux partenaires bien appréciés de l'ITC. « La formation à l'ITC correspond bien au besoin du marché du pays », a-t-il précisé. C'est donc important pour le développement durable de l'économie du Cambodge. Plus l'économie se développe, plus on a besoin des mains-d'œuvre qualifiées. C'est là, notre mission de l'ITC!

Après le discours de bienvenue de son Excellence Madame la présidente, monsieur GIGAUDAUT Christophe, attaché de coopération et d'action culturelle de l'ambassade de France au Cambodge, a adressé son discours à l'ensemble des participants :

*Excellence,
Mesdames,
Messieurs,
Chers amis,
Et chers collègues,*

D'abord, permettez-moi de féliciter pour l'institut un excellent travail que vous avez réalisé et aussi les documents de travail aujourd'hui. Notre réunion de Consortium se passe quelques jours avant la fête de la Francophonie, permettez-moi donc, en tant que représentant de l'ambassade de France, de féliciter une Francophonie extrêmement vivante au sein de l'ITC. L'an dernier, nous avons eu une réunion à distance et cette année, en présentiel, c'est déjà une excellente chose.

L'ITC est un ébahissement de l'enseignement supérieur et de recherche de haut de niveau avec une forte collaboration avec l'ambassade de France et ses parties prenantes. Dans cet établissement, il existe plus de 5000 étudiants qui apprennent le français, c'est un nombre important. Vu cette ampleur, l'ambassade de France apporte un soutien en octroyant des bourses aux étudiants méritants, avec la participation du ministère de l'éducation, de la jeunesse et des sports. L'ITC est riche en coopération internationale : IRD, CIRAD, AFD, ECAM LaSalle, École nationale des Ponts et Chaussées etc. Ce partenariat international est en train de s'enrichir. L'ITC est un environnement francophone exceptionnel, grâce à la présence des étudiants français dans le cadre du projet ECAM LaSalle. Les étudiants cambodgiens et français se mêlent, ce qui est riche en termes de visibilité francophone. Nous avons également la présence des autres établissements de haut niveau de formation et de recherche tels que : École polytechnique, IUT de Saint-Nazaire, Insa de Rennes, Insa de Lion etc., ces établissements et l'ambassade de France sommes toujours à côté de l'ITC pour l'accompagner.

Je tiens à féliciter et remercier son excellence OM Romny qui a fait beaucoup d'efforts pour que l'ITC et l'ambassade de France arrivent à réaliser des tâches intéressantes, durant sa bonne gouvernance.

Merci beaucoup et je vous souhaite d'excellents travaux.

S. E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Merci beaucoup, monsieur Christophe GIGAUDAUT. Now, I would like to remind you that our cooperation with Japan started in 2000 and it has been more than 20 years. I would therefore like to thank the colleagues from different universities from Japan for their support in terms of human resources and equipment. This essential support allows ITC to be a training center for high-level engineers in the region. I would like now to give the floor to Professor Watanabe.

Prof. Watanabe KOICHIRO, Jica Senior Advisor

Thank you Madam Sackona. I am now a Senior Advisor for Jica in Tokyo. I am always happy to work with ITC.

S.E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Thank you, Professor.

Maintenant, notre partenaire belge, qui est venu en appui à l'ITC, depuis 1917. Ça fait 25 ans.

Prof. VERLEYSSEN Michel, Université Catholique de Louvain

Merci madame la présidente. Mes collègues francophones de Belgique et moi-même, nous sommes ravis d'être ici à la réunion du Consortium à l'ITC pour continuer de travailler ensemble. En écoutant et lisant les documents du Consortium, nous pouvons constater beaucoup de projets réalisés et de belles missions accomplies par l'ITC. Au nom de mes collègues présents ici dans la salle, je tiens à féliciter toutes les réalisations que la direction de l'ITC a achevées pour les années écoulées. Bien sûr, les travaux auxquels nous nous sommes consacrés étaient fructueux en termes d'enseignement et de recherche. L'ancien projet a pris fin en 2022 et un autre nouveau projet intitulé « Appui institutionnel » le remplacera, nous avons de la conviction que ces projets ont apporté beaucoup de choses en termes de coopération à l'ITC et à nous aussi, dans les deux sens ITC et universités belges. Sachant que nous sommes là pour le Consortium et pour le reste du temps, on regarde ensemble avec les collègues de l'ITC les nouveaux programmes qui touchent ce nouveau projet.

Merci

beaucoup.

S. E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Merci beaucoup professeur. Now, i would like to give the floor to Professor Takada from Tokyo Tech. So, please, professor.

Prof. Takada JUN-ICHI, vice-president of Tokyo Tech

Good afternoon, everyone,

We are happy to come back to ITC after two years because of Covid-19. Despite covid-19, we had the opportunity to work together to discuss with ITC colleagues several things about the LBE project. I am happy to be a member of Consortium and I like the discussion avec you. Thank you very much.

M. Fabien MEHEUST, directeur adjoint régional de l'AUF Asie-Pacifique

Madame la ministre,

Excellence,

Mesdames,

Et Messieurs,

Je suis ravi de faire part de cette réunion du Consortium international d'appui à l'ITC. C'est une première pour moi. Certes, l'ITC est pour moi un établissement francophone modèle qui a un bon rayonnement dans la région avec lequel l'AUF. L'AUF est depuis 18 ans avec l'ITC, soit notre coopération a commencé en 2004. En tout cas, merci à toute l'équipe de l'ITC pour tous les travaux accomplis et surtout pour les

documents particulièrement riches mises à note disposition. Et vous pouvez compter sur l'AUF pour le soutien du Startup. Merci beaucoup.

Adaptation de l'ordre de jour de la réunion

Madame la présidente a présenté cet ordre de jour à tous les participants en précisant que certains membres ont travaillé avant la réunion et d'autres après la réunion pour enrichir la discussion des activités réalisées de l'an dernier et la présentation des stratégies et perspectives pour l'année à venir (modifications des programmes ou présentation de nouvelles options etc.).

Programme de la réunion du Consortium international d'appui à l'ITC (14 mars 2022)

14h00-17h30 au Cambodge / 8h00-11h30 en France / 16h00-19h30 au Japon

14h00-14h30 : Mot de bienvenue de S. E. Mme PHOEURNNG Sackona, présidente du Conseil d'administration et ministre de la culture et des beaux-arts

14h30-15h15 : Présentation du rapport d'activités

15h15-15h45 : Q & A

15h45-16h00 : Pause-café

16h00-16h30 : Présentation du rapport de stratégies et perspectives

16h30-17h00 : Discussion et Q & A

17h00 : Discours de clôture de la présidente du Conseil d'administration

Présentation

Afin de ne pas alourdir le compte-rendu, nous ne citons que quelques remarques importantes de chaque présentation.

M. SOY Ty, directeur adjoint de l'ITC

Il a présenté les événements marquants du fait que Dr. OM Romny est pris par une autre réunion.

A) Événements marquants

- 1) Certificat de félicitations international de Jica à Dr. OM Romny, le 22 décembre 2021
- 2) Concours des robots national et international
- 3) Lancement du programme international ECAM LaSalle
- 4) Concours d'entrée à l'ITC 2021
- 5) Visite de la mine d'or du Cambodge
- 6) Inauguration du laboratoire de l'analyse de nanostructure et de chimie
- 7) Inauguration du centre d'expérimentation scientifique et technologique
- 8) Inauguration du laboratoire de génie biomédical
- 9) Les journées portes-ouvertes ITC-INDUSTRY
- 10) The 1st International Conference on Earth Resources and Geo-Environment Technology (EraGET2022)
- 11) Première pierre à l'atelier « STEM » sur le campus de l'ITC à Kampong Cham

B) Résumé des activités et résultats des études

- À cause de la Covid-19, les cours à l'ITC sont donnés en ligne
- La date de l'examen du baccalauréat était reportée
- Le concours était aussi en ligne
- Nombre de candidats inscrits au concours : 3392 dont 50 à Tbongkhmum
- Nombre de candidats admis : 1728 dont 25 à Tbongkhmum
- 3 étudiants acceptés dans deux grandes écoles de France : 1 dans l'école polytechnique et 2 dans l'école nationale de la statistique et de l'administration économique Paris (ENSAE)
- Nombre des professeurs : 342/87 femmes (93PhD, 180Master et 69 autres)
- Employabilité : 76% ont trouvé du travail, 17% continuent les études, 7% autres

Dr. SIM Tepmony, directeur de la formation du 3^{ème} cycle

Il a présenté les deux formations master et PhD :

- Il existe 8 programmes de master
- Nombre d'étudiants de master : 122/39 femmes
- Nombre de bourses : 58 (12 HEIP-NUBB-SRU/28 EU-AFD/13 ITC-HEIP et 4 CAVAC, USAID, ARES-CCD)
- Nombre de diplômés : 2017-2022 = 277/61 femmes
- Employabilité : 80% (440\$-590\$)

- Il existe 5 programmes doctoraux (5 unités de recherche).
- Nombre d'étudiants : 55/17 femmes (ETM=10/FTN=10/MSS=11/MIT=19/W&E=5.)
- 34 étudiants en cotutelle avec des universités en France et en Belgique.
- Co-financement et partenaire : MoEYS, MEF, ITC, HEIP, NPIC, NIPTIC, KIT, BGF, ARES, AUF, IPC, CCCA etc
- Nombre de diplômés : 4/ 1 femme
- Nombres de partenaires dans le cadre de HEIP : Chulalongkorn University, Kasetsart University, Curtin University, INP-ENSEEIH, ENSIIE, Institut Teknologi Bandung

Mr. LAY Heng, vice-doyen de la faculté d'électricité

Le Centre E-Learning a réalisé les activités suivantes :

- 40 cours en ligne développés pour l'ITC
- 11 cours pour l'UNESCO-BEEP
- 9 cours pour le CIRAD (RUA)
- 3 cours pour partenaires
- 77 pour CIESF-IT Passport Examination Preparation BOOK
- 74 Maths and Khmer contents grade 12 for MoEYS

M. SIEANG Phen, directeur des relations internationales

Le perfectionnement & la mission d'enseignement et la coopération internationale sont présentés dans cette partie :

Le perfectionnement et la mission d'enseignement :

- Formation de longue durée (master et PhD):
 - Nombre de professeurs : 25
 - Nombre d'étudiants : 35
- Formation de courte durée (stage):
 - Nombre de professeurs : 19
 - Nombre d'étudiants : 11
- Nombre de séminaires organisés par différents départements: 4
- Nombre de mobilité enseignante entrante : 2 (1 de l'Université de Paris Sorbonne dans le département GIM et 1 autre de l'université de Liège dans le département GIC)

La coopération internationale:

- Nombre de nouveaux de protocole d'accord (MoU) signés : 5
- Nombre d'accord-cadre de coopération (MoA) : 3
- Nombre d'étudiants étrangers : 9
- Nombre de grandes visites : 14

Mlle IN Sokneang, doyenne de la faculté de génie chimique et alimentaire et responsable de la cellule d'interface (UIL)

Le perfectionnement et la mission d'enseignement et la coopération internationale sont présentés dans cette partie :

La cellule d'interface :

- Nombre de séminaires pour étudiants et enseignants: 19
- Nombre de visite des entreprises à l'ITC : 13
- Nombre de visite des enseignants chez les entreprises
- Nombre de projets développés avec les PME : 5
- Formation de courte durée : 3

- Journée Portes ouvertes (Open House) : 70 entreprises/ONG (Renforcer les relations avec les entreprises)
-
- Développer un manuel pour la cellule d'interface
- Continuer de renforcer les liens avec les entreprises
- Promouvoir les services commerciaux...

Dr. OR Chanmoly, directeur du Centre de Recherche et d'Innovation (RIC)

Le centre de recherche et d'innovation est composé de :

- 41 chercheurs senior
- 35 enseignants chercheurs
- 37 chercheurs à temps plein
- Structure de la recherche : 5 unités de recherche
- Nombre de chercheurs : 113 contre 12 en 2010
- Nombre de projets : 84 contre 12 en 2010
- Deux grands projets du RIC : SATREPS et HEIP
- SATREPS sera fini en mars et le nouveau portant sur « la qualité de l'air au Cambodge » commence en juillet 2022
- Journal de Recherche Scientifique et des Technologies Associées
- Lancement de la 11^{ème} Conférence Internationale : En présentiel et en ligne
- Amélioration de la gouvernance du RIC :
 - Amélioration du système de l'indicateur clé de performance (KPI)
 - Développement du système de gestion du laboratoire
 - Établissement d'un cadre de diffusion des résultats de la recherche
 - Développement d'une plateforme de soumission de publication scientifique en ligne

Première discussion/First Discussion

Après avoir écouté les six premières présentations, nous pouvons en discuter. La parole est à vous tous, en présentiel et en ligne. Je pense que vous avez travaillé avec vos collègues de l'ITC pour parler des activités réalisées et de celles pour l'année à venir. Vous pouvez donc faire des commentaires et remarques. Je suis à votre écoute.

After listening to the first six presentations, we can discuss now. The floor is yours, for the people who is on site and online. I think you have worked with your colleagues at ITC to talk about the activities carried out and those for the coming year. You can therefore make comments and remarks. I'm listening to you.

M. Yann CHARLES, directeur adjoint aux relations internationales, Institut Galilée, Université Paris 13

For the scientific journals that you mentioned, they will be indexed, right? In this case, that's interesting, in my opinion. But my question is whether it can be accessed online. You know, when we talk about impact-factors, it is important that all documents are online for consultation.

Dr. OR Chanmoly, directeur du Centre de Recherche et d'Innovation (RIC)

Thank you, professor, for your question. yes of course they will be online.

M. Ludovic PROTIN, directeur honoraire de l'ITC

D'abord, je voudrais donc remercier l'ITC et sa direction et ses départements pour le la qualité des documents produits comme tous les ans; on a un état des lieux plus que remarquable de sa qualité en cet instant précis et on peut comparer d'une année sur l'autre, on peut comparer effectivement la progression ou la baisse, l'avantage de ces documents alors je vous rappelle que l'ITC s'est approprié le nécessaire en 2004 et donc en 2004, un corps professeur entièrement cambodgien et une direction entièrement cambodgienne. À partir de ce moment-là, on peut se poser comme ça se pose dans certains pays, sur la qualité de la poursuite du fonctionnement de cet établissement de l'ITC. Et bien, ce document montre effectivement que depuis des années, non seulement l'ITC a poursuivi sa progression entièrement avec sa direction et son fonctionnement, son corps professionnel entièrement cambodgien. C'est quelque chose de remarquable qu'il faut quand même noter dans cette région.

Alors, là, je voudrais reprendre quelque chose qui a inquiété pas mal de mes collègues notamment mes amis belges, en ce qui concerne l'augmentation des étudiants. L'augmentation des étudiants, elle a été très importante en 2004-2006 pour une nécessité, c'était des problèmes de finance mais il faut absolument augmenter le nombre et puis progressivement, ce n'est plus un problème de finance c'est un problème de mettre à la disposition des entreprises et des ONG et des administrations cambodgiennes, les personnels compétents donc voilà donc maintenant c'est une réalité. Alors à l'époque, la grosse question que se posaient les membres du CA, c'était notamment nos collègues, c'était, est-ce que cette augmentation rapide va nuire à la qualité de l'enseignement? Voilà c'était la grosse question qui se posait à l'époque. Je crois que dans le document, nous a vu aujourd'hui, on a la réponse l'une des principales préoccupations de l'ITC, ça a été toujours ça. Aujourd'hui, le document nous montre qu'il y a une poursuite de perfectionnement des enseignements. À l'époque, je me rappelle, cette poursuite se faisait essentiellement dans quelques pays : la Belgique, le Japon, la France. Maintenant sans doute, grâce à l'impulsion du directeur, Monsieur OM Romny, il existe une diversification très importante du nombre de pays où l'ITC intervient. Ça, c'est une progression très importante par rapport à ce que j'ai connu. C'est-à-dire que l'ITC a beaucoup de collaborations. Avant, c'était dans quelques pays, mais maintenant, la formation des enseignants se fait dans plus d'une quinzaine de pays d'après ce que je sais. Donc, vous voyez la diversité c'est quelque chose de remarquable pour l'ITC et je crois qu'effectivement ce développement qu'il y a eu, il a eu sous l'impulsion de deux directeurs, madame la Présidente du CA et puis Monsieur le directeur, OM Romny. Je crois qu'il faut aussi remercier Monsieur pour cette impulsion qu'il a donnée à l'établissement et je crois qu'on pourra tous le féliciter effectivement à ce niveau-là. Alors, ma question, c'était de savoir dans les formations, des formations évidemment, c'est sur un budget puisqu'il faut envoyer des professeurs à l'étranger se former. À l'époque, pour la formation le perfectionnement des enseignants il y avait des bourses, il y avait des bourses de la France, de la Belgique, partout. J'ai pas trop bien vu mais j'ai peut-être pas bien regardé maintenant quelle source de financement pour le perfectionnement des étudiants. Est-ce qu'il y a toujours un budget au niveau de l'ITC ou est-ce que c'est toujours des bourses extérieures, voilà ma question.

S. E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Merci, Monsieur PROTIN.

Donc, nous allons répondre à deux questions. Je peux laisser Dr. OR Chanmoly répondre à cette première question qui touche les journaux scientifiques. Est-ce qu'il y a des impacts factor? C'est en ligne?

Dr. OR Chanmoly, directeur du Centre de Recherche et d'Innovation (RIC)

Thank you, Madam. Thank you, professor, for your question.

Currently, we are working on the platform. We are developing the platform. The platform has two parts. One part is the submission. That means the author can submit and then the reviewer can access to our platform and the management, and the administration also are on this. The second part is the kind of advertisement or solving our product. In that page, also you can search engine, you can search like the title, the key word, the abstract. So, the that wanted to be at least of the publication that has already started with the September already. Yes, at the end of the year the platform will be launched for submission and as well as for public. Thank you.

S. E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Merci beaucoup. Je reviens à question de quantité et qualité. Comme monsieur PROTIN l'a mentionné, tout à l'heure. Le nombre d'étudiants de l'ITC augmente. À ce propos, c'est lié à deux raisons. La première, c'est le besoin des entreprises. Si vous observez, depuis les dix dernières années, l'économie du Cambodge a connu considérablement son développement. On a besoin des mains-d'œuvre dans plusieurs domaines : électricité, géo ressource, génie civil, environnement etc. Très peu d'universités privées assurent de telles formations. C'est à nous donc de les prendre en charge. Il y a dix ans, on ne parlait pas de mines mais maintenant, on en parle. C'est en rapport avec la politique du gouvernement. Je me souviens de l'an 1998, à ce moment-là, j'étais un seul docteur à l'ITC et puis un an après, c'est monsieur OM Romny. Mais la situation actuelle est compétemment différente. L'ITC consiste en 90 enseignants qui ont mené à terme leurs études doctorales, formés dans différents pays, grâce aux bourses de divers bailleurs de fonds : AUN/Seed-Net, AUF, BGF etc. La plupart d'entre ont été formés en France et en Belgique. Seuls les enseignants de langue soient formés localement.

En ce qui concerne le budget, en général, il provient des frais de scolarité. On en déduit une partie pour donner

des bourses aux étudiants et surtout les étudiants d'origine des zones rurales. Par exemple, le montant dû à payer pour les filles est inférieur à celui des garçons, soit 450\$ au lieu de 600\$. Nous avons une autre bourse octroyée par la banque mondiale pour valoriser la formation de STEM. Toutes les constructions des infrastructures de l'ITC sont la charge du gouvernement. Quant aux partenaires étrangers de l'ITC, ils nous apportent un soutien en termes d'équipement et de ressources humaines.

Grâce à tous ces facteurs, l'ITC peut devenir ce qu'il est actuellement. Malgré tout, la qualité de la formation ne peut pas se passer du perfectionnement des enseignants. C'est pour cela, la mobilité des enseignants pour une formation de courte durée, sous forme de séminaire ou conférence etc. Oui, bien sûr, l'écho de la bonne réputation de l'ITC, c'est grâce à la bonne gouvernance de la direction de l'ITC dont Dr. OM Romny fait partie mais il va partir en retraite en avril.

J'en profite pour vous dire que l'ITC est le seul établissement dans lequel le Conseil d'administration nomme le directeur et son équipe de directeur. Le 22 février 2022 dernier, la réunion extraordinaire du Conseil d'administration a eu lieu et il accordé sa confiance, à l'unanimité, à Dr. PO Kimtho, successeur de son excellence Dr. OM Romny. Son parcours académique était intéressant, il a eu son diplôme d'ingénieur de France, son master de Thaïlande et son doctorat du Japon, de Tokyo Tech dont le Professeur Takada est le vice-président. Donc, félicitations !!!! Vous pouvez donc désormais continuer de travailler avec lui pour le développement mutuel de nos institutions.

Une autre précision sur le quantitatif, le nombre d'étudiants inscrits après le concours est de 1500 juste pour les deux premières années de base, foundation year. Entre 15% et 20% d'entre eux vont obtenir des bourses d'études pour aller dans d'autres établissements au Cambodge et à l'étranger. L'objectif est d'avoir un nombre suffisant que nous avons prévu initialement lorsqu'ils sont en 5^{ème} année.

M. Ludovic PROTIN, directeur honoraire de l'ITC

Madame la présidente, juste pour vous valoriser deux chiffres importants : 30% du corps professoral de l'ITC a eu une formation du 3^{ème} cycle et 17% pour les autres établissements de l'enseignement supérieur au Cambodge.

S. E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

La voilà. C'est une remarque importante. C'est la raison pour laquelle l'ITC attire l'attention des chercheurs et il a beaucoup de projets. Le ministère de l'éducation, de la jeunesse et des sports considère l'ITC comme un établissement modèle.

Dr. OEURNG Chantha, deputy director of the Institute of Technology of Cambodia

Good afternoon excellency, ladies, and gentlemen,

Allow me to present you this part of strategy and perspectives of ITC. So far ITC has developed a 10-year strategic plan that run from 2021 to 2030 that enable ITC to become a very dynamic and different institution in terms of education, teaching, and research. We have a clear vision, structure of the strategies. we have envisioned we have empowered we have enabled, and we have energized systems to achieve our strategies.

The main perspective of ITC to become a leading institution that focus on efficiency and excellence offering the academics and research, science, technology, innovation engineering and transfer knowledge to the communities.

Strategy of ITC 2021-2030:

ITC has developed 5 strategies to achieve the objectives:

1. Establish and apply an academic program that responds to market needs with national and international recognition,
2. Develop human resources and modernize technology for good governance, management, and financial affairs,
3. Develop physical infrastructure and modernize laboratories,
4. Establish investment projects and applied research projects targeting technology start-up and transfer,
5. Modernize data information system for dissemination of activities and results to the community.

Strategy and perspective for 2022-2023

We have some main action plan to achieve the minimum quality standard based on IQA system. It is important that all internal programs meet nationally standardized standards. This requires all teachers to be well prepared,

not only teaching but also laboratory, library, and other teaching materials. All departments must ensure that all standards must be met at a minimum by the year 2023. With HEIP (the higher education improvement project) supported by the World Bank, ITC created the “Pre-degree” program with Curtin University, Australia. It is a double degree program. This program allows the Cambodian student to study one year at ITC and 2 or 3 years at Curtin University. It is a program that attracts the attention of Cambodian students who are interested in the high-quality international program. Before, only students with the possibility could study abroad, but now such a program exists at ITC. Currently, the economy of Cambodia has changed a lot and some families are able to afford these tuition fees for their students.

Another program in civil engineering is also offered to students. As part of this program, the student can spend a semester in an ITC partner university, in France, in Thailand ... The courses are given by ITC professors and professors from our partner universities. At the end of this training, the student can have a double degree. This program is planned for the year 2024. Why, this program? You can see the needs and opportunities in this area of construction. Today's Cambodia needs these workers.

A Research on coastal waters will also be launched with the support of the Ministry of the Environment and with the participation of foreign partners: IRD for example. We have a lot of developments: investment of resorts and hotels to welcome tourists in the coastal regions and on the islands. This could pollute the biodiversity and ecosystems of the sea. But, we have a lot of research in fresh water but not in sea water. That why ITC wants to go in this direction. ITC is planning to launch it in the near future.

A Center of Research and Technology Transfer (CRTT) will be created with funding from the Ministry of Economy and Finance. If the documents are approved, we can receive around 23 million US dollars to develop this kind of center. This center will play an important role of R&D, especially the innovation and technology transfer to the private sector.

Another point is that we have about 100 doctoral lecturers and we have a lot of projects, as Dr. Moly mentioned, with the funding from ADB, Word Bak, AFD, AUF, JICA...

Knowing that the SATREPS project is finish and we are moving towards another project that brings “air quality research”.

For the UIL, as Dr. Sokneang mentioned, we need more private companies to visit our labs. The more they know well the capacity of our laboratories, the more projects they do. Also, we need more members for the consortium with the companies and more participation for the open house that we organize every year.

S. E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Merci beaucoup pour la présentation. J'ai une question. Pourquoi, a-t-on besoin seulement de 17000 diplômés de l'ITC pour le développement du Cambodge?

Dr. OEURNG Chantha, deputy director of the Institute of Technology of Cambodia

Merci pour la question, Madame. 17000, c'est le nombre des étudiants formés pour la période de dix ans du fait que nous avons annuellement en moyenne 1500 nouveaux étudiants. Mais avec notre nouveau camp, on peut en avoir plus.

S. E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Pour moi, je n'en suis pas convaincue du fait que votre méthode de calcul n'est pas convaincante. Un autre point, en ce qui concerne la recherche et la coopération. Nous savons très bien que nous passons de la qualité de l'eau à la qualité de l'air. Pour ce projet, 4 ou 5 universités du Japon vont faire des recherches conjointes avec 4 ou 5 universités au Cambodge, plus certains ministères. Dans ce cas-là, je me demande pourquoi les grandes universités partenaires de l'ITC en Europe, ne peuvent pas en faire partie. La présence de ces collègues occidentaux peut nous apporter une variété de commentaires, de recommandations. Je pense qu'on peut mobiliser nos collègues de différentes nationalités dans cette recherche. Je ne sais pas, vous en savez plus que

moi. Pour moi, plus on est nombreux, plus on est riche en stratégies, technologies, méthodes de recherche etc. Voilà mes deux remarques.

Dr. OEURNG Chantha, deputy director of the Institute of Technology of Cambodia

Merci madame pour vos remarques. Je me permets de vous apporter quelques explications complémentaires. Pour les projets SATREPS et la recherche de la qualité de l'air, c'est le Japon qui les finance. Ce financement était possible à condition que certaines universités japonaises puissent mener cette recherche avec les chercheurs dans les pays en voie de développement tels que le Cambodge, la Thaïlande. Pour la recherche de la qualité de l'air, nous avons trois universités locales qui y participent : Institut de Technologie du Cambodge, Université des Sciences de la Santé.

En ce qui concerne les recherches en tant que telles, nous allons voir si l'on peut faire venir d'autres collègues des universités membres de l'ITC.

S'agissant du nombre de 17000, nous avons discuté à plusieurs reprises avec les chefs de département.

Dr. OR Chamoly, directeur du Centre de Recherche et d'Innovation (RIC)

Thank you. I can bring you a few more words to better understand air quality research. In fact, we have been working with Kanazawa university on air quality for more than 10 years. That's why we have connections with this university and other Japanese universities. Another important thing is the nature of the project called ODA (Official Development Assistance). It is a project between government and government. This project therefore went through the Ministry of Foreign Affairs and International Cooperation.

S. E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Merci pour la clarification. Je sais et je comprends ce que vous avez dit mais de toute façon, c'est possible. Par exemple, au Ministère de la Culture et des Beaux-Arts, nous avons le projet Mekong-Lancang pour lequel nous faisons venir des chercheurs partenaires pour travailler ensemble même ce projet ne touche que les pays en Asie qui le Mékong. Par exemple, le département de génie chimique et alimentaire possède des partenaires en France, en Thaïlande. Là, ce n'est pas impossible que vous soyez ensemble. Il s'agit d'une forme de coopération bilatérale même cela ne se dit pas dans le projet. Bref, c'est ma recommandation.

M. Ludovic PROTIN, directeur honoraire de l'ITC

Je crois que vous avez raison Madame la Présidente d'alerter sur ce problème de chiffres de prévision à long terme. C'est quelque chose qui est difficile à faire et qu'en plus peut être dangereux. Donc, je crois que c'est au niveau de la rédaction, il faut bien signaler dans votre rédaction dans quelle mesure ces chiffres ont été présentés comment ils ont été fait et surtout prendre les précautions d'usage, c'est-à-dire si quelque chose change, ce chiffre est souvent complètement transformé de façon qu'on ne puisse pas reprocher dans 6 ou 8 ans d'avoir donné tel chiffre vous pouvez le donner il y a pas de problème mais il faut le préciser dans la rédaction dans quelles conditions et comment vous avez calculé ça. Madame a raison.

S. E. M. OM Romny, directeur général de l'ITC

Je crois pouvoir vous apporter quelques éléments complémentaires par rapport aux chiffres. Anyway, the number of 17,000 students per year to be recruited is linked to two important things: increase in campus and teacher. In two years, it will be ready. By calculating with the heads of department, the recommendations of the world bank and ADB, the financing of 25 million US dollars from the World Bank, 11 million US dollars from ADB and 25 million US dollars from the Ministry of Economy and Finance are mobilized to ensure the specialized training of these human resources so that the government's policy of Cambodia becoming an upper-middle income country by 2030 and a high-income country by 2050. So, in 10 years, the number of students to be recruited will be 17,000.

The Ministry of Labor and Vocational Training, the Ministry of Economy and Finance have proposed to ITC to carry out a new project called "skill for the economy". I think that number is not 100% correct but I think we can accept it because we spent two or three months to calculate it. Dr. Kimtho, can you add more information about that?

Dr. PO Kimtho, directeur adjoint de l'ITC

Thank you very much. In fact, Dr. Romny mentioned everything, but I try to add some information to make it clearer, regarding this number. Mainly, I will depend on the campus that we are going to construct. We will build the new buildings in the new campus about 10km from the here to increase the number. We will develop the new programs, new skills. We have planned to train more faculty staffs to ensure the quality of training. We have calculated these numbers, based on the data provided by the departments in terms of human resources, laboratories and other facilities.

S. E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Merci pour la clarification. Est-ce qu'il y a d'autres remarques?

S'il n'y a pas de questions, je reviens vers un peu vers le nombre d'étudiants. C'est sur et certain que vous avez le financement de la Banque Mondiale, de la Banque Asiatique de Développement, mais ce financement ne concerne que les infrastructures et les équipements. D'après moi, lorsqu'on prévoit 17000 étudiants, on doit penser aussi au nombre d'enseignants qui mérite d'être recruté. Pour moi, je voulais savoir simplement comment vous êtes arrivé à créer ce nombre de 17000. Peut-être, vous avez des documents qui vous ont permis de travailler là-dessus mais nous, on ne les a pas. C'est la question. Avec ce projet, combien d'enseignants qui méritent d'être recrutés et dans quel département? Peut-être, pas le même nombre dans tous les départements respectifs.

Dr. OEURNG Chantha, deputy director of the Institute of Technology of Cambodia

Excusez-moi, vous pourriez avoir ces arguments expliquant la façon sur laquelle on s'est basé pour faire ce calcul dans le document de stratégies et perspectives. Nous avons les nombres précis concernant chaque programme.

S. E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Merci. Est-ce qu'il y a d'autres remarques?

Prof. Thomas VALLEE, attaché de coopération scientifique et universitaire de l'ambassade de France au Cambodge

Merci, Madame la ministre. J'ai une interrogation sur la formation pour le programme international en génie civil. Vous avez évoqué 60 étudiants à peu près. J'aurais voulu savoir comment vous pouvez envoyer ces étudiants pour un semestre dans le programme d'échange à l'étranger.

Dr. OEURNG Chantha, deputy director of the Institute of Technology of Cambodia

Merci pour la question. En ce qui concerne le stage à l'étranger, il existe deux options : bourse octroyée par l'établissement partenaire et financement des parents. Nous avons aussi d'autres possibilités si l'on se réfère à la situation actuelle de l'ITC. Actuellement, nous avons des appuis financiers de l'AUF et de l'ambassade de France au Cambodge pour financer le séjour de nos étudiants dans le programme de double diplôme avec Insa de Rennes, par exemple. Je crois que les frais de séjour ne posent pas beaucoup de problème parce que ces étudiants proviennent de familles riches, surtout un semestre dans une université dans la région ne coûte pas très cher mais pour la mobilité à l'étranger on revient vers les sources de financement que je viens de mentionner. Dans le projet HEIP, nous avons également ce genre de financement.

Prof. Thomas VALLEE, attaché de coopération scientifique et universitaire de l'ambassade de France au Cambodge

Oui, on vous aide mais je vous encourage aussi à rencontrer les partenaires du monde bancaire comme la BRAID. Nous en avons discuté pour mettre en place, ce qu'on appelle Prêt-étudiant. Ce qui permet aux étudiants venant de familles pauvres de pouvoir poursuivre des études en France ou ailleurs.

Dr. OEURNG Chantha, deputy director of the Institute of Technology of Cambodia

Merci. Oui, c'est une des possibilités. Mais pour les frais de scolarité pour les étudiants qui sont inscrits au programme international de génie civil sont de 4000\$, incluant des bourses pour les meilleurs étudiants. C'est plus cher que le programme normal. Si l'on regarde le programme international en Thaïlande, c'est entre 5000\$ et 6000\$ et aux Etats-Unis ou en Europe, c'est beaucoup plus cher.

Prof. Watanabe KOICHIRO, Jica Senior Advisor

Through this Consortium meeting, prof. Takada and I, we propose to set up the title "Professor Emeritus". This does not require a decision at the ministerial level but at the university level. Mrs. Sackona was the director of the ITC and Dr. OM Romney is the second Cambodian director of the ITC and you are retiring in April. You two deserve this title. Knowing that this title does not require the change of state salary, it is an honor granted to a professor who has spent a good professional career in a university.

Prof. Thomas VALLEE, attaché de coopération scientifique et universitaire de l'ambassade de France au Cambodge

Oui, il a raison. Pour avoir ce grade, cela n'a rien à avoir avec la décision du ministre mais de la direction de l'université. En France, on accorde ce grade à un professeur, quand il part à la retraite, à condition qu'il maintien encore une activité comme recherche ou relations internationales, par exemple.

S. E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Ok, si c'est comme vous avez mentionné. J'ai pris une note et nous allons soumettre cette proposition au Conseil d'administration en juin.

Maintenant, notre réunion arrive à sa fin. J'en profite pour remercier la présence de vos tous de loin ou de près qui a rendu la discussion de notre réunion du Consortium beaucoup plus riche. Votre coopération, votre expertise et votre partenariat font partie intégrante des réalisations de l'ITC. Les efforts et les partenaires internationaux ont rendu l'ITC ce qu'il est actuellement. Sans cet appui incontournable, l'ITC actuel aurait été impossible. Un grand merci à tout le monde et on se verra l'an prochain.

Synthèses par département / Summaries by department

Comme cette année, à cause de la Covid-19, notre réunion du Consortium n'a duré qu'un après-midi, au lieu de deux jours, certains départements ont discuté de leurs programmes et modifications nécessaires pour le fonctionnement de l'année académique 2022-2023, avant la réunion et d'autres les ont abordés après la réunion en présentiel et en ligne / *As this year, due to Covid-19, our Consortium meeting lasted only one afternoon, instead of two days, some departments discussed their programs and modifications necessary for the academic year 2022-2023, before the meeting and others after the meeting, on site and online.*

Le tableau ci-dessous regroupe les modifications et les propositions des programmes des départements et les avis des membres du Consortium / *The table below brings together the modifications and proposals of the programs of the departments and the opinions of the members of the Consortium.*

No	AVIS DU CONSORTIUM	FAVORABLE
1	Demander le grade « Professeur Émérite » à la direction de l'ITC pour les grandes personnalités et les professeurs qui ont beaucoup travaillé pour le développement de l'ITC et ils vont partir à la retraite	X
2	La mise à jour du cursus de master génie de l'eau et de l'environnement (École doctorale)	X
3	La mise à jour du cursus de master génie agro-industriel (École doctorale)	X
4	La mise à jour du cursus de master Génie de technologie et de gestion de l'énergie (École doctorale)	X
5	La mise à jour du cursus de master génie mécanique, informatique et communication (École doctorale)	X

6	Demander de modifier le curriculum du programme de Télécommunications et Réseaux (Département GTR-GCI)	X
7	Ouverture du Département du Génie des Transports et des Infrastructures (GTI)	X
8	GIC update the curriculum of year 3, 4 and 5 to adapt to the change of the program in 2 nd year for students who choose to study in GIC, GTR, Data Science, in the future (GIC)	X
9	GGG updates the curriculum of year 3 for two courses on "Oremicroscopy" and "Petrology and Mineralogy". These courses will be combined to increase the practical work, which can fulfill in the industry needs. Moreover, this course is the main core for the field mineral exploration and exploitation (GGG)	X
10	GGG updates the curriculum of year 4 for five courses on "Geophysics => added the TP class", "Rock Blasting Techniques => added TD class", "Mineral Exploration => added TD class", "Basic Geological Mapping => added TD class", "Mineral Characterization => removed this course due to the course of mineral exploration is covered this content already". The purpose of modified is to fulfill the requirement of current job market needed, especially in the field Mining, which is rapid growth in late 2021 (GGG)	X
11	GRU requested to modify the course "Construction of Rural Road" to "Road Engineering and Construction" for improving competent of student to meet the need of job market (GRU)	X
12	GRU will work on the Technician program in order to modify the program for a specific skill need on Water Supply and setup water supply laboratory with support from Shanghai Micro Purification Co.,Ltd (GRU)	X
13	GRU will implement the Water and Environment Oriented Living lab by creating on more lab called "Coastal and Wetland Environmental Research Lab". The students and lecturer will do the real-life water demo sites and creating a multi-stakeholder virtual network (GRU)	X
14	Propose to establish the Cambodia Coastal Research Center. The detail structure, vision, mission, stakeholders, researcher and source of fund will be submitted in next consortium 2023 (GRU)	X
15	ITC is planning to launch 1year International Pre-degree Foundation Programs of Curtin in Oct 2022 at ITC and students could continue their undergraduate study for both Engineering (+4years) and Science (+3years) at any Curtin campus upon this foundation program completion. The pre-degree foundation program was established by technical assistant from both Curtin Perth, Australia and Curtin Malaysia under Higher Education Partnership Program of HEIP. The Establishment of Pre-degree Foundation Program in Eng. and Science will meet the Curtin's undergraduate entry requirement at any Curtin campus	X



**COMPTE-RENDU DE LA RÉUNION DU 29^{ÈME}
CONSEIL D'ADMINISTRATION DE L'ITC,
LE 23 JUIN 2021, À PHNOM PENH**

Membres de droit présents

1. Présidente du Conseil d'Administration, S.E. Mme PHOEURNG Sackona, Ministre de la Culture et des Beaux-Arts,
2. Ministère de l'Éducation, de la Jeunesse et des Sports, représenté par son Excellence YUOK Gnoy, secrétaire d'État,
3. Conseiller du Ministère de l'Éducation, de la Jeunesse et des Sports, M. Murat YINDIZOGLU,
4. Directeur de l'ITC, S.E.M. OM Romny, Ambassade de France au Cambodge, représentée par M. Christophe GIGAUDAUT, Conseiller de Coopération et d'Action Culturelle,
5. ARES-CCD, représentée par M. Philippe BOUILLARDS,
6. AUF, Direction Régionale du Bureau Asie-Pacifique, représentée par M. Jean-Marc LAVEST, Ministère de l'Économie et des Finances, représenté par son Excellence CHOU Kimleng,
7. Ministère des Mines et de l'Énergie, représenté par S.E. PEN Chhorda, Secrétaire d'État,
8. Secteur privé, représenté par le directeur de la SKD, OKNHA LAY Meng Sun.

Membres invités présents

9. M. Thomas Vallée, attaché de Coopération Scientifique et Universitaire, Ambassade de France au Cambodge,
10. M. Pascal MAUSSION, vice-président des relations internationales, INP Toulouse,
11. M. THOEUN Vongdy, program officer for Jica office in Cambodia.

Direction de l'ITC

14. Dr. CHUNHIENG Thavarith, directeur adjoint, chargé de la coopération,
15. M. NUTH Sothân, conseiller de l'ITC, chargé de la pédagogie et des études,
16. Dr. PO Kimtho, directeur adjoint de l'ITC, chargé de l'administration et des projets,
17. M. SOY Ty, directeur adjoint de l'ITC, chargé des affaires académiques,
18. M. OEURNG Chantha, directeur adjoint chargé des plannings et supervisions du Centre de recherche et d'innovation,
19. M. Bruno DAGUES, conseiller de la direction de l'ITC,
20. M. SIEANG Phen, chef de cabinet de directeur et des relations internationales,
21. Dr. OR Chanmoly, directeur du centre de recherche et d'innovation,
22. Dr. SIM Tepmony, directeur du programme de 3^{ème} cycle,
23. M. NGOUN Kollika, chef du département de génie industriel et mécanique,
24. Dr. Kimgnoun, doyen de la faculté de génie géoressource et géotechnique,
25. Dr. CHHUON Kong, doyen de la faculté d'hydrologie,
26. Dr. IN Sokneang, doyenne de la faculté de génie chimique et alimentaire,
27. M. HAN Virak, doyen de la faculté de génie civil,
28. M. LAY Heng, vice-doyen de la faculté de génie électrique,

29. Mme SREY Malis, chef du département TC,
 30. Dr. HIN Raveth, vice-directeur du programme de 3ème cycle,
 31. M. KHIEV Samnang, responsable du service informatique,
 32. M. KHEM Trankrasel, responsable de la section de français,
 33. M. CHUM Tival, responsable de la section d'anglais,
 34. M. KIM Vannada, responsable de l'assurance de qualité de l'ITC,
 35. SRANG Sarot, responsable de mécatronique et robot,
 36. M. SRENG Sokchenda, chef de département de télécommunications et réseaux.
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Accueil des participants et ouverture de la réunion virtuelle

En introduction, **S.E. Dr. Sackona PHOEURNG**, Ministre de la Culture et des Beaux-Arts et **Présidente du Conseil d'Administration de l'ITC**, souhaite la bienvenue à l'ensemble des membres du Conseil d'Administration et les remercie pour leur participation à ce 29^{ème} CA. Le Conseil d'Administration de l'ITC et son Consortium international d'appui se réunissent 1 fois par an, le Conseil des Études et de la Vie Universitaire 2 fois. Les réunions régulières de ces instances témoignent du bon fonctionnement de l'établissement. Au cours du CA, le bilan des activités puis les prévisions sont présentées par le Directeur de l'ITC. Le CA recueille les conseils de ses membres et prend les décisions. C'est le moment pour donner des avis, faire des remarques, des critiques et des encouragements sur le travail effectué par l'équipe de l'ITC.

Nous avons des membres du Consortium fidèles de France, de Belgique, du Japon et du réseau AUN/Seed-Net etc. Comme d'habitude, nous avons un représentant du Consortium qui participe à la réunion du Conseil d'administration. Cette année, madame Adèle GROS MARTIAL, qui est là parmi nous, le présente. Nous avons aussi le partenaire industriel. Je voudrais conclure de ce petit discours d'introduction en laissant présenter certains événements importants. Il y a eu de nombreux événements qui montrent l'évolution et le rayonnement de l'ITC, par exemple, la 10^{ème} journée scientifique de l'ITC, dont le titre est « Enhancement of Engineering Resources for industry 4.0 », avec 70 publications réalisées de des différentes universités nationales et internationales. À cet événement ont participé plus de 250 participants pour promouvoir la recherche. L'ITC est en train de gagner le pari de son évolution et on est en formation au niveau international compétitif et ce n'est pas fini évidemment. Il nous faut garder le cap maintenu. Un grand merci à tous nos partenaires pour votre fidélité et grâce à vous l'ITC est devenu ce qu'il est actuellement. Je vous souhaite un bon succès à notre réunion d'aujourd'hui.

Avant de passer à notre ordre de jour, je voudrais laisser son excellence M. YUOK Ngoy, secrétaire d'Etat au Ministère de l'Éducation, de la Jeunesse et des Sports prononcer son discours.

S.E.M. YUOK Ngoy, secrétaire d'État du Ministère de l'Éducation, de la Jeunesse et des Sports

- *Votre Excellence, Madame la Ministre de la Culture et des Beaux-Arts, ancienne directrice de l'ITC,*
- *S.E.M. CHOU Kimleng, secrétaire d'État du Ministère de l'Économie et des Finances*
- *S.E.M. le directeur général de l'ITC,*
- *Mesdames et Messieurs les membres du Conseil d'administration de l'ITC,*

Je suis très heureux d'assister à cette réunion annuelle qui, comme chaque année, souligne le développement de ce bel Institut et le progrès de ses formations déjà de très haute qualité.

La démarche d'amélioration continue adoptée par l'ITC depuis sa fondation est bien sûr derrière cette qualité indiscutable qui a fortement bénéficié des stratégies volontaires de coopération aux niveaux national et international de l'ITC, et de la contribution de tous ses partenaires qui constituent un réseau très dense qui va même au-delà du consortium de soutien.

Nous avons aujourd'hui devant nous un institut qui peut être fier d'avoir plus de 85 docteurs en son sein, d'attirer chaque année plus de 3500 bacheliers de très bon niveau, qui développe chaque année de nombreux projets résolvant des problèmes importants au Cambodge. L'ITC participe aussi aux grands projets de réformes avec le soutien de l'ADB et de la Banque mondiale, ainsi que le JICA et le JST, comme pour le projet SATREPS. L'ITC met régulièrement en place de nouveaux programmes de formation (notamment un nouveau programme doctoral et de nouveaux masters sur dans des domaines émergents comme l'ingénierie des sciences des données) et ses chercheurs publient de nombreux articles académiques chaque année, avec une vraie présence internationale dans les domaines d'excellence de l'ITC.

Nous avons un très grand plaisir de constater tous ces accomplissements encore une fois et désirons exprimer ici nos félicitations à son équipe de direction, et notre fort soutien à cet établissement qui le mérite pleinement. Notre reconnaissance est immense pour vous tous qui démontrez votre soutien à l'ITC par votre présence aujourd'hui.

Votre excellence, Mesdames, Monsieur les membres du Conseil d'administration, je vous remercie de votre attention.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Merci son excellence pour votre discours très encourageant en soulignant le progrès de l'ITC. On revient vers nos collègues français, malheureusement, son excellence madame l'ambassadrice et l'attaché de coopération et d'action culturelle sont pris par autre mission. C'est donc Monsieur Thomas VALLEE qui représente l'ambassade de France. La parole est à vous, monsieur.

M. Thomas VALLEE, attaché de coopération scientifique et universitaire

Madame la présidente,
Monsieur le secrétaire d'État,
Son excellence M. Romny,
Chers collègues,

Je suis très content d'être là au nom de l'ambassade de France, pour ce conseil d'administration qui montrent encore une fois, en regardant les documents, le dynamisme de l'ITC. J'en prendrai pour preuves le nombre record de candidature en première année et le nombre record de réussite à ce concours de première année, aussi qu'il y a une 1709 réussites dont 3747 inscrits. Nul doute que parmi ces jeunes recrutés se trouveront des étudiants brillants et des étudiantes brillantes qui viendront, je l'espère, candidatés aux bourses du gouvernement français. Cette année, se sont encore 8 nouvelles bourses que nous avons offertes aux étudiants de l'ITC pour partir faire leur master en France ainsi que des bourses cofinancées avec le ministère de l'éducation, de la jeunesse et de sports pour faire des docteurs en France. Nous sommes très fiers de cette réussite. Nous sommes aussi très fiers de la coopération que vous avez avec les structures de recherche française, évidemment je pense à l'IRD, représenté par Adèle GROS MARTIAL, qui est aussi présente. Je pense aussi au CIRAD et voilà et donc je voulais dire rapidement combien j'espère que nous pourrons continuer à contribuer à ce fort dynamisme de l'ITC dans les années à venir. Je pense constamment à ECAM LaSalle qui va venir pour potentiellement à la rentrée prochaine avec une filière au sein de l'ITC. Je pense aussi à une potentielle collaboration aussi à venir et je voulais dire en ces quelques mots

que nous serons à vos côtés pour continuer à contribuer à ce dynamisme que nous espérons bien évidemment inarrêtable. Voilà je vous remercie et je vous souhaite à tous un très bon conseil d'administration.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et **Présidente du Conseil d'Administration de l'ITC**

Merci monsieur Thomas VALLEE, représentant de l'ambassade de France au Cambodge. Je laisse ensuite notre collègue de Belgique intervenir, M. Philippe BOUILLARD, représentant de l'ARES-CCD.

M. Philippe BOUILLARD, représentant de l'ARES-CCD

Merci madame la présidente. Je voudrais également partager mon plaisir d'être avec vous malheureusement virtuellement pour ce conseil d'administration. Excellence, et chers collègues, je voudrais attester sur le fait que nous avons pu même à distance suivre l'évolution et c'est toujours un plaisir de voir comment les équipes de l'ITC sont dynamiques et progressent. Si vous me permettez, je vais prendre un petit instant pour souligner le fait que nous sommes un moment charnière de l'apport de la coopération belge avec l'ITC et un projet sur lequel nous travaillons, se termine et comme la plupart des administrations, c'est le moment de réflexion pour la coopération belle qui va légèrement modifier son mode de fonctionnement. Je voudrais attirer l'attention des équipes de l'ITC sur le fait qu'il va se passer durant l'été deux choses :

* la première chose, c'est que l'ARES-CCD va nommer un consultant pour évaluer le résultat du précédent projet et je voudrais quand même souligner que de notre point de vue, nous sommes très très satisfaits de ce que nous avons obtenu tous ensemble. Je pense qu'il y a eu une nette contribution au développement de la recherche à l'ITC puisque nous avons soutenu des projets de recherche, des bourses de de doctorat, des programmes de doctorat de l'ITC. Ça, c'est très positif. On a aussi contribué au développement de la cellule d'interface et à la mise en place d'un système informatique, avec des aspects moins réussis, mais je pense que c'est normal dans un projet dont nous allons faire l'évaluation cet été. L'ARES-CCD va interroger l'ITC pour que ce dernier fasse une lettre d'intention pour dire ce que vous avez envie de faire dans un potentiel prochain projet et je pense que ça c'est un moment très important pour lequel ce serait bien que certains d'entre vous réfléchissent à effectivement quel développement possible que vous entrevoyez et nous allons vous aider à rédiger une lettre plus efficace possible dans le processus. C'est important de noter que l'ARES-CCD a décidé de ne plus financer les dimensions de gouvernance, certains philosophes européens estiment que lorsque l'Europe se mêle de gouvernance dans un pays comme le Cambodge, post-colonialisme, c'est devenu inacceptable mais sommes toujours à vos côtés dans une vision de partenaires égaux, au profit de développement de l'ITC. Merci de votre attention.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et **Présidente du Conseil d'Administration de l'ITC**

Merci professeur pour votre intervention qui manifeste davantage une bonne coopération entre l'ARES-CCD et l'ITC. On sait très bien que tous les projets ne sont pas pérennes, ils s'achèvent un jour mais évidemment les résultats positifs sont toujours là. On en est très contents tous. On attend impatiemment l'évaluation de vos experts. C'est sûr et certain que nous allons mettre l'accent sur d'autres dimensions. Pour ce faire, nous avons notre conseiller, Bruno DAGUES. Je vous demande de veiller de plus près à la mise en place de ce projet sous d'une nouvelle coopération.

Maintenant, je laisse la parole à M. Jean-Marc LAVEST, directeur régional Asie-Pacifique de l'AUF.

M. Jean-Marc LAVEST, directeur régional Asie-Pacifique de l'AUF

Merci madame la présidente. Nous sommes aussi fiers du travail accompli par l'ITC. J'apprécie beaucoup la construction multilatérale de l'ITC qui est propice à son développement. Ce matin même, j'étais en train de signer une tranche supplémentaire destinée à l'ITC. Nous sommes très fiers de vous accompagner. Vous êtes un exemple. On cite souvent « ITC ». Vous inspirez souvent ici beaucoup d'institutions en Asie. Il s'agit d'une trajectoire remarquable pour votre pays.
Merci madame la ministre.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Merci monsieur le directeur. C'est notre partenaire fidèle depuis 1992. And now, the floor is for our colleagues from Japan. As I remember, when we started our relationship with Japan, it was in 2000. The first meeting of AUN/Seed-Net, at Chulalongkorn University, when I was the director of ITC at that time. It was the first time I've been there. AUN/Seed-Net is an integral part of supporting ITC. So, I would therefore like to invite Mr. THOEUN Vongdy, Program Officer for Jica Office in Cambodia, to take the floor.

M. THOEUN Vongdy, Program Officer for Jica Office in Cambodia

Yes Madam, today, our representative is busy today. I'm here just to collect some information. I would like to appreciate ITC's good collaboration with Jica, so far. Now, we are implementing a new project called LBE, Laboratory Based-Education. Thank you so much, Dr. Om Romny, for your good collaboration with our experts. Thank you, Madam for letting me express my idea, today.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Thank you, Mr. Vongdy. Now, the floor is for professor KOICHIRO Watanabe, from Kyushu University. He is our friend since long time ago. He is not only in the AUN/Seed-Net but now the representative of Jica in Japan. He is always with us. I remember that during the meeting of Board of Trustee, it was difficult because the slides was sometimes in French; sometimes in English, but I think you understood what we wanted to talk about. Your presence today is a great honor for us. So, please the floor is yours now.

Professor KOICHIRO Watanabe, Representative of Jica in Tokyo

Bonjour Madame Sackona and everybody. I am KOICHIRO Watanabe, former vice-president of Kyushu University. But now, I am in Jica office in Tokyo. I know the ITC very well. I really appreciate the internationalization of ITC, if we compare it with the past, it is much developed. As you know, ITC is the top university in the ASEAN Countries. So, the internationalization is very important in this university, I think. In this regard, the English language plays a crucial role. For me, I think that the LBE project is a project that exists not only in France but also in Europe. We are promoting such kind of this education.

Anyways, Madam Sackona, I hope to see you face to face soon. Thank you.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Thank you, Professor Watanabe. I would like to thank all kinds of collaboration with all ITC partners. It is thanks to all of you that ITC has become what it is today. Yesterday, I had dinner with the Japanese ambassador. We talked about the Olympic Games in Japan. It's a big global event. We wish you great success at this event.

Le directeur de l'ITC, Dr. OM Romny et le directeur adjoint M. SOY Ty ont présenté les événements marquants et certaines activités. En ce qui concerne la formation des ingénieurs et techniciens, et la

formation du 3^{ème} cycle à l'ITC, elles ne sont pas remises en cause lors de la pandémie en comparant avec d'autres établissements de l'enseignement supérieur, surtout privé.

Est-ce que vous avez des questions par rapport aux activités présentées?

Please, raise your hand when you have questions relating to the exciting events and other activities presented?

Bonjour M. Pascal MAUSSION, vice-directeur des relations internationales de l'ENP-Toulouse. Vous êtes le bienvenu au club. La parole est à vous, monsieur.

Remarques de Pascal MAUSSION, vice-directeur des relations internationales INP Toulouse

Her Excellency, probably in English. Thank you for this very interesting presentation and I would like to congratulate the all the ITC staffs for the very good results that you have regarding the employability of your graduates, your reaction in order to face the covid crisis, the increasing number of Master thesis which is obviously one of the highest ratio in Cambodia. I just have apart from this well thanks and congratulations, I'm quite curious to know if you have any private competitors in Cambodia on the higher education sector, probably on some very narrow nice and how do you face these challenges?

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Thank you for your interesting question. You know that indeed we cannot avoid the competition. For me, this competition started, I think, more than 10 years ago when the private university also decided to open these engineering courses, especially civil engineering, and electrical engineering. In addition, the Ministry of Labor and Vocational Training, also the Polytechnic Institute, provide the same type of training. Recently, the Ministry of Public Works and Transport also decided to open an institute of the same type. What I can tell you is that you can't avoid such competition, under the free market but to dominate our opponents, ITC is more interested in quality. In terms of human resources, according to the statistics, we have three times more than other higher education institutions in the country. Quality is an important indicator that we must consider. When we also talk about infrastructure, we get a lot of support and different projects: ADB, World Bank, our ministry and our own income. I believe all of this can push ITC ahead, in engineering, nationally and internationally. I can assure you that we continue on our good path to maintain our quality of training. We are sure that all graduates coming out of ITC will definitely find work. Once again, we face competition. It's inevitable but we have to stay on track and achieve all the expected goals. I think Dr. Romny can add something else.

H.E.M. Dr. OM Romny, Director of ITC

Thank you, Professor Mascal MAUSSION, for joining the meeting today. Actually, I would just like to add to what Ms. Sackona mentioned, about the competition. I think that it is good. We look like the palyer of the football. In case we play alone, we have no competition, no effort. So, it is good to have competition from all public and private sectors. We have a lot of candidates now. In this regard, we can judge and see all that can be done to push the ITC ahead. I am sure that due to human resources in terms of facility infrastructure and also in terms of clear mission and clear preparation of all ITC activities, accountability including commitment of board members to administration, we must get the flagship for the university in the country as well as in the region.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

I am sorry, you know because sometimes the online meeting is difficult because you can't see all the participants. I would also like to welcome Professor de Takada, Vice-President of Tokyo Tech

Institute of Technology. You are welcome to our team. Please, note that Professor Takada is also our friend from logue date. Our friendships are very important, not only between universities but also between countries. Also the culture I can say, for the Angkor site, we have many Japanese experts who provide technical support on this.

Mr. Junichi TAKADA, vice-president of TOKYO Institute of Technology

Sorry, I couldn't catch the current discussion but obviously I like to just mention that our project (LBE) is ongoing. Although we don't have the physical access to Cambodia but I accept for our colleague, Chikako who is making the best effort to promote this project, because we'd like to promote this laboratory-based-education which connects the education and the research are more practical manner. So, I believe that such kind of education can be can provide in particular the experiences and the practices as well as the soft skills through such kind of activities has a very strong collaboration with the industry to this part of the students to the industry but I think this additional part may I give the opportunity to the students to brush through the education in ITC. I hope that this kind of practice as well as the promotion of the research through the students activities as well. Thank you very much.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Thank you professor for your rich comment. Next up is Dr. SIM Tepmony presenting postgraduate training at ITC.

...

Thank you, Dr. SIM Tepmony. Dear participants, do you have questions or remarks?

... As this part relating to the postgraduate training is important, I would like to hear any question of comment from our participants. For me, I have one remark. For the next meeting, Consortium and Board of Strustee, please, not only do the conclusion but also M&E, because we need to know where our graduates go after postgraduate training at ITC. Maybe, you can provide more information relating to the procedure of recruitment. It is very important for our members to understand more and more. I think that it is very important to assure the quality of the training.

It is my comment and again, I would like that the responsible for this try give more information during the next Consortium and also Board of Trustee. I would like to hear another comment from our participants.

Professor, Takada, please.

Mr. Junichi TAKADA, vice-president of TOKYO Institute of Technology

Thank you. I have two questions.

My first question is about the organization of the master and the PHD programs because as I understand that you established the program separated from the department and really focusing on the research field. So, I'm just curious about the management of the individual program which is separated from the department. How you coordinate such kind of that educational activities I understand that Dr. Tepmony is taking care of the whole structure but before the individual program I guess that it's apart from the department. So, I'd like to know a little bit about how the program some managed.

My second question is about the PHD. I congratulate that the number of the enrollment is so much increased and I observe that about half of them enroll in the quota program but it means that other half of just enrolling the ITC PhD program that's what I wanted to confirm. Thank you very much.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Thank you professor for your comment. Next up is Mr. Pascal MAUSSION from INP Toulouse.

Remarques de Pascal MAUSSION, vice-directeur des relations internationales INP Toulouse

Yes, thank you, your excellency. I would like to know what types of transportation does the ITC Target in his new master dedicated to transportation. Could you tell me what kind of transportation, air transportation, water transportation, land transportation? Did you conducted the market?

H.E.M. Dr. OM Romny, Director of ITC

Thank you, Professor Mascal MAUSSION. But firstly, I would like to respond to the question of Professor Takada regarding to the program at ITC that we are making separation program from the department. Actually, the graduate degree program and the bachelor degree program is linked together. It means they work together under the control of the academic affairs office. The programs are not really separate. We align them together with the departments.

The enrollment of the students, for the PhD program, is linked together with the current situation of economy of the country. Mostly, from year to year, the PhD's students, the number of students enrolled is not big. Just, this year, we a collaboration, under the initiative of the Ministry of Economy and Finance, one of local higher institution called the National Polytechnic Institute of Cambodia (NPIC) wants to upgrade his human resources to have enough PhD professors to run his training. In this case, the Secretary of State of the Ministry of Labour and Vocational Training asked to send some faculty staffs from the NPIC to PhD program in ITC. Otherwise, the Ministry of Economy and Finances does not pay the scholarships for these doctoral students. This is the decision of the Secretary of State of the Ministry of Economy and Finance, H.E.Mr. Vong Sengvisoth. So, it is a good image that ITC has. You see, we pride ourselves on our quality of training. Beside of this, we have also our condition. For those who do not have enough performance quality, they are not allowed. We have created the selection committee and only 9 candidates are selected.

Relating to the transportation, for now, we must give priority, especially to the development of infrastructure. The emphasis is on land transport and not air transport and also water transport is still limited. That is why we seek to promote this type of land transport. For this, we must train human resources. In this perspective, Mr. Bruno Dagues has worked with the Ecole Nationale des Ponts et Chaussées to support training at master's and PhD level. We are starting slowly step by step. For me, transport ground are the first priority. If we have enough capacity, we start another air transport training. Last year, we hosted the manager of Vincy Airport to talk about the aviation management training. A polytechnic in Singapore is selected for such training. The documents including the MoU are ready but everything is blocked, because of the Covid-19.

Dr. SIM Tepmony, directeur du programme de 3ème cycle

I think, almost all points, our director already pointing out. For the organization, we have for the master program with each program we have the we call responsible person who in charge of the program. Usually they come from the department the closest one to the program and that one will manage and coordinate with the concern department as well as, the research center and has to report directly to a graduate school. So, this is the management, it's a multi-disciplinary so we cannot find one from a particular department. So, this is the arrangement of the program and the for PhD courses. We follow strictly the rule of the regulation of the Ministry of Education, Youth and Sport. Actually, I think the role of our ministry is one of the hardest as well and we have to do a lot of administration and those students normally there they have to meet a critering that they said and we cannot just select them without knowing their background etc and I can currently tell you that most of them receive the degree outside, most of them from France, Belgium, Korea and Japan also. So, the students from NPIC, they hold the degree from Japan and Korea. The quarry of the most snow the things that they don't want to go out because they have the family and the director of NPICS encourage them to do a PhD with a local partner. Thanks to the Ministry of Economic and Finance

that play confidence on ITC. It's our honor and mission as well. Concerning the transport, I think that our director already addressed the message to you and we can let the responsible person in charge on this to respond. Thank you.

Dr. PHUN Veng Kheang, responsable du programme Master du département de transport et infrastructure

Thank you, Madam. I'am PHOUN Veng Kheang and I am in charge of master program in transport engineering. I would like to add to the answer of our director, Dr. OM Romny. Regarding the master program, we allow students to choose any field they want when they come to the program. We're not restricted them to for example land transport or logistics but, as we can see the current situation in Phnom Penh or in Cambodia traffic or land transport and infrastructure are very important and you know everyone know. So, we start with the first promotion focusing on the traffic engineer and infrastructure development. We are not limited them to choose only land transport. We allow them to choose any topic, first and secondly after graduate in transport field, at least we identify three directions: first, they can work in the consultant company and second they can go to the ministry including Ministry of Public Works and Transport and thurst they can become a researcher or academic people like become a lecturer in transport field as you may know that human resource in transport related to the engineer is very few for Cambodia. So, those are the expectation from this program. Thank you very much.

S.E. Dr. Sackona PHOEURNNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Thank you. I think that it is clear for everyone. Do you have any comment? Okay, no remark. So, I would like to move to other presentations relating to E-Learning Center presented by Mr. Lay Heng and Capacity Building and Cooperation by Mr. SIEANG Phen.

...

Thank you. Do you have any comment from our participants relating to two presentations. Please, Professor Takada.

Mr. Junichi TAKADA, vice-president of TOKYO Institute of Technology

Thank you very much for the presentations. I have one question to the E-Learning Center. Congratulations for Online Examination. I like to know a lit bit more. How they can be implemented? Can you share it with us?

S.E. Dr. Sackona PHOEURNNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Yes, Professor. I will give the floor to Dr. OM Romny but I can assure you that it is complicated. You know, because of Covid-19, exams to recruit new employees are canceled in some ministries. However, due to good technological capability of ITC, several types of exams for recruiting students and employees are handled by ITC team. Dr. OM Romny can tell you more.

H.E.M. Dr. OM Romny, Director of ITC

Thank you very much, Professor Takada, for your good question. It is a big concern when most of the people thinking that the examination online is not recognized, because we can not control.

However, ITC can do that and has put a platform. Let's be sure that everything is fine and especially when the number of participants is big. Our platform can guarantee that 50000 candidates. That means that can enter at the same time to take the exam. The number of reserved places is more than 100,000. We tested it several times to be sure. We allowed ITC students and professors to test this system without interruption. Therefore, the results were good.

One more thing, we can develop, for example, 300 questionnaires. They are random. The questions bank and the answers are random. Even, the 'students sit side by side, cannot copy on each other, because the questions and the answers are different.

Another point, the students cannot go back to complete the answers because the time is limited. If the student does not tick the answer, there is no zero but he loses points. It is one of the logic that we already applied. We've tested many times and we've tried many times. Finally, we get the feedback from the students. We conducted the interviews with the students who passed and failed the exam. They said that everything that ITC offered as part of the exam was acceptable.

The last one, we have no choice. Face-to-face examination is not permitted. Only the online exam is recommended. Beside of this, we know that the number of students is a bit high (1300) because finally for students who have succeeded by cheating, for example, they will have problems when they are in class. At the first year, they can drop out of school automatically. In this case, we can keep only the real deserving students. For me, I think that it is better than nothing to do for the current situation. Thank you.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Thank you. I have also some remarks. We know very well that because of the pandemic, many things are cancelled: mobility of missionaries, students and professors but ITC can survive. We were able to make a good cooperation with École Nationale des Ponts et Chaussées, the IUT of Saints-Nazaires etc. I think it's a good image to get this new department up and running. Note that this Ecole Nationale des Ponts et Chaussées is very famous not only in France but in the world. So, please, keep going one this collaboration for the development of this new department of ITC.

Do I have another comment from the participants? If no, we move to the collaboration with the industries presented by Dr. IN Sokneang and Research Center by Dr. OR Chanmoly.

...

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Thank you. As you can see, from the beginning until now, it is a big part of activities of ITC for 2020-2021. I can give the floor to Professor Watanabe who raises his hand.

Mr. Junichi TAKADA, vice-president of TOKYO Institute of Technology

Thank you very much for your presentation.

Under the Covid period, the online activities are so much in progress, in ITC. I observe and that's quite nice and I congratulate for such progress even under the difficult situation. So, I haven't just you have a lot of activities by utilizing the video conference or you learning activities. I'm just curious about the website of ITC because it seems that not only ITC but I mean several Cambodia Universities I check the website and the website is not freaking the updated and in case of ITC I found the activities and photos in 2014. So, I'm just wondering under this difficult situation as you mentioned the online means is more important and does this kind of condition. So, I'm just curious whether you are not going to utilize the website to put and update more activities during the pandemic, it is very important, I think. It is just my opinion.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Thank you, Professor, for your comment. I would like to give you one reason Professor, you know, in Cambodia, many people use Facebook. It is the most popular platform in this country, but anyway, I let Dr. PO Kimtho response to your question.

Dr. PO Kimtho, Deputy-Director in charge of administration and planning

Thank you, very good afternoon professor. I would like to confirm a little bit about the website. We have discuss among our college to improve the website at the interface but still we need to add some more contents into the website. So, I can say that it is almost ready but still we are not upload to the online yet, to the internet yet. So, we try to speed up this one because we see that this is still very important to us even we have Telegram, WhatsApp and other platforms but still a website is very official one. So, we hope to finish it as soon as possible. Thank you very much, Professor.

Mr. Junichi TAKADA, vice-president of TOKYO Institute of Technology

Thank you very much, I'm looking forward to see that new website.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Yes, exactly. The floor is now for Professor Pascal MAUSSION.

Remarques de Pascal MAUSSION, vice-directeur des relations internationales INP Toulouse

Thank you, your Excellency.

I would like once again to congratulate ITC for this very complete and harness presentation of those activities including the SWOT analysis of the researcher involvement is of important. I'm sure recognition of researchers' involvement is paramount if you want to keep them with ITC, prevent them, the researchers, from going elsewhere, I mean probably the private sector, so my question is what will be your main decision in this area in order to keep the researchers very active and productive at ITC?

Dr. OR Chanmoly, director of Research and Innovation Center

Thank you, Professor Pascal MAUSSION. Yes, right now, the competition of the outsider is a very active. So, we need to provide, to show the very important benefit, especially for the activity researcher. I think that it is the benefit that I talk. I'm talking is not the only about the money but also about the environment. For example, at the ITC, we can have team of the research, equipments and facilities for labs. We have the system. When I would like to write a proposal, you came up easily and after, you get the project. We can fully focus only on research. So, we should reduce the worknote of the researcher in terms of administration. Because of search all day, they don't like the administrative tasks. They like only the technical work. So, I think the environment is a very important for researcher and also we should visualize we have the project for disseminate the research output to value the active researchers and also ITC is working hard on promotion of the faculty staff to have some position, for example, professorship. Right now, I think it almost done. We will have the professorship soon I think, because we already got some information back from the Ministry of Education, Youth and Sport relating to the professorship. Thank you.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Yes, thank you. This answers your question, professor? Okay, from the beguening untile now, we have different activities during the academic year 2020-2021. Now, Dr. OEUNRG Chantha will present the strategies and perspectives of ITC. Not only 2021-2022 but until 2030. We will present to you the strategies and action plans for 2021-2022. We will vote to adopt this document. Afterwards, Dr. PO Kimtho will present the financial report for this year and the next year and the last one is the nomination of the direction board.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et **Présidente du Conseil d'Administration de l'ITC**

Okay, now, we come back to our meeting. We have two things. The first one it is the regular of our board. That means every time, we will adopt the recommendations of consumption 2020-2021. In the last slide, you can see the 9 comments of Consortium. That means the International Program with Ecam Lasalle, the creation of the faculty of applied Sciences, the creation of ICT and cyber University, the creation the program of applied Mathematics and statistics for engineer, the creation of Master in Data Science, the creation of Data Based Center, the creation of food technology, the creation of center of startup and the creation of department of transport and infrastructure. I think we need the support, we need the adoption of board about this favorable comments from Consortium. So, it is my first my first request.

I got nother thing also as I said from the beginning, actually, after I need to update the statutes of ITC, because it was updated the last time in 2009. That means, we need the board to allow us, you know, a permission to review those statutes of ITC and also transfer Institute of Technology of Cambodia (ITC) into the University of Technology of Cambodia (UTC). So, I need also the support and the permission from the board, you know, to lead our direction to go ahead with this objective.

The last one, we also need the permission of board relating to the recruitment of the first year students. The next year 2021 and 22, ITC would like to recruit engineers:

- In ITC's Phnom Penh: 1,300
- In ITC's Tbongkhmum: 120
- And ITC also wants to recrute 1,000 technicians.

As we can see that the technician program is also important for the development of economy in Cambodia.

About the tuition fee, we keep the same like this year. For the engineers, the tuition free for the students male is 600USD, and 450USD for the female students. So, ITC takes in charge of compensator the 150USD dollar for the female students. For technicians, the tuition fee for the male student is 300USD and for the female 200USD. It is the same way that ITC must compensate for the female student, in order to increase the number of female students at ITC. So, it is the second part of our document. Now, I would like to ask any question or comment if you have, please raise your hand.

Okay, please, Madam Adèle GROS MARTIAL from IRD and after Professor Takada.

Mme Adèle GROS MARTIAL, représentante au Cambodge chez l'IRD et **représentante du Consortium international d'appui à l'ITC 2021**

Votre excellence Madame la ministre, je suis Adèle GROS MARTIAL, représentante du Consortium qui s'est réuni au mois de mars. Tout d'abord pour vous dire que le Consortium est vraiment impressionné par la qualité des projets qui qui qui avait été proposé par l'ITC et son engagement effectivement à l'accompagnement. On voudrait aussi féliciter l'ITC pour la rapidité aussi l'implémentation puisque le directeur nous a indiqué que ce programme allait être mise en place dès cet automne ou alors donc à partir de janvier 2022.

Quelques remarques que je voudrais rapporter du Consortium. Tout d'abord, le Consortium est très sensible et à porter son attention à la qualité des recrutements à l'ITC. C'est donc un point qui a été mentionné et ce point est important pour maintenir la qualité, l'exigence de cette institution du pays et donc ce point a été souligné. Ensuite, nous avons donc également plusieurs remarques sur les différents projets de nouveaux programmes de Master, de Bachelot ou des nouveaux départements qui vont être mises en place et voici les recommandations de ce Consortium international d'appui à l'ITC. Ça a été d'anticiper au maximum surtout le Continuum depuis la formation juste aux aspects de recherche de manière à ce que pour chacun de ces programmes, l'ITC, avec les jeunes qui vont être formés, puisse répondre bien sûr au besoin urgent en matière

de formation de ressources humaines pour le pays, par exemple le cas dans le domaine des transports. C'est donc tout à fait important à court terme, d'aller vers cette formation mais également d'aligner ces formations et l'organisation de ses départements, les curricula sur les standards internationaux de manière à pouvoir faciliter la mobilité à moyen terme avec les grandes institutions dans le domaine dans la région et au niveau international. Ça a été souligné. Et également à long terme de préparer ces jeunes à une capacité d'analyse, à des moyens de recherche pour pouvoir intégrer non seulement l'appui au développement économique du Cambodge mais éventuellement à l'appui à la préservation des ressources du Cambodge. Il a été question également des objectifs du développement durable. Tous ces points ont été soulignés notamment pour le Master de transport mais également dans la formation dans le domaine de technologie des aliments (Food Technology). Ces trois points : à court terme, former des ressources humaines, à moyen terme, respecter les standards internationaux, et à long terme, préparer la relève en matière de recherche, non seulement pour accompagner l'économie mais également pour accompagner la protection des ressources du Cambodge.

Et enfin, je voudrais souligner un dernier point. C'était aussi une recommandation du Consortium sur les compétences transversales, les compétences en matière de management, mais également les compétences en matière de langues, par exemple pour le niveau B1 en anglais ou alors que B2 en français, pour ceux et celles qui vont partir poursuivre leurs études à l'étranger. Donc la maîtrise des langues est intéressante. Et également, ce qui a été proposé de mettre en place des Data Science dans différents programmes de manière très transversale, donc de voir comment on pourra donner ce bagage de technologie numérique et de Data Science dans d'autres programmes que le master qui sera dédié aux Data Sciences. Voilà les trois grands points qui ont été soulignés et que je souhaitais rapporter ici au nom de du Consortium. Merci Madame la présidente.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et **Présidente du Conseil d'Administration de l'ITC**

Yes, thank you for summarizing all the important Consortium remarks. I will answer after the remark of Professor Takada.

Mr. Junichi TAKADA, vice-president of **TOKYO Institute of Technology**

Thank you very much. Really, I don't have any comments of the preferencing the consultant because I also participated in the meeting but I have one question about direction to change the name of ITC. So really, I am just wondering if it decides to transfer from my institute to the university what could be the difference in particular in terms of the present education system because really you have the engineer's program and the technician's program instead of the undergraduate. So, I just imagine that if you transfer to the university, they may change to the bachelor course or you can keep the similar education system but you just transfer from institute to the university and then I'm not so sure what may change by this transition. Thank you very much.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et **Présidente du Conseil d'Administration de l'ITC**

Thank you very much. I don't see any remarks. So, maybe, I will try to answer the question 1 and I let Dr. OM Romny response to the second.

Madame MARTIAL Adèle, merci beaucoup pour vos remarques. Bien sûr, la qualité de recrutement de l'ITC est une des priorités. Si je me souviens très bien quand le ministère de l'éducation, de la jeunesse et des sports a commencé à faire la réforme de l'examen du baccalauréat. A ce moment-là, il exigeait que les universités accueillent les étudiants de mention A, B, C, D, E sans examen. Seul ITC qui gardait son mode de recrutement, c'est-à-dire, quelles que soient les mentions, ils devaient passer un concours d'entrée pour assurer la qualité de la formation. L'objectif est de laisser les étudiants méritants poursuivre leurs études dans cette école d'ingénieurs. Ce système existe jusqu'à maintenant. Tous les étudiants qui veulent étudier à l'ITC, doivent passer le concours d'entrée, quel que soit le niveau de mention. Même durant cette période de la pandémie du Covid-19, nous sommes capables d'assurer des cours en ligne avec aisance et qualité. Quant au concours, il est toujours maintenu mais en ligne. Cela témoigne de notre expertise en ce sens.

En ce qui touche les différents projets d'ouverture de nouveaux départements, je tiens remercier tous les membres du Consortium pour chercher à partager de l'expérience et à nous apporter un soutien incontournable pour les chercheurs de l'ITC. J'en profite pour vous dire qu'avant de monter un projet, d'habitude, nous faisons une étude du besoin du marché du pays et de la société. Par exemple, les nouveaux départements que vous avez cités, la technologie des aliments, le transport et l'infrastructure, Data science, etc. C'est pour cela, d'année en année, nous avons des changements. Et le rôle du Consortium, il est là pour orienter toutes les modifications nécessaires qui conviennent à la situation d'actualité.

En termes de ressources humaines qui composent le Consortium, il est incontestable que nous en avons assez pour donner des recommandations à toutes les nouvelles directives qui méritent d'être mises en place dans les facultés et départements. C'est sûr et certain que nous ne pouvons pas avoir tout de suite les fruits de ces changements mais à long terme. À titre de rappel, nous avons des partenaires qui ont de l'expertise de France, d'Asie qui sont à notre côté pour nous appuyer.

Quant aux compétences des langues étrangères française et anglaise, bien sûr, elles sont obligatoires pour les étudiants et les enseignants de l'ITC. C'est pour non seulement l'enseignement mais aussi pour la recherche. Tout cela, c'est pour assurer la qualité de la formation dans notre institut.

And now, I will let Dr. OM Romny explain which difference between ITC and UTC.

S.E. Dr. Romny OM, Directeur de l'ITC

Thank you very much, Professor, for your question, professor. I would like to explain to you what is the difference between ITC and UTC, what is the objective that we want to transform ITC to UTC. The reason is that if we observe the level of the universities in the world, most of them are starting from bachelor >Lam. Then why, except in Cambodia, ITC, as well as the order part of university in the African countries that the program had been mixed together between the technician program and up to the higher degree program. Beside of this, in terms to match the initiative of the members of the University framework, that we want to distinguish different missions of the university to do. One of the ways that because currently we have the kind of the loan budget from the government in term to boost up the specializing under, we call, the skills of the technician level at ITC. So, as in our action plan, you can see that the recruitment is up to 1000 of the requirements of the technician level program. This fits perfectly with the government's IDP program. Beside of this, ITC's going to establish one of the school, called "school of the technician program" and this is so called in the French system that we already have adopted the method from France, that we called IUT (Institut Universitaire de Technologie). This means that the institute is part of the university. But ITC, we already have ITC but we created another IUT it's meaning that is a double scale, in this regard, we cannot be justified that which one is the big name is which one is the small name. If we put IUT on the ITC is to make people confusing of this one and the other one I observe that we already have difficulty in term to working with another partner university outside. In the French system, they know very well that they did not distinguish the level university or institute. They keep almost the same and sometimes, the university covers the general level but the institute covers the specific level. You know, entrance to prestigious universities in France is not easy. Beside of this, in case that we want to work with the partner university outside, they also consider us like a baby. We cannot be getting all but we still the baby so that sometime, the level of cooperation can't be face to face, in term of the university level. It is one of experiences. So that, we try to shapeup this one, providing the specializing in navigation like the skills for apprentices. Only 2 years are offered for them. This is what factories need. We want to help poor people from the rural area. They spend only 2 years that they can be easy to integrate in the job market. So, this is happening already done and the ADB have been providing the part of this one and now we are under the preparation for the contraction of the building factory, a 7-storey building full of equipment including the Fab-Lab. I think that the building will be used like the IUT called the school of technician level program for the providing of apprentices. Beside of this one, they are under the performance of ITC. So, IUT is a part of UTC. I think there are no differences but just to change the name, I to U, in terms of structure, it is not so much different.

Mr. Junichi TAKADA, vice-president of TOKYO Institute of Technology

Thank you very much Dr. Romny. I understand the background yeah because Tokyo Tech is also the Institute of Technology. In fact, Tokyo Tech was Tokyo University before the war but we got a lot of interest from

MIT and we changed the English name to Tokyo Institute of Technology after the war. So, that why we stick on the name of the institute but I also understand that your point and **I don't have objection** for changing the name. Thank you very much.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et **Présidente du Conseil d'Administration de l'ITC**

Thank you, Professor but everything is still the same. Okay, may I have the support from you about the remarks or proposals of the Consortium. We will need this support to submit to the Ministry of Education, Youth and Sport. If you say nothing, it means you adopted them. So, we are listening to the last presentation on the financial report, presented by Dr. PO Kimtho.

...

Comments or remarks:

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et **Présidente du Conseil d'Administration de l'ITC**

Thank you very much for the presentation of budget. I would like to hear from everyone. I think that the very difficult for all the members, maybe except the Ministry of Finance, you know. This this year is very difficult because some activities are canceled with the World Bank and the ADB, in terms of procurement, mobility. But it is a reality. Some parts are so difficult with the World Bank and the ADB, in terms of supply, mobility. It has been done today with the transparency with the very careful about the budget to spend this year and also the prevision for the next year. Dr. PO Kimtho said that you can see the number but maybe for you and for me also it is difficult to understand but one thing that we can take from our experience and also our estimation that the most of the budget for next year it comes from the World Bank for infrastructures, equipments, something like that. Due to the difficulty of Covid-19, it is too difficult to make sure that we can achieve 100% but we can show one thing. According to two sources of budget of the Ministry of Education, Youth and Sport and ITC, we can ensure the payment of the courses without problem for the next year. But the rest, we cannot assume because we don't know how we'll be the situation with Covid-19. When you saw this report, I don't know if you have remarks or comments. But I think that you Excellency CHOU Kimleng, present here with us and he really experts on finance maybe he can highlight certain points. So, please, the floor is yours, his excellency.

S.E. CHOU Kimleng, Secrétaire d'État du Ministère de l'économie et des finances
Thank you very much for the presentation

I would like to pay my respects to HE Mme PHOEURNG Sackona, Minister of Culture and Fine Arts, the members of direction board of ITC and colleagues.

First of all, I really appreciate the presentation for the 2020-2021 and 2021-2022 academic year. It is a good presentation, not only this part but also other parts. We can understand everything, it's easy.

Secondly, relating to the budget for the 2020-2021 academic year, I see the consolidated budget which is 9 million but according to your slide, you have made around 5 million, because of the Covid-19 pandemic. I think that's reasonable. For the budget from the Ministry of Education, Youth and Sport and ITC, I can compare the budget for 2020-2021 and 2021-2022, it's almost the same amount of \$4 million. This means that even the difficult health situation, we can allocate the same expenses for the next coming year, or a little more. I think it is very good and I really appreciate.

When we take a look in detail 3 components: expenditure for your salary staffs, investment expenditure and operating expenditure, we can see to improve a lot about investment a little bit increase. I believe it can work. I would like to congratulate the members of the direction board of ITC for their efforts and lately, I must thank all the partners for their support and especially financial. Thank you.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

I don't see the hands up and I can summarize what HEM CHOU Kimleng said.

As you said, the budget for 2019 and 20, we have a lot of impacts but for the next year, we are very keen to carefully looking for that experience and why we are pragmatics to do our budget for the next year. Dr. PO Kimtho is looking for every corner and also why we can assure that if we cannot implement the project from World Bank, or other projects; this would not cause any impacts to the operational courses of ITC. Because, we can assure very important this salary of our teaching staffs, the minimum of function of cost if the Covid-19 still is in our country. But I don't think so, you know. I hope that the next year, we can sit around a table, for 2022, you know. So, I think that this year very difficult to do very clearly with 100% sure about the budget. But, we try our best to assure the operational courses in ITC correctly, and ITC can go smoothly in the next year. Okay, I don't have any comment or question, I would like to give the floor to Professor Watanabe.

Professor KOICHIRO Watanabe, Representative of Jica in Tokyo

Thank you, Madam Sackona. I have a small comment relating to the internationalization. As Dr. Romny and Dr. Chanmoly mentioned international cooperation. I see that these international activities are much developed if we compare them with those of 20 years ago. Regarding financial budgets, I also believe that internationalization is important. I remember last month the Science Day was a great success. It is not international but the activity of the university. Dr. Romny mentioned that you had invited international speakers. Other universities in Asean countries have also organized international activities like ITB in Indonesia but online because of Covid-19. I think that the ITC can organize such activities called international event or international symposium in each field but not as a scientific day in the hall of the ITC but knowing that the research and innovation center has 5 research units. Each unit can prepare its annual international symposium. For me, ITC has enough human resources and facilities to do. Only the problem is the preparation. We just need more effort from each of you.

I very much appreciate the international activities carried out by ITC. For me, if ITC can do such activities, I think there will be more collaboration and as well as budgets. I am convinced that ITC can do this. It's just my comment.

S.E. Dr. Sackona PHOEURNG, Ministre de la Culture et des Beaux-Arts et Présidente du Conseil d'Administration de l'ITC

Thank you, Professor. We keep your recommendation and we will try our best to promote the internationalization, the next year.

The last thing, it is the nomination of the ITC's team. Normally, we have the procedure to nominate the director, the deputy director, the dean, vice-dean and other leaders for the direction board, offices, faculties, departments and services. If you look at the document, we can that everything seems the same:

- 1) Dr. OM Romny, directeur général de l'ITC
- 2) Dr. Ludovic PROTIN, directeur honoraire de l'ITC
- 3) Dr. CHUNHIENG Thavarith, directeur général adjoint permanent de l'ITC chargé de la coopération
- 4) Dr. PO Kimtho, directeur général adjoint chargé de l'administration, des finances et des audits
 - Dr. BUN Long, coordinateur du Projet ADB
 - M. CHREA Rada, conseiller technique des constructions
- 5) M. SOY Ty, directeur général adjoint chargé des affaires académiques
6. Dr. OEURNG Chantha, directeur général adjoint chargé des plannings et supervisions du Centre de recherche et d'innovation
- 7) M. NUTH Sothân, Conseiller des affaires académiques, de la jeunesse et des sports
 - M. SOY Sokhom
 - M. NHEP Sophal
- 8) M. PENH San, conseiller de la direction pour l'administration, les finances et les services internes
- 9) M. PHOL Norith, conseiller de la direction des plannings et des projets avec l'Union Européenne
- 10) Prof. Bruno DAGUES, conseiller de la direction de l'ITC
- 11) Dr. SIM Tepmony, directeur du programme de 3ème cycle
 - Dr. HIN Raveth

- Dr. SRANG Sarot, responsable du programme international ECAM LaSalle et du Start-Up Center
- 12) Dr. OR Chanmoly, directeur du Centre de Recherche et d'Innovation
 - Dr. SUONG Malyna
 - Dr. TAN Reasmey
 - DR. SIEANG Chansopheak, chargé du développement Fab-Lab et du concours de robots
- 13) Dr. IN Sokneang, doyenne de la faculté de génie chimique et alimentaire
 - Ms. KHOEURN Kimleng
- 14) Dr. HAN Virak, doyen de la faculté de génie civil
 - Dr. LY Hav
 - M. CHHOUK Chhayhorng
 - M. CHA Chanly, chargé de l'architecture
- 15) Dr. NGOUN Kollika, chef du département de Génie Mécanique et Industriel
 - M. UNG Amata
 - Dr. Pech Rotna, chargé du programme Master
- 16) Dr. CHRIN Phok, chef du département de Génie Électrique et Énergétique
 - Dr. AM Sokchea
- 17) Dr. SRENG Sochenda, chef du département de Télécommunication et Réseaux
 - Dr. Thoun Kosal
- 18) M. LAY Heng, chef du département de génie Informatique et Communication
 - M. YOU Vandy
- 19) Dr. CHHOUN Kong, doyen de la faculté d'hydrologie
 - Dr. ANN Vannak
 - Dr. KET Pinnara, chargée du programme Master
- 20) Dr. BUN Kimgnoun, doyen de la faculté de géoressource et géotechnique
 - Dr. ENG Chandoeurn
- 21) Dr. PHUN Veng Kheang, responsable du programme Master du département de Transport et Infrastructure
- 22) Mme SREY Malis, chef du département de TRONC COMMUN
 - M. LONG Sovann, responsable du programme de physique
 - Dr. LIN Mongkulserrey, responsable du programme de mathématiques
 - Mme KHEM Trankrasel, coordinatrice de la section de français
 - M. CHUM Tival, coordinateur de la section d'anglais
- 23) Dr. LIN Mongkulserrey, responsable du campus ITC à Tbongkhmum et à Kampong Cham
- 24) M. KHIEV Samnang, chef du service informatique
 - M. SIENG Chamroeur
- 25) M. KIM Vannada, chef du bureau d'assurance de qualité et des relations avec ACC
- 26) Mme HANG Vinchorthy, chef du bureau du personnel
- 27) M. MOEUNG Noi, chef du bureau du projet PB
- 28) M. EARM Kosal, chef du bureau de comptabilité et finances
 - Mme KOY Sophary
- 29) M. SIEANG Phen, chef du bureau des relations internationales et chef du cabinet du directeur
- 30) M. KOE Chhomsethy, chef du bureau du service technique
- 31) M. SRENG Vichet, chef de bibliothèque et du centre d'exposition

So, in fact, the direction of ITC consists of 31 people. According to ITC's statutes, these people are appointed by the Board of Trustee. With the approval of the Board, these people will lead the ITC for the next year. I believe you all agree. Okay, you applause, that means you've adopted this nomination.

Before leaving us, I would like to thank all the members of the Board of Trustee very much for your precious presence and your support. We hope to meet you all face to face for the next year.

Le tableau suivant récapitule tous les points abordés et l'avis du Consortium après la discussion et la présentation de tous les responsables de départements.

No	AVIS DU CONSORTIUM 2021	Favorable
1	Mise en place du programme international avec ECAM LaSalle	√
2	Création de la faculté des sciences appliquées	√
3	Création de la faculté de l'ICT & Cyber Université	√
4	Création du programme de mathématiques appliquées et statistiques pour les ingénieurs	√
5	Création du Master en génie des sciences des données (Data Science)	√
6	Création du Master en génie des sciences des données	√
7	Création du nouveau département de génie alimentaire	√
8	Création du centre Start-Up	√
9	Création du département Transport et Infrastructure	√

Relevé de décisions du CA 2021

Ce tableau ci-dessous illustre les décisions (l'approbation) du Conseil d'Administration 2021.

No	RELEVÉ DE DÉCISIONS DU CA 2021
1	Mise en place du programme international avec ECAM LaSalle
2	Création de la faculté des sciences appliquées
3	Création de la faculté de l'ICT & Cyber Université
4	Création du programme de mathématiques appliquées et statistiques pour les ingénieurs
5	Création du Master en génie des sciences de données (Data Science)
6	Création du Master en génie des sciences des données
7	Création du nouveau département de génie alimentaire
8	Création du centre Start-Up
9	Création du département Transport et Infrastructure

À part ces neuf points adoptés, le Conseil d'Administration a sollicité également quelques recommandations complémentaires :

- a) Mettre à jour le site web de l'ITC et le rendre plus attractif;
- b) Possibilité de transformer ITC en UTC;
- c) Organiser le symposium international pour chaque unité de recherche.

Annex 3. Overview of Decision of CA 2021 and Recommendation of Consortium 2022.

No	RELEVÉ DE DÉCISIONS DU CA 2021	2021-2022
1	Mise en place du programme international avec ECAM LaSalle	Réalisé
2	Création de la faculté des sciences appliquées	En réalisation
3	Création de la faculté de l'ICT & Cyber Université	En réalisation
4	Création du programme (département) de mathématiques appliquées et statistiques pour les ingénieurs	Réalisé
5	Création du Bachelor en génie des sciences de données (Bachelor of Engineering in Data Science)	Réalisé
6	Création du Master en génie des sciences des données	En réalisation
7	Création du nouveau département de génie alimentaire	Réalisé
8	Création du centre Start-Up	En réalisation
9	Création du département Transport et Infrastructure	Réalisé

À part ces neuf points adoptés, le Conseil d'Administration a sollicité également quelques recommandations complémentaires :

- a) Mettre à jour le site web de l'ITC et le rendre plus attractif; *(En réalisation)*
- b) Possibilité de transformer ITC en UTC; *(En réalisation)*
- c) Organiser le symposium international pour chaque unité de recherche. *(Au niveau RIC)*

No	AVIS DU CONSORTIUM	FAVORABLE
1	Demander le grade « Professeur Émérite » à la direction de l'ITC pour les grandes personnalités et les professeurs qui ont beaucoup travaillé pour le développement de l'ITC et ils vont partir à la retraite	X
2	La mise à jour du cursus de master génie de l'eau et de l'environnement (École doctorale)	X
3	La mise à jour du cursus de master génie agro-industriel (École doctorale)	X
4	La mise à jour du cursus de master Génie de technologie et de gestion de l'énergie (École doctorale)	X
5	La mise à jour du cursus de master génie mécanique, informatique et communication (École doctorale)	X
6	Demander de modifier le curriculum du programme de Télécommunications et Réseaux (Département GTR)	X
7	Ouverture du Département du Génie des Transports et des Infrastructures (GTI-GCI)	X
8	GIC update the curriculum of year 3, 4 and 5 to adapt to the change of the program in 2 nd year for students who choose to study in GIC, GTR, Data Science, in the future (GIC)	X
9	GGG updates the curriculum of year 3 for two courses on "Oremicroscopy" and "Petrology and Mineralogy". These courses will be combined together to increase the practical work, which can fulfill in the industry needs. Moreover, this course is the main core for the field mineral exploration and exploitation (GGG)	X

10	GGG updates the curriculum of year 4 for five courses on "Geophysics => added the TP class", "Rock Blasting Techniques => added TD class", "Mineral Exploration => added TD class", "Basic Geological Mapping => added TD class", "Mineral Characterization => removed this course due to the course of mineral exploration is covered this content already". The purpose of modified is to fulfill the requirement of current job market needed, especially in the field Mining, which is rapid growth in late 2021 (GGG)	X
11	GRU requested to modify the course "Construction of Rural Road" to "Road Engineering and Construction" for improving competent of student to meet the need of job market (GRU)	X
12	GRU will work on the Technician program in order to modify the program for a specific skill need on Water Supply and setup water supply laboratory with support from Shanghai Micro Purification Co.,Ltd (GRU)	X
13	GRU will implement the Water and Environment Oriented Living lab by creating on more lab called "Coastal and Wetland Environmental Research Lab". The students and lecturer will do the real-life water demo sites and creating a multi-stakeholder virtual network (GRU)	X
14	Propose to establish the Cambodia Coastal Research Center. The detail structure, vision, mission, stakeholders, researcher and source of fund will be submitted in next consortium 2023 (GRU)	X
15	ITC is planning to launch 1year International Pre-degree Foundation Programs of Curtin in Oct 2022 at ITC and students could continue their undergraduate study for both Engineering (+4years) and Science (+3years) at any Curtin campus upon this foundation program completion. The pre-degree foundation program was established by technical assistant from both Curtin Perth, Australia and Curtin Malaysia under Higher Education Partnership Program of HEIP. The Establishment of Pre-degree Foundation Program in Eng. and Science will meet the Curtin's undergraduate entry requirement at any Curtin campus	X

Annexe 3a. Rapport de l'enseignement de français (2021-2022).

La Section de Français de l'Institut de Technologie du Cambodge assure des cours de français langue étrangère à tous les étudiants de la première année à la quatrième année du cursus ingénieur. Pour les groupes de 5^{ème} année (32h pour un semestre seulement) : cours de *Module d'Insertion Professionnelle (MIP)* (en français)

Classe	Niveau	Nombre d'heures/semaine		Total du nombre d'heures/an
		Semestre 1 (16 semaines)	Semestre 2 (16 semaines)	
I1	A1	6h	6h	192h
I2	A2	6h	4h	160h
I3	A1*	4h	2h	96h
	A2			
	B1			
I4	A2	2h	2h	64h
	B1			
	B2			
I5	MIP	2h		32h

*I3-A1 : Étudiants ingénieurs venant du cycle technicien

1. Ressources humaines

L'appel à recrutement des enseignants vacataires de français a été lancé le 27 août 2021. L'interview s'est faite le 14 septembre 2021.

Ressources humaines de la Section de français 2021-2022 total : 27.

- 1 responsable de la Section (Titulaire d'État)
- 1 secrétaire
- 25 enseignants de français : 6 titulaires d'État, 19 vacataires

2. Programmation des cours de français 2021-2022

Voir *La programmation des cours de français de l'année académique 2021-2022* (Annexe 2, pages 10-24).

3. Méthode d'évaluation

- Contrôle : à la fin du premier semestre par 4 types d'évaluation : compréhension orale (CO), compréhension écrite (CE), production écrite (PE), Grammaire et Vocabulaire).
- Examen de niveau A1/A2/B1/B2 à la fin du second semestre sous 4 compétences d'évaluation : compréhension orale (CO), compréhension écrite (CE), production écrite (PE) et production orale (PO), bien adaptées du Cadre Européen Commun de Référence pour les Langues (CECRL).

4. Résultats de l'évaluation (Année 2020-2021)

Campus Phnom Penh (2020-2021)

Cycle	Niveau	Résultat			
		Succès	Échec	Absent	Total
1 ^{ère} année (I1)	A1	1398	316	145	1859
2 ^{ème} année (I2)	A2	780	124	3	907
3 ^{ème} année (I3)	A1*	25	2	0	27
	A2	124	48	1	173
	B1	373	169	224	766
4 ^{ème} année (I4)	A2	126	19	1	146
	B1	117	80	1	198
	B2	68	17	0	85

Troisième année : I3

Répartition en **3 groupes de niveau** selon les résultats de l'année précédente :

* Groupe de niveau A1 (I3-A1)

Il s'agit des étudiants venant du cycle Technicien. La plupart d'eux n'ont jamais appris le français.

Campus de Tbong Khmum (2020-2021)

Pour les étudiants à Tbong Khmum, dû à leur petit nombre, ils ne sont pas classés par le résultat final de l'année précédente.

Cycle	Niveau	Résultat			
		Succès	Échec	Absent	Total
1 ^{ère} année (I1)	A1	22	15	16	53
2 ^{ème} année (I2)	A2	19	3	0	21
3 ^{ème} année (I3)	B1	20	0	1	21
4 ^{ème} année (I4)	B1	37	0	0	37

5. Certification du niveau de français

L'ITC délivre deux types de certification :

- 1) **Attestation de connaissance en langue française** : il s'agit d'une simple attestation donnant le nombre d'heures de cours de français effectués pour les étudiants de 5^{ème} année qui ne bénéficient pas de la réforme. Mais les étudiants des autres années peuvent également la demander en cas de nécessité.
- 2) **Attestation de niveau de langue française** : une session de test de niveau a lieu en juin, vers la fin du second semestre pour les étudiants en :
 - 1^{ère} année : A1
 - 2^{ème} année : A2
 - 3^{ème} année : A1/A2/B1
 - 4^{ème} année : A2/B1/B2

Ressources humaines de la Section de français 2021-2022

No.	Nom et prénom	Sexe	Département	Date de naissance	Diplôme	Sujet de mémoire	Université et pays	Année de fin d'étude	Sujet de thèse	Université et pays	Année de fin d'étude
1	KHEMTRAN Krasel	F	SF	13 Oct. 1971	Master 2				La motivation des étudiants dans l'apprentissage du français à l'Institut de Technologie du Cambodge	Université de Moncton, Canada	1999
2	MONG Sokunvatey	F	SF	22.04.1965	Licence ès Lettres		Université de Phnom Penh (Cambodge)	1994			
3	EL Sotheany	F	SF	01.05.1970	Licence FLE		Université de Phnom Penh (Cambodge), Université de Rouen (France)	1993			
4	KHEM Nimith	F	SF	25 mai 1965	Master 2	La néologie dans les langues française et russe	Institut d'Etat pédagogique des langues étrangères de Kiev (Russie)	1990		Institut de Kiev, Ukraine, Russie	1990
5	NHEP Kim Hun	M	SF	18.11.1972	Licence ès Lettres		Université Royale de Phnom Penh (Cambodge)	1996			
6	PRUM Rithy	M	SF	05.11.1971	Licence		Université de Phnom Penh (Cambodge), Université de Rouen (France)	1994			
7	NOU Samrach	M	SF	07.05.1986	Master		Université Caen-Basse Normandie, France	2016			

8	MAM Champei	F	SF	27.12.1979	Master 2	Démarche de projet et travail coopératif : Apport pour la formation à la pratique réflexive au sein de l'équipe enseignante, le cas des enseignants au Lycée HUN Sén Sérey Pheap	Université Caen Basse Normandie, France	2013			
9	KUCH Chanpoly	M	SF	01.01.1973	Master en linguistique	Rapport de 30 pages : proverbes khmers et français	Université Royale de Phnom Penh	2009			
10	YEANG Ranich	F	SF	22.05.1998	Licence		Université Royale de Phnom Penh	2018			
11	SAR Hieng	F	SF	26.02.1948	Licence		Université de Phnom Penh, Cambodge	1992			
12	PAN Chansonita	F	SF	07.08.1995	Licence		Université Royale de Phnom Penh , Cambodge	2017			Institut Français du Cambodge
13	BUN Veary	F	SF	19.05.1954	Licence		Université Royale de Phnom Penh , Cambodge	1988			
14	MOUNG Romany	F	SF	27.05.1959	DALF C1		Institut Français du Cambodge, Cambodge	2006			
15	KEM Malyan	F	SF	08.11.1950	DALF C1		IFC (Institut de Français du Cambodge)	2000			
16	VORN Savathana	M	SF	19.05.1984	Master	Rapport du stage pratique :	CUS, Cambodge (Cambodian	2018			

						Gestion administrative à l'école secondaire	University for Specialties)				
17	NET Ninit	M	SF	10.09.1993	Licence		Université Royale de Phnom Penh (Cambodge)	2018			
18	PHUONG Sothea	M	SF	07.07.1987	Licence		Université Royale de Phnom Penh , Cambodge	2010			
19	PHAN Phadeth	M	SF	01.01.1995	Licence	Rapport du stage pratique	Université Royale de Phnom Penh , Cambodge	2017			
20	PHUONG Chenda	M	SF	14.01.1984	Licence		Université Royale de Phnom Penh , Cambodge	2017			
21	AN SINA	M	SF	16.01.1997	Licence	Rapport de stage: La production orale dans la classe	Université Royale de Phnom Penh (Cambodge)	2019			
22	LONG Sophea	M	SF	3/1/1993	Licence		Université Royale de Phnom Penh , Cambodge	2014			
23	SOK DALIN	M	SF	4/16/1987	Licence+1		Institut National de l'Éducation, Cambodge	2016			
24	MOEUN SOKVISAL	M	SF	01.07.1195	Licence		Institut des Langues Étrangères	2017			
25	SAN VITOU	M	SF	30.11.1989	Licence		Université Royale de Phnom Penh , Cambodge	2011			
26	TOL SINATH	M	SF	07.07.1996	Licence		Université Royale de Phnom Penh	2019			
27	DUONG SAVIN	F	SF	16.07.1997	BacII			2016			

Programmation des cours de français en 2021-2022

Année d'études	Progression des cours					Divers
	Manuels de référence			Nombre de dossiers/ d'unités/ de leçons	Crédit (UV)	Exigences particulières
	Méthodes	Cahier d'activités/ d'exercices	Documents supports de référence :			
1 ^{ère} année	Méthode : <i>#LaClasse A1</i>	Cahier d'activités : <i>#LaClasse A1</i>	Exercices de grammaire A1	6 unités (U0, U1, U2, U3, U4, U5, U6) + atelier	Total : 192h (6 crédits)	Dès la rentrée académique, les étudiants de 1 ^{ère} année doivent passer un test de niveau.
	Semestre 1			3 unités +U0	96h (3 crédits)	
	Unité 0 : Bonjour . <i>Alphabet</i> . <i>Salutation</i> . <i>Se présenter</i> . <i>Les nombres</i> . <i>Les jours, les mois</i> Unité 1 : Toi et moi . <i>Se présenter</i> . <i>Parlons de notre pays, nationalité</i> . <i>Demandons des informations, des cartes d'identité et remplir les formulaires</i> . <i>Grammaire, phonétique,</i>	U0 et U1				

	lexique . Faisons le point					
	Unité 2 : C'est la famille . Présentons notre famille . Professions . Décrire une tierce personne : caractères physiques et morale . Grammaire, phonétique, lexique . Faisons le point	U2				
	Unité 3 : Jour après jour . Parler de la ville, des Sports préférés et des loisirs . Emploi du temps, l'heure et les activités quotidiennes . Grammaire, phonétique, lexique . Faisons le point	U3				
	Semestre 2			3 unités	96h (3 crédits)	
	Unité 4 : Qu'est-ce qu'on mange ? . Les aliments, les goûts et les préférences . Commander un repas et demander le prix . Grammaire, phonétique, lexique . Faisons le point . Entraînement au DEFL A1	U4				
	Unité 5 : Pause shopping.	U5				

	<ul style="list-style-type: none"> . Parler des magasins . Décrire des vêtements : style, choix et achat . Se plaindre et exprimer son avis . Grammaire Phonétique et lexique . Faisons le point . Entrainement au DEFL A1 						
	<p>Unité 6 : Préparation des fêtes de fin d'années</p> <ul style="list-style-type: none"> . Présenter sa ville . Nommer et localiser . Proposer une sortie . Dire des moyens de transport . Grammaire Phonétique et lexique . Faisons le point . Entrainement au DEFL A1 	U6					
Préparation du test de niveau DELF A1	Vers la fin de la 1 ^e année, on organise un examen final sous forme de DELF A1 en appliquant les quatre compétences : CO - CE - PO - PE.						
2^{ème} année	Méthode : #LaClasse A2		Exercice de grammaire A2	5 unités (U1, U2, U3, U4, U5) + atelier	Total de cours 160h (5 crédits)	Les étudiants qui n'obtiennent pas le niveau A1 en fin de la 1 ^{ère} année suivront les	
	Semestre 1			3 unités	96h (3 crédits)		

<p>Unité 1 : Bienvenue <i>. Présentons-nous !</i> <i>. Grammaire, phonétique et lexique</i> <i>. Faisons le point</i></p>	U1				mêmes cours que leurs amis de classes ayant obtenu le niveau A1. Ils sont très accompagnés en classe.
<p>Unité 2 : Bon voyage <i>. Réalisons un carnet de voyage</i> <i>. Grammaire, phonétique et lexique</i> <i>. Faisons le point</i></p>	U2				
<p>Unité 3 : À table ! <i>. Présentons une recette</i> <i>. Grammaire, phonétique et lexique</i> <i>. Faisons le point</i> . Entraînement au DEFL A2- partie 1</p>	U3				
Semestre 2		2 unités	64h (2 crédits)		
<p>Unité 4 : On sort ! <i>. Réalisations une enquête sur les loisirs</i> <i>. Grammaire, phonétique et lexique</i> <i>. Faisons le point</i> . Entraînement au DEFL A2- partie2</p>	U4				
<p>Unité 5 : Profession reporter <i>. Faisons un reportage</i> <i>. Grammaire, phonétique et lexique</i></p>	U5				

	. <i>Faisons le point</i> . Entraînement au DEFL A2-partie 3							
Préparation du test de niveau A2	Vers la fin de la 2 ^e année, On organise un examen final de sous forme de DELF A2 en appliquant les quatre compétences CO - CE – PO - PE							
3^{ème} année Niveau A1 (Les étudiants venant du cycle Technicien)	Méthode : #LaClasse A1	Cahier d'activités : #LaClasse A1	Exercices de grammaire niveau A1	4 unités (U0, U1, U2, U3) + ateliers	Total : 96h (3 crédits)	Ces étudiants viennent du cycle Technicien. Ils ont le niveau A0. Mais ils doivent avoir au moins le niveau A2 à la fin de leur cursus d'études d'ingénierie.		
	Semestre 1			3 unités	64h (2 crédits)			
	Unité 0 : Bonjour ! . <i>Alphabet</i> . <i>Salutation</i> . <i>Se présenter</i> . <i>Les nombres</i> . <i>Les jours, les mois</i>	U0						
	Unité 1 : Toi et moi . <i>Se présenter (suite)</i> . <i>Parlons de notre pays, nationalité</i> . <i>Demandons des informations, des cartes d'identité et les formulaires</i> . <i>Grammaire, phonétique, lexique</i> . <i>Faisons le point</i>	U1						
Unité 2 : C'est la famille . <i>Présentons notre famille</i>	U2							

	<p>. Professions . Décrire une tierce personne : caractères physique et morale . Grammaire, phonétique, lexicque . Faisons le point</p>						
	Semestre 2			1 unité	32h (1 crédit)		
	<p>Unité 3 : Jour après jour . Parler de la ville, des Sports préférés et des loisirs . Emploi du temps, l'heure et les activités quotidiennes . Grammaire, phonétique, lexicque . Faisons le point</p>	U3					
	Bilan : Révision pour l'entraînement au DELF A1						
Préparation du test de niveau A1	Vers la fin de la 3 ^e année, on organise un examen final sous forme de DELF A1 en appliquant les quatre compétences CO - CE -PO - PE						
3^{ème} année A2	Méthode :	Le cahier d'activités du	Exercices de grammaire A2	12 leçons (p11 - p 70) +	Total : 96h (3 crédits)	Les étudiants qui n'obtiennent pas	

(Niveau rattrapé)	Le français par les textes niveau A2	français par les textes niveau A2		ateliers et activités ludiques		le niveau A2 en fin de la 2 ^{ème} année doivent le rattraper d'une manière claire et attentive. Ils sont très accompagnés en classe. En plus, on les encourage à passer le test de niveau B1.
	Semestre 1			8 leçons	64h (2 crédits)	
	<i>Partie 1- A.</i>					
	<i>Texte 1 : Qui est-elle ?</i>	L1				
	<i>Texte 2 : Par où faut-il passer ?</i>	L2				
<i>Texte 3 : Fâché avec l'heure</i>	L3					
<i>Texte 4 : On ne sait jamais</i>	L4					
<i>Partie 1-B.</i>						
<i>Texte 5 : Allos faire des courses ensemble</i>	L5					
<i>Texte 6 : T'en souviens-tu ?</i>	L6					
<i>Texte 7 : Je voudrais changer cette chemise ...</i>	L7					
<i>Texte 8 : Tu veux un coup de main</i>	L8					
Semestre 2				4 leçons	32h (1 crédit)	

	<i>Partie 2- A.</i> Texte 9 : Allô, docteur Joubert ? Texte 10 : Des explications les noms des rues françaises	L9 L10					
	<i>Partie 2-B.</i> Texte 11 : Anne Dubois va-t-elle refuser ? Texte 12 : Allez, debout les gosses ! Entrainement au DEFL A2	L11 L12					
Préparation Niveau A2 ou B1	Entrainement au DELF A2 ou B1	Documents A2 et B1					
3^{ème} année Niveau B1	Méthode : #LaClasse B1	500 exercices de grammaire B1	3 unités (U1, U2, U3)		96h (3 crédits)		
	Semestres 1			2 unités	64h (2 crédits)		
	Unité 1 : Souvenirs . Raconter sa vie . Décrire une personne et un lieu . Situer dans le temps et comparer	U1					
	Unité 2 : Au nom de la loi . Raconter du passé . Situer dans le temps . Exprimer son opinion	U2					

	. Parler des réseaux sociaux						
	Entraînement au DELF B1	Bilan					
	Semestres 2			1 unité (= 4 leçons)	32h (1 crédit)		
	Unité 3 : Affaires sensibles . Présenter un fait . Synthétiser . Analyser Révision	U3					
	Entraînement au DELF B1						
Préparation du test de niveau B1	Vers la fin de la 3 ^e année, on organise un examen final sous forme de DELF B1 en appliquant les quatre compétences CO - CE- PO - PE						
4^{ème} année Niveau A2 (Niveau rattrapé)	Méthode : Le français par les textes niveau A2	Le cahier d'activités du français par les textes niveau A2		8 leçons	Total : 64h (2 crédits)	Les étudiants qui n'obtiennent pas encore le niveau A2 doivent le rattraper d'une manière claire et attentive. Ils sont très accompagnés en classe. En plus, on les encourage à passer le test de niveau B1.	
	Semestre 1			4 leçons	32h (1 crédit)		
	. Leçon 13 : Amélie est toujours pressée	L13					
	. Leçon 14 : La montagne est super !	L14					
	. Leçon 15 : Est-ce une plaisanterie ?	L15					
	. Leçon 16 : Faire un arbre	L16					

	généalogique						
	Semestre 2			4 leçons	32h (1 crédit)		
	. <i>Leçon 17 : J'émet quand même des réserves</i>	L17					
	. <i>Leçon 18 : D'accord ou pas d'accord ?</i>	L18					
	. <i>Leçon 19 : Laurent doit prendre la parole en public</i>						
	. <i>Leçon 20 : L'interview de M. Nattier, conseiller municipal</i>	L19					
		L20					
Préparation du test de niveau A2	Préparation du test de niveau DELF A2						
4^{ème} année Niveau B1	Méthode : #LaClasse B1	Exercices de grammaire 500, niveau B1		2 unités (U4-U5)	Total : 64h (2 crédits)		
	Semestre 1			1 unité de 4 leçons	32h (1 crédit)		
	Unité 4 : Junior association	U4					
	. <i>Exprimer la cause, l'obligation, la volonté, la certitude</i>						
	. <i>Argumenter donner des instructions</i>						
	<i>Bilan pour l'examen</i>						
	Semestre 2				32h (1 crédit)		

	Unité 5 : Scandales ? <ul style="list-style-type: none"> . Juger, critiquer, caractériser . Exprimer la surprise, l'indifférence, un sentiment négatif, une opinion . Décrire un phénomène 	U5							
Préparation du test de niveau B1	Vers la fin de la 4 ^e année, on organise un examen final sous forme de DELF B1 en appliquant les quatre compétences CO - CE- PO - PE								
4^{ème} année Niveau B2	Méthode : Affaires.com, niveau B2-C1	Exercices de grammaire 500, niveau B2		2 unités	Total : 64h (2 crédits)				
	Semestre 1			1 unité	32h (1 crédit)				
	Unité 1 : Acteurs économiques <ul style="list-style-type: none"> . Paroles d'actifs . Diversité des entreprises . Etablissements de crédit . Défense du consommateur . Rôle de l'État 	U1							
	Bilan pour l'examen								
	Semestre 2				1 unité	32h (1 crédit)			
	Unité 2 : Créateurs de l'entreprise <ul style="list-style-type: none"> . Profil de créateur . Recherches des capitaux . Lieux d'implantation 	U2							

	<i>. Choix de société</i> <i>. Paroles d'entrepreneurs</i> <i>. Bilan</i>						
	Entrainement au DELF B2						
Préparation du test de niveau B2	Vers la fin de la 4 ^e année pour le groupe I-4 forts, on organise un examen final sous forme de DELF B2 en appliquant les quatre compétences CO - CE- PO - PE						
5^{ème} année	MIP (Module d'Insertion Professionnelle)				Total : 32h (1 crédit)		
	Semestre 1						
	Partie 1 : 1. Savoir vivre en affaires 2. Savoir travailler en groupe 3. CV 4. Lettre de motivation 5. Entretien d'embauche Partie 2 : 6. Rédaction de mémoire 7. Soutenance						

Annexe 3b. Rapport de la section d'anglais en 2021-2022

1. Introduction

English language has been taught Engineering students in ITC (Institute of Technology of Cambodia) since 1995. The rationale of having English language in ITC is to help young engineering students to get jobs and further study.

II. Perspectives and strategies

1. Perspectives

To become one among Higher Education Institution in ASEAN countries, leading in teaching English (English for Specific Academic Purposes (ESAP), respond to the need of Department of Higher Education for University level in the context of ASEAN integration.

2. Strategies

To enhance the quality of English language teaching in (ITC) the English Section has strategies as follow:

- Teachers recruitment announcement in Public
- Requirement Master's degree diplom in ELT
- Qualification English proficiency B2 level
- Update existing curriculum according to the need of the job market
- Training staff

3. Human resources

Professeur ayant un Doctorat: (0)

Professeur ayant un Master: (6)

- Mr. CHOUM Tival (Master, Université de langues 'etrange`res, Pyatigorsk, Russie, 1995)
- Mr. CHENG Kimsan (Master, Universit'e de langues, Sydney, Australia, 1999.
- Mr. SO Phea (Master, Universit'e de langues Waikato, New Zealand, 1998)

Professeur vacataire ayant un Master (4):

Professeur vacataire ayant une licence (12):

- Mrs. CHEA Sophea (Bachelor, IFL, 2007)
- Ms. HONG Ratanak OMARA (Bachelor, IFL, 2017)
- Ms. HEANG Leakena (Bachelor, IFL, 2017)
- Ms. TIM Nina Eliza (Bachelor, IFL, 2017)
- Mr. YEAT Vanna (Master, IFL, 2018)
- Mr. MAO Punleu (Bachelor, IFL, 2019)
- Ms. LY Soda (Bachelor, IFL, 2018)
- Ms. HONG Hilang (Bachelor, IFL, 2014)
- Mr. CHAT Koem Hong (Master, IFL, 2019)
- Mr. LAY Hongly (Bachelor, IFL, 2019)
- Mr. CHHUEY Laoteng (Bachelor, IFL, 2019)
- Mrs. PEAN Kosomak (Bachelor, IFL, 2007)
- Mr. PENCHHO Chareth (Master, IFL, 2018)
- Mr. AY Sok (Master, IFL, 2015)
- Mr. CHHAN Panha (Bachelor, IFL, 2021)
- Ms. MEAS Phallin (Bachelor, IFL, 2017)

4. Le tableau ci – dessous indique le nombre total des professeurs de la section d’Anglais

Section	Professeurs Titulaires Présents (Abs.)	Professeurs stagiaires Présentes (Abs.)	Retours d’étudiants	Vacataires
Anglais	3(0)	0	0	15

Le tableau ci – dessous représente le nombre total des professeurs de l’ITC en Section d’Anglais

Doctorat Présenté (Abs.)	Master/DEA Présenté (Abs.)	Licence anglaise Présenté (Abs.)
0	6 (0)	14 (0)

Diploma	2021-2022
Doctor	0
Master	7
Bachelor	12
Total	19

5. English Language Course

The English language course is specially designed for engineering students who have studied some English previously. The course links languages learning to other subjects in whom young learners are interested, such as Technology, Science and Environment thus providing ITC’s young engineers with an authentic reason for communicating in classroom, their workplace and further study. The English course began from year2-year5.

6. Course materials

The English Section has taught English for Specific Academic Purposes (ESAP) which provides students with the language and skills to a specific academic discipline instructed in English (content course) rather than GE in order to prepare them for ASEAN integration which proposed by Department of Higher Education. Technology1 , Technology2 series by Eric H. Gledening and Alision Pohl, English for environmental Science course book by Terry Phillip and I5 course book designed by Project members of English Section with English-medium university courses have been used in the course. This course focuses on General sub-skills required in academic contexts to help students to get job and further study.

- Year2, we used Technology1 (A2 level) course book, Eric H. Gledening and Alision Pohl
- Year3, we used Technology2 (B1 level) course book, Eric H. Gledening and Alision Pohl
- Year4, we used English for Environmental Science (B2 level) by Garnet of Education. English for Specific Academic Purposes (ESAP)
- Year5, we use ENGLISH for WORK AND CAREER: ENGINEERING SKILL WHICH DEVELOP BY project MEMBERS IN ENGLISH SECTION IN ORDER TO HELP STUDENTS TO PRPARE THEMSELVES IN THE REAL JOB MARKET

7. Training teachers

Five English language teachers were sent to attend the 18th Cam TESOL conference which held on February 18th -20th, 2022 supported by ITC and by (IDP) Australian Center for Education (ACE)

**REPORT
ON
RESULT OF ENGLISH LEVEL EXAM 2020 - 2021**

I2 (A2)

REPEATED A2	PASSED A2	ABSENT
136	361	21
		TOTAL 166

I2 (B1)

REPEATED A2	PASSED A2	ABSENT
28	360	57
		TOTAL 445

I3 (A2)

REPEATED A2	PASSED A2	ABSENT
26	19	46
		TOTAL 91

I3 (B1)

REPEATED B1	PASSED B1	ABSENT
46	118	31
		TOTAL 265

I3 (B2)

REPEATED B2	PASSED B2	ABSENT
80	358	55
		TOTAL 493

I4 (A2)

REPEATED A2	PASSED A2	ABSENT
5	6	6
		TOTAL 17

I4 (B1)

REPEATED B1	PASSED B1	ABSENT
25	49	14
		TOTAL 88

I4 (B2)

REPEATED B2	PASSED B2	ABSENT
51	91	41
		TOTAL 183

**Note:*

There are 27 of year 4 students still repeat level A2

STUDENTS NUMBER 2021- 2022

Year	Total	Male	Female	Student's Registration to study English
I2	1624	1124	500	1624
I3	990	627	269	896
I4	901	296	97	393
I5	733	569	164	733

I2 DIAGNOSTIC TEST RESULT 2021-2022

Level	Number of students by level
A2	942
B1	682
Total	1624

8. Conclusion

The English section has done to follow the proposal for teaching French and English at ITC by working group Languages ITC- auf-French Embassy June 3rd, 2016. As the result, the English Section got great successes in English language reform, students were accepted their result they got and because the English Section was supported by management team of ITC, English staffs, stakeholders and students.

Annex 4. Minutes of CEVU meeting.

Problèmes soulevés pendant la réunion de CEVU (1 décembre 2021) et solutions

	Résolu pendant la réunion	Responsable sur problèmes restants	Date à résoudre
I- Enseignement et recherche			
1- Enseignement scientifique			
I2 Quelques étudiants n'ont pas l'ordinateur pendant le cours de Data Structure and Programming?	√		
I3, I4-GAR : Proposer d'apprendre en classe pour certains cours pratiques (Atelier, Dessin en couleur, Autocad, ...)	√		
I3, I4-GGG, I4-GTR, I3-GCA : Souhaiter pratiquer les TPs aux laboratoires.	√		
I3, I4, et I5-GIM, I3, I4, et I5-GRU : Proposer d'apprendre en classe pour les TDs et TPs.	√		
I5-GCA : La soutenance du mémoire de fin d'études fera en ligne ou sur place?	√		
Master ETM : Proposer de séparer entre le laboratoire pour la recherche et pour les TPs.	√		
Master WEE : Proposer une salle pour les étudiants pour les activités de recherche.	√		
2- Internet et e-learning			
T2-GCA, I3, I4-GCA et enseignants GCA, Master (ECS, ETM, MSE, TIE)			
- L'internet est lent et quelques fois pas de connexion.		Service informatique	Janvier 2022

II- Matériel			
Enseignants GIM		Service Technique et Service Informatique	décembre 2021 et janvier 2022
- La fuite d'eau du climatiseur dans la salle B-112.			
- Réparer ou remplacer le climatiseur et le ventilateur dans la salle B-207.			
- Réparer le climatiseur dans la salle C-106 et C-107.			
Enseignants GEE			
- L'infiltration d'eau dans la salle B-313.			

Problèmes soulevés pendant réunion de CEVU (11 mai 2022) et solutions

	Résolu pendant la réunion	Responsable sur problèmes restants	Date à résoudre
I- Enseignement et recherche			
1- Enseignement scientifique			
I1, I2-DTC: Problème d'accès à Ms Teams (Maths et Physique).	√		
I3&I4-GCA et I3&I4-GCA (TbK):			
- Problème d'accès à Ms Teams	√		
- Manque de matériels pour les TPs	√		
- Proposer d'avoir les cours en classe.	√		
I3&I4-GAR : La visite des temples dans le programme d'études.	√		
I3&I4-GIM : Souhaiter d'apprendre les cours en classe.	√		
I4-GRU : Souhaiter d'avoir la visite d'entreprise/chantier.	√		
2- Internet			
I1&I2-DTC : Problèmes de Wifi	√		
M1-WEE : Temps de connexion à l'internet d'une heure (actuel) à deux heures?	√		
Enseignants GIM : Problèmes de Wifi au bâtiment I.	√		

II- Matériel			
I1&I2-DTC, Enseignants AMS:		Service Technique et Service Informatique	Mai et juin 2022
- Salle F-401, F-403 : Ventilateurs ne marchent pas bien. Cable HDMI dans ces deux salles.			
- Salle S1 et S2 : Ventilateurs, Microphone, et ampoules n'en fonctionnent pas bien.			
I4-GGG			
- LCD ne fonctionne pas bien.			
- D-102 : Climatiseur, ventilateur et ampoules ne fonctionnent pas bien.			
Enseignants GEE: L'infiltration d'eau dans la salle B-313.			
III- Hygiène			
I1, I2 : Veiller nettoyer les salles de cours.		S. technique	Mai 2022
I3-GGG : Les toilettes pour femme au rez-de-chaussée du bâtiment B.			
I4-GRU: Toilettes aux 3 ^{ème} et 4 ^{ème} étages du bâtiment A.			
IV- Parking			
I1&I2-DTC, I4-GTR:			
- Horaire du parking ?	√		
- Le parking jusqu'à 18h pour le samedi.	√		
Enseignant AMS: L'accès au parking derrière le bâtiment F pour les enseignants.	√		
V- Divers			
I3-GCI: Ouverture de la porte d'entrée (ouest) le samedi.	√		
Enseignant GGG : Proposer de couper des branches d'arbre au parking de voiture.	√		

Annex 5. List of Master Thesis.

N°	Name	Sex	Research Topic	Promo.	Defense Date	Remark
M-MSE (MGCI) <i>(Two group of students: register only at ITC, register in double degree program with INSA Rennes)</i>						
5	KEO Pisey	M	Vérification de stabilité selon l'en 1993. Mise au point d'un logiciel d'application et d'abaques de dimensionnement	1	2011	Double Degree
6	LIM Songly	M	Vérification de stabilité des poteaux hybride. Evaluation de l'applicabilité de l'eurocode 4 et de l'eurocode 2	1	2011	Double Degree
7	REE Nim	M	Etude numérique du comportement des structures des chaussées pavées sous charges de trafic	1	2011	Double Degree
8	HENG Socheat	M	Simulation expérimentale d'écoulement multiphasique dans les milieux poreux	1	2011	Double Degree
9	Y Maneth	M	Simulation numérique de la modification du sol compressible environnant sous l'effet de la mise en place de colonnes ballastées	1	2011	Double Degree
10	KAN Kuchvichea	M	Simulation numérique du comportement hydro-mécanique des colonnes ballastées et du sol environnant	2	2012	Double Degree
11	CHHENG Sochanavong	M	Réutilisation des sédiments de dragage dans la fabrication des écociments	2	2012	Double Degree
12	SAYASANE Phettavanh	M	Intensification des échanges thermiques par l'utilisation de nanofluides à base de nanotube de carbone ntc/eau	2	2012	Double Degree
13	HIN Sovannara	M	Modélisation de l'évolution de l'endommagement dans une poutre constituée de matériaux quasi-fragiles tel que béton	2	2012	Double Degree
14	CHAO Ang Puth Both	M	Simulation numérique des écoulements et du transport granulaire sur les sols urbains-modèle de réseau de microcanaux	2	2012	Double Degree
15	CHHORN Chamroeun	M	Valorisation de sédiments : l'influence d'un traitement thermique	2	2012	Double Degree
16	PROK Narith	M	Influence de la pluie dans le transport de sédiment en ruissellement	2	2012	Double Degree

17	EA Lysothearin	M	Recherche de la plus haute résistance du béton en utilisant des matériaux locaux (en province de Kompong Speu)	2	2012	Double Degree
18	SOK Sim	M	Recherche de la plus haute résistance du béton en utilisant des matériaux locaux (en province de Siem Reap)	2	2012	Double Degree
19	LIM Samreth	M	Contribution à la détection, à la localisation et au suivi, par méthode d'évaluation dynamique, de l'endommagement des câbles du génie civil	3	2013	Double Degree
20	HENG Piseth	M	Développement d'un modèle (simple et multi-ddl) d'un poteau soumis à une charge du type impact (véhicule, projectile)	3	2013	Double Degree
21	DIM Sreyleak	F	Etude numérique du comportement de poutres de couplage	3	2013	Double Degree
22	HUOT Makara	M	Caractérisation et modélisation du comportement mécanique d'un alliage binaire titane-molybdène	3	2013	Double Degree
23	KAN Socheat	F	Simulation numérique du comportement mécanique des structures de chaussées pavées	3	2013	Double Degree
24	LAN Rathanak	M	Etude des échanges thermiques dans les échangeurs thermiques et microcanaux par l'utilisation de nanofluides à base de nanotube de carbone	3	2013	Double Degree
25	BAK Davan	F	Comportement d'un rupteur thermique à la ruine -détermination d'un critère de ruine combiné	3	2013	Double Degree
26	CHHANG Sophy	M	Développement d'un modèle (simple et multi-ddl) d'un poteau soumis à une charge du type impact (véhicule, projectile)	4	2014	Double Degree
27	KY Sambath	M	Etude des échanges thermiques dans les échangeurs thermiques et microcanaux par l'utilisation de nanofluides à base de nanotube de carbone	4	2014	Double Degree
28	CHEA Kim	M	Contribution à la détection, à la localisation et au suivi, par méthode d'évaluation dynamique, de l'endommagement des câbles du génie civil	4	2014	Double Degree
29	HIN Raveth	M	Identification the indentation behavior of chemically tempered glasses	4	2014	Double Degree

30	SIM Viriyavudh	M	Simulation numérique du comportement mécanique des structures de chaussées pavées	4	2014	Double Degree
31	EAR Bunpo	M	Etude numérique du comportement de poutres de couplage	4	2014	Double Degree
32	TO Theany	M	Comportement d'un rupteur thermique à la ruine -détermination d'un critère de ruine combiné	5	2015	Double Degree
33	TENG Kongou	M	Simulation numérique du comportement mécanique des structures de chaussées pavées	5	2015	Double Degree
34	SOK Tetsya	M	Etude des échanges thermiques dans les échangeurs thermiques et microcanaux par l'utilisation de nanofluides à base de nanotubes de carbone	5	2015	Double Degree
35	HO Lyeng	M	Etude numérique du comportement de poutres de couplage	5	2015	Double Degree
36	LEANG Enghok	M	Contribution à la détection, à la localisation et au suivi, par méthode d'évaluation dynamique, de l'endommagement des câbles du génie civil	5	2015	Double Degree
37	HEANG Longseng	M	Développement d'un modèle (simple et multi-ddl) d'un poteau soumis à une charge du type impact (véhicule, projectile, ..).	5	2015	Double Degree
38	LENG Khundadino	M	Caractérisation et modélisation du comportement mécanique d'un alliage binaire titane-molybdène	5	2015	Double Degree
39	CHHUN Kean Thai	M	Modifications de comportements mécaniques et physiques de sols gonflants par un ajout de chaux	6	2016	Double Degree
40	DUCH Monirak	M	Etude géotechnique des fondations profondes des éoliennes terrestres	6	2016	
41	HUY Samphorstra	M	Etude des caractéristiques géométriques et géotechniques des berges de rivière pour analyser sa stabilité, application au Cambodge (Mékong, Bassac...)	6	2016	
42	SAO Sopanha	M	Etude comparative entre les essais triaxiaux et les essais en cisaillement direct sur les sols Phnom Penh non remaniés et remoulés	6	2016	
43	NUTH Vattanak	M	Recherche de la plus haute résistance du béton en utilisant des matériaux locaux (en province de Kampong Cham)	6	2016	

44	SARAY Putheara	M	Etude comparative entre les comportements d'un graveleux latérique et d'un sable argileux en technique routière au Cambodge	7	2017	
45	SENG Nora	M	Analyse numérique de l'interaction sol-pieu	7	2017	Double Degree
46	MUY Meng Lay	M	Repairing of cracked concrete structural elements using fibrwrap® : experimental study	7	2017	
47	MOM Sokvisal	M	Dimensionnement de structures de chaussées bitumineuses avec utilisation d'agrégats d'enrobés régénérés	7	2017	Double Degree
48	MENG Try	M	Poteaux hybrides	7	2017	Double Degree
49	SONN Sokhom	M	Etude de comportement de la liaison d'acier-béton sur l'ancrage de slabe bz : expérimental via modèle élément fini	7	2017	Double Degree
50	MUY Yeak Leang	F	Durabilité des bétons d'ouvrages: carbonatation et perméabilité	7	2017	Double Degree
51	CHHORN Bun Theng	M	Optimisation de prix de plancher pour le bâtiment	7	2017	Double Degree
52	LAY Sinnara	M	Réparation d'élément béton armé avec fibrwarp	7	2017	Double Degree
53	SOK Sithpisey	M	Renforcement de la résistance des éléments structuraux en béton avec le système fibrwrap	7	2017	Double Degree
54	SAROU Lynita	F	Modeling soil-pile interaction using Macro-element approach	8	2018	Double Degree
55	HORM Rithymarady	F	Strength of silicate glass for aerospace application by biaxial flexure method, ring-on-ring configuration	8	2018	Double Degree
56	HOURN Phanvichet	M	An energy momentum integration scheme for the nonlinear dynamics of 3D Timoshenko beam formulation	8	2018	Double Degree
57	REM Sokkheang	M	Modélisation du comportement à basse température des enrobés bitumineux recyclés	8	2018	Double Degree
58	CHENG Kim Chhoung	M	Development of connection of glass beam: a numerical study	8	2018	Double Degree
59	KAO Sophea	F	Bearing capacity of pile foundation in frictional soil	8	2018	Double Degree
60	CHHAY Lyhour	M	Behavior of concrete pavement in Cambodia under temperature effect	8	2018	Double Degree
61	HENG Sounean	F	Développement d'un essai accéléré pour la Réaction Sulfatique Interne	8	2018	Double Degree

62	CHHANG Vandeth	M	Traitement des graveleux latéritiques au ciment en technique routière au Cambodge	8	2018	Double Degree
63	CHOR Phearin	M	Renforcement de la résistance des éléments en béton armé en utilisant de Fibrwrap: Études expérimentales	8	2018	Double Degree
64	Y Sovann	M	Comportement thermodynamique des enrobés bitumineux régénérés	8	2018	Double Degree
65	CHEA LEANGHENG	M	Effect on Capacity of RC Beam and Column Strengthened with Fibrwrap® System by Cyclic Exposure to Water and Salt Water	9	2019	Double Degree
66	PHOEUK MENGHAY	M	Numerical study of the mechanical behavior of the innovative CLT-Concrete composite floor	9	2019	Double Degree
67	CHHOENG OUDOM	M	Finite element model for linear analysis of pipe elbow element subjected to in-plane/out-of-plane loading and internal pressure	9	2019	Double Degree
68	NUT SOVANNETH	M	Experimental study of lime additive and temperature effects on the mechanical characteristics of hma	9	2019	
69	CHAP HUYSEA	M	Mechanical Properties of RC Beam and Column Strengthened by Fibrwrap® System after being submerged into Different Exposure Solutions	9	2019	Double Degree
70	CHORN MAKARA	M	Contribution à l'étude des scellements de galerie dans les ouvrages de stockage des déchets radioactifs à vie longue	9	2019	Double Degree
71	NGET PHEARA	M	Stress measurements of granular flow on the inclined plane using sensitive sensor	9	2019	Double Degree
72	LEANG CHHAINAN	M	Experimental contribution to the characterization of concretes reinforced with high temperature organic fibers	9	2019	Double Degree
73	LIM CHHOUNG	M	The influence of temperature on the fracture toughness of glasses with different transition temperatures	9	2019	Double Degree
74	LOV PENG AN	M	Parametric study of mechanical properties of mixture of commercial polymers-sikadurs	9	2019	
75	CHHOM KANHARA	F	Cyclic test and characterization of mechanical properties of Laser welded joints: Application to dual phase steels	9	2019	Double Degree
76	PANG CHHAY NARAK	M	Improvement of mechanical behaviors of the Reclaimed Asphalt Pavements	9	2019	

77	HEU REAKSMEYVATA NA	M	Optimization by comparative study of PT and steel-mixed floor prices for building	9	2019	Double Degree
78	NGUON LEANGSRENG	M	Modification of Behavior of Soft Clay soil by using sand columns	9	2019	Double Degree
79	CHREA MAKKONAKUN	M	Etude Expérimentale De L'amélioration Des Sols Meubles Par Des Colonnes De Sable	9	2019	
80	KEN KOEMHONG	M	Experimental Study of Compaction Effect on Expensive Soil	10	2020	Double Degree
81	LONG HOK SOENG	M	Cost Effective Foundation for Low-Rise Building	10	2020	Double Degree
82	LEAV MENGHUY	M	Numerical Study of Permeability Influenced by Tortuosity in Porous Media	10	2020	Double Degree
83	KHEN CHANTHORN	M	Development of Self-Healing Repairing Mortars	10	2020	Double Degree
84	OUCH VANTHET	M	Experimental study on the behavior of mixed cross-laminated timber (CLT)-concrete slab	10	2020	Double Degree
85	OENG THAILENG	M	Seismic and Soil Structure Interaction (SSSI)	10	2020	Double Degree
86	SUY SAMNANG	M	Study of the Mechanical Behaviour of Bamboo "BAMBUSA BURMANICA"	10	2020	Double Degree
87	MEAS CHANBROSOEU	M	Thermo-Mechanical Modelling for Massive Structures	10	2020	Double Degree
88	HOEUN SELA	M	Study of contact conductance between aggregate and matrix in cementitious materials	10	2020	Double Degree
89	LINH SUNHOK	M	Estimate the efficiency of bottle plastic pieces reinforced subgrade soil by experimental method	10	2020	Double Degree
90	HOK RATHANARAINGS EY	F	Thermal behavior of double skin facades	10	2020	Double Degree
91	SOURN NAVY	F	Effect of Different Solution Submersion Exposure on Concrete Beam Strengthening with Fibrwrap® System and on Fiber Composite Laminate	10	2020	Double Degree

92	RE RORNG	M	The Effect of Column Offsets in Reinforced Concrete Structure	10	2020	
93	SOK SOPHEAKDEY	M	Effect of Cyclic Exposure of Water and Salt Water to Concrete Beam Strengthening with Fibrwrap® System and to Fiber Composite Laminate	10	2020	Double Degree
94	MUT MESA	M	Numerical Study of Rail Stresses Induced by Wheel-Rail Contact using ABAQUS	10	2020	
95	OEUNG KIMHENG	M	Assessment study of energy demand in multi-story steel moment frames	11	2021	Double Degree
96	HENG KIMHONG	M	Optimization of the ion exchange processing parameters for strengthening of a soda-lime silicate glass	11	2021	Double Degree, Link with HEIP
97	HEM BELLYDETH	M	Experimental study of the effectiveness of Tyfo® fibr anchors under tensile load	11	2021	Link with Company Fibrwrap®
98	YUN RITH PAGNA	M	Study on mechanical and microstructural properties of smaw butt-welded joints using various welding electrodes for structural steel fabrication	11	2021	Double Degree
99	MONG PHANNA	M	Study on mechanical properties characterization of tempered glass	11	2021	Link with LBE/JICA
100	MEAS CHANDARA	M	Design and build a lightweight chassis of a mini electric vehicle	11	2021	Link with LBE/JICA
MIM (MGIM)						
101	NGETH Hongneng	M	Experimental study on butt joints using shielded metal arc welding	1	2017	
102	EM Sophat	M	Experimental study on butt joints using mig welding	1	2017	
103	CHEA Vabotra	M	Effect of heat source temperature on organic Rankine cycle (ORC)	3	2018	
104	THEANG Sothy	M	Dynamic modeling and simulation for a parallel-mechanism-mounted UAV	3	2018	
105	PHAL Vannak	M	Mass charge effect on organic Rankine cycle	3	2018	
106	PICH Yanghav	M	Development of Plastic Shredder for Recycling Plastic	3	2018	
107	CHHAM REAKSMEY KHEMRA	M	Study on Performance and Emission of Gasoline Engine by Using Ethanol-Blended Super Gasoline	4	2019	

108	YEAN SOPHEAK	M	Control Performance for Parallel-Mechanism-Mounted UAV	4	2019	
109	TENG VAN OEURN	M	Study on Performance and Emission of Gasoline Engine by Using Ethanol-Blended REGULAR Gasoline	4	2019	
110	MIN CHENG HORN	M	Study on Performance and Emission of Gasoline Engine Using Liquefied Petroleum Gas (LPG)	4	2019	
111	SETHY BORETH	M	Pose Estimation of WMR using Multi-Sensor Data Fusion	5	2020	
112	KEO CHIVORN	M	Flight Controller and Structural Design for Fixed-Wing UAV	5	2020	
113	LY LEANGCHHENG	M	Modeling, Control and Simulation on 3DOF Robot Manipulator	5	2020	
114	TEM LYHOR	M	CNC-Mill Construction and Automatic Control to Shape the Specimen by CAD/CAM	5	2020	
115	MORK TONGLY	M	Simultaneous Localization and Using Intel Realsense Camera	5	2020	
116	LIM BUNVIREAK	M	Development of Smart Irrigation Controller for Gravity Irrigation System in the Rural Area	5	2020	
117	TIM HOKSONG	M	Preliminary design and performance prediction of mini hybrid rocket motor for a sounding rocket	6	2021	
118	THOK PISETH	M	Study of sensorless control of permanent magnet synchronous motor in solar E-Tuktuk application	6	2021	Link with HEIP
119	YONRITH PHAYUTH	M	Path planning and control of wheeled mobile robot with occupancy grid map	6	2021	
120	CHAO VANYI	M	Development of landing site tracker for UAV	6	2021	
ETM (MGEE)						
121	THY Selaroth	M	Dynamic economic dispatch using model predictive control algorithm	1	2015	
122	PHOU Ty	M	Path planning for four omni-directional wheel robot	1	2015	
123	CHAN Sopheap	M	Development of multipoint vehicle tracking system	1	2015	

124	SON Chanvathana	M	Implementation of GSM network using openbts and gnu radio with universal software radio peripheral	1	2015	
125	ROS Vannak	M	Computer controlled electronic watt-hour meter via radio frequency	1	2015	
126	NONG Sovanneth	M	Impacts of grid connected PV on distribution network (low voltage)	1	2015	
127	YOU Hong	M	Cost optimization of a hybrid power system for rural communities in Cambodia	1	2015	
128	ING Sothy	M	Comparison of using artificial neural network and decision tree to do short term load forecasting	1	2015	
129	CHEA Vutha	M	Optimal placement of autorecloser and sectionaliser on radial distribution system 22kv	1	2015	
130	LAY Romnea	M	Bio-security controller for chicken farm (takeo province)	2	2015	
131	HUOT Samnang	M	Monitoring system for excavator base on sms technology	2	2015	
132	LENG Por	M	Development of metal detector to seek landmine unexploded ordinances (uxos)	2	2015	
133	CHHANG Vutha	M	Conversion of pork lard to biofuel	2	2015	
134	SOM Chanthla	M	The conversion of jatropha to bio-fuel	2	2015	
135	HENG Sok Meng	M	Customized kits for automobile and OBD using k-line protocol communication	2	2016	
136	UL Dara	M	Home connekh integration over smart home	2	2016	
137	CHHUO Kreng	M	Car security using Bluetooth tag and GPS	2	2016	
138	PHUNG Tolany	M	Modeling of inter-turn faulty 3 phases transformer	1	2016	
139	SAM Tetra	M	Improvement of solar power efficiency by cooling solar panel with water spray	1	2016	
140	CHRENG Sarin	M	Conversion of used cooking oil to biofuel	1	2016	
141	ROATH Kulika	M	Inter-turn short circuit fault detection of 3 phases transformer	1	2016	
142	SENGCHHORN Rady	M	Conversion of fish oil to biofuel	2	2016	
143	MOUN Phat	M	Conversion of oil used from KFC restaurant	1	2016	
144	SAR Tikhett	M	Smart energy management system	2	2016	

145	CHHORN Sengchheang	M	Implementation of wireless connectivity of upper secondary school in remote area	4	2017	
146	HEANG Latin	M	Experimental Investigation on Sawdust and Tree Leaves Briquette Using Fish Residue Oil and Waste Deep Fried Oils as Binder	5	2020	
147	CHOENG Porchaing	M	Experimental Investigation on Rice husk and Bagasse Briquette Using Fish Residue Oil and Waste Deep Fried oil as Binder	5	2020	
M-WEE (MGRU)						
148	SY Hayean	M	Assessment of crop water use in Chreybak river catchment using cropwat mode	1	2014	
149	OUN Sreymao	F	Sustainable solid waste management in Cambodia, case study in Pursat	1	2014	
150	SOT Ratha	M	Plastic wastes recycling as a means to waste management in Phnom Penh, Cambodia.	1	2014	
151	PIN Bora	M	Phnom Penh waste collection roadmap development	1	2014	
152	CHUM Sokhey	M	Understanding the impacts of dam development in the 3 s rivers, Cambodia	1	2015	
153	SUONG Sila	M	Sediment load estimate in Chreybak river: the implication for integrated watershed management	1	2015	
154	OU Sothea	M	Assessment of water use for improved water governance under climate changes, using weap model	2	2015	
155	KIM Mengersreang	M	Assessment of urban runoff for improved strom water management in Phnom Penh	2	2015	
156	PHENG Ty	M	Water supply management in Phnom Penh city	3	2017	
157	SIM Sen	M	Modeling of storm water network in a part of Pursat Town, Cambodia for performance improvement	3	2018	
158	Vong Dara	M	Assessment of rice water use by CROPWAT model and water allocation management the irrigation system in Taing Krasaing catchment	1	2018	
159	VUTH Sivornng	M	Enhancing Kampot Municipality Solid Waste Management System with 3R Option	3	2018	

160	Sor Chhaya	F	Water Quality Analysis for Agriculture in Sourtr Nikom District, Siem Reap Province a Comparison with National Standards	2	2018	
161	Y PUTHEALY	M	Modelling drinking water distribution system at Pursat province using EPANET	5	2019	
162	SREU BORA	M	Digital Terrain Model (DTM) creation by different measurement methods for water resources study	5	2019	
163	CHUM KIMLEANG	M	Assessment of Climate Change Impact on Urban Stormwater Quality in Boeng Trabaek Drainage Catchment	5	2019	
164	KE SEREYVATH	M	Lab scale of arsenic adsorption in synthesis water using iron ore as an absorbent	5	2019	
165	MENG KEA	M	Water Resource Management in Detention Places of Cambodia	5	2019	
166	SVAY CHHALY	M	Long-Term Urban Drainage Modeling in Phnom Penh	5	2019	
167	SEANG KIMSOUR	M	Characterization of the Quality of Domestic Wastewater Discharge into Kob Srov Lake	5	2019	
168	SUONG CHANMEAKARA	F	Assessment of Environment Flow under Climate Change Scenarios – Case study of Stung Chinit Basin	5	2019	
169	HUOT SYRADETH	F	Multidrug-Resistant Bacteria (MRD) in Tonle Sap Lake, Tonle Sap River, Mekong Rivers, Bassac River and Discharged Wastewaters	5	2019	
170	NORNG SOPHA	F	Understanding Role of Women in Improving Access to WASH of Phnom Penh Urban poor	5	2019	
171	THOUN LIEANG	F	Spatial Variation of Water Quality in Boeng Tamouk Lake, Northern-part of Phnom Penh, Cambodia	5	2019	
172	CHOUN LYHOR	F	Effectiveness of PAC and Calcium Hypochlorite Dose in Surface Water Treatment at Tonle Sap River	5	2019	
173	PHOEUK SOKNY	F	Microbial colonization distribution in a large tropical flood pulse ecosystem - Tonle Sap Lake, Cambodia	5	2019	
174	KOL PONLOK	M	Application of SWMM to explore possible climate change impact on urban stormwater drainage	5	2019	
175	PHOEURN SOKHIM	M	Groundwater Assessment in Siem Reap-Angkor Region	5	2019	

176	EM SOPHEALEAKSMY	F	Studying on the efficiency of three natural coagulants for water treatment at Tonle Sap River water	5	2019	
177	KEO SAMPHORS	F	Characterization of Tonle Sap River water quality as influent by untreated domestic wastewater	5	2019	
178	CHEA SYPHA	M	Assessment of Land Use Change Impacts on Stormwater Runoff and Water Quality in Boeng Trabek Catchment, Cambodia	5	2019	
179	CHHEN ROTANAK	M	Mapping of groundwater vulnerability at coastal area of Preah Sihanouk province, Cambodia	5	2019	
180	LIM DALIKA	M	Development Municipal Wastewater Treatment Management with Lagoon System in Kampot Town	5	2019	
181	MELVIN FRICK	M	Pesticide Distribution in the Hydrological Compartments in Koh Thum district, Kandal, during the dry season	6	2020	
182	LAI CHENDA	F	Evaluation of Wastewater Treatment Efficiency Utilizing Coconut Fiber as Filter Media	6	2020	
183	SDEUNG OUK SOVANNARITH	M	The Spatio-Temporal downscaling of rainfall under changing climate, focusing on the sub-daily (hourly) rainfall over Phnom Penh City area	6	2020	
184	CHEA CHANDINAN	M	Micro-Scale Flood Hazard Assessment under Climate Change Scenarios: Case Study of Boeungkak 1 and Boeungkak 2	6	2020	
185	KHEANG RATANA	F	Chemical Distribution Assessment of well Water in the Floodplain Areas along the Tonle Sap Lake	6	2020	
186	SOU PHALLA	M	Correlation between physicochemical and microbiological properties of sewage and flooded water in Boeung Trabek Sewage Canal	6	2020	
187	MAO THEARA	F	Comparative Study of Polyvinyl Alcohol Gel and Coir Coconut Fiber Bio-Carriers in Moving Bed Bioreactor for Treating Wastewater from Institute of Technology of Cambodia	6	2020	
188	SAM SOKYIMENG	M	Application of Electrocoagulation Process in Removing Turbidity and Bacteria of Water in Choeung Ek Lake	6	2020	
189	HOK SREYRORTH	F	The Preliminary Study of Arsenic Removal from Groundwater by Utilizing ElectroChemical Arsenic Remediation (ECAR)	6	2020	

190	CHHAM AMRET	M	Assessment of the Impact of Climate Change on Hydrological Processes in Stung Sen Catchment of the Tonle Sap 6Sub-Basin, Cambodia	6	2020	
191	VORNG SAY	M	Pollutants Removal by Chemical Coagulation and Filtration of Textile Dyeing Wastewater	6	2020	
192	SENG SOPANHA	M	Influence of Water Quality on Microbial Colonization Distribution in a large Tropical River-Lake System	6	2020	
193	MATH ALPY	M	Water Quality Study of Prek Te River, a Mekong River Tributary in Cambodia	6	2020	
194	SAM SOCHEATA	F	Study on Microbiology in Wastewater and Virus Treatment Method	6	2020	
195	KHEAM CHHENG LY	M	Comparison of the Effectiveness of Alternative Bio-Adsorbents in Phosphate and Nitrogen Removal from Wastewater	6	2020	
196	KHIM DARA	M	Design New Urban Drainage Network by Using PCSWMM	6	2020	
197	YOU RANY	F	Arsenic removal from groundwater by utilizing Electro-Chemical Arsenic Remediation (ECAR) technology at Koh Thom district, Kandal province, Cambodia	7	2021	
198	MAY PHUE WAI	F	Assessment of dissolved silicon in surface water and its relation to ecosystem productivity in Tonle Sap lake: a case study around Chhnok Tru area	7	2021	Link with LBE/JICA
199	YENG SOVANN	M	The study of urban drainage system and urban flood modeling in Battambang town, Battambang province, Cambodia	7	2021	
200	MONIROTH SOPHEAVATTEY	F	Presence and characteristics of antibiotic-resistant Aeromonas spp. and Escherichia Coli in Pangasius aquaculture system in Cambodia	7	2021	
201	RUOS BUNHUOT	M	Hydrogeochemical identification and quality assessment of groundwater at the floodplain area around Tonle Sap lake	7	2021	Link with LBE/JICA
202	HENG CHHENGLANG	F	Effects of watershed land use and land cover changes on total suspended sediment in Tonle Sap lake	7	2021	
203	CHOUN CHAKRIYA	F	Development of aerated electrocoagulation-flotation reactor for color, turbidity and oil removal from slaughterhouse wastewater	7	2021	

204	SAING KIMLENG	M	The assessment of multi-pathway exposure to fecal contamination of urban poor settlements in Municipality of Phnom Penh (MPP)	7	2021	
205	CHEM VIBOL	M	Seasonal assessment of silica on in surface sediment fractions and its correlations to the productive ecosystem of Tonle Sap lake: a case study around Chhnok Tru area	7	2021	
206	OR THAYBONA	M	Improving removal efficiency of natural organic matters from drinking water treatment plant by powder activated carbon injection in coagulation process	7	2021	
207	ENG KHUN	M	Recovery nutrient from aquaculture wastewater: an aquaponic recirculation system	7	2021	Link with LBE/JICA
208	SENG PHAYA	F	Optimization of Anaerobic Baffled Reactor (ABR) and Anaerobic Filter (AF) as low-cost wastewater treatment system	7	2021	Link with HEIP
209	HEANG BORIN	M	Comparative study of septic tank, anaerobic baffled reactor, anaerobic filter for treating domestic wastewater	7	2021	Link with HEIP
210	KIM CHINA	M	The assessment of waste flows and plastic leakage into the environment in Kep municipality	7	2021	
211	SEM SOVANDY	M	Assessment groundwater quality in the coastal area of Preah Sihanouk province, Cambodia	7	2021	
212	CHAN SAKDANUPHOL	M	Impacts of land use change on hydrology of the Tonle Sap lake basin using SWAT	7	2021	Link with LBE/JICA
213	ROTHA VISAL	M	Assessment of hydraulic performance of water supply system in Takhmao city, using modeling approach	7	2021	
214	CHHUN MENG	M	Formulizing the design criteria for the piped water supply system in urban area of Cambodia	7	2021	
215	RANN SOPHEARON	M	Assessment of pesticide residues in water from Kampong Thom, Cambodia	7	2021	Link with LBE/JICA
216	VENG VISAL	M	Application of autodesk storm and sanitary analysis model on hydraulic modeling for urban storm drainage at Siem Reap city	7	2021	
217	PUOK SREYKEO	F	Hydraulic modelling of suspended sediment transport through a sluice gate of Prek system in Kandal province, Cambodia	7	2021	
218	Y SONA	M	2D-fluvial hydraulic characteristic assessment at Chaktomuk junction, Phnom Penh city	7	2021	

219	SEK SREYMAO	F	A survey of household water use and groundwater quality index assessment in a rural community of Cambodia	7	2021	
220	PHOEUK SOPHORN	M	Urban flood modelling in Preah Sihanouk city using Storm Water Management Model (SWMM)	7	2021	
221	PHY KOSORL	M	The application of PCSWMM to assess the potential impact of urbanization on storm water flood at Dangkor district, Phnom Penh, Cambodia	7	2021	
222	KUOCH THEARY	F	Distribution and ecological risk of heavy metal from artisanal gold mining in Chong Plah village Memang district Monduliri province, the north-east of Cambodia	7	2021	
223	HAK NALIN	F	Pesticide distribution in the hydrological compartment system in Koh Thum district, Kandal province during the dry and rainy seasons	7	2021	
224	SUN BUNNETH	F	Optimization on wastewater treatment efficiency using activated charcoal and coconut fiber as porous media	7	2021	
225	SARET SOVANDARA	M	Hydraulic design of storm drainage system in Siem Reap city, using Autodesk Storm and Sanitary Analysis (ASSA)	7	2021	
226	KOH SOMALAY	F	Evaluation on wastewater treatment system using Sewage Treatment Operation Analysis over Time (STOAT)	7	2021	Link with LBE/JICA
M-AIE						
227	HUOT Kimneng	M	Quantification of restricted substances in textile produced in Cambodia	1	2015	
228	EUNG Theara	M	Regeneration process of the resin haix used for arsenic affected community in Cambodia	1	2015	
229	MOANG Darachampich	F	Production of beverage from red glutinous rice	1	2015	
230	TUY Phearun	F	Assessment of the nutritional components, total phenolic compounds and antioxidant activities in jamune	1	2015	
231	SENG Kong	F	Methane generation in Dangkor landfill of Phnom Penh	1	2015	
232	HONG Kim Eang	F	Optimisation de la fermentation de radis blancs avec son de riz	2	2016	
233	MENG Sophang	F	Aroma analysis of Cambodian traditional dark purple rice wine	2	2017	

234	CHE Ratana	M	Survival of escherichia coli k12 and detection of antibiotic-resistant bacteria in tonle sap river, Mekong river and Bassac river	3	2017	
235	EAV Chenda	F	Seasonal variation and distribution of heavy metal in lake water and bottom sediment of Tonle Sap lake	4	2017	
236	SEN Veasna	M	Mitigation of heavy metal from Dangkor landfill to groundwater	3	2017	
237	TAING Bun Leang	F	Production process and quality control of fish sprinkle product	3	2017	
238	YAN Thary	F	Dietary exposure assessment of nitrite from food streets in population in Phnom Penh	3	2017	
239	TANN Sarann	M	Assessment of nutrient load from Chhnok true community of Tonle sap lake, Cambodia	3	2017	
240	LONG Samavatey	F	Conversion of coconut oil to biofuel	2	2017	
241	VORN Thary	F	Evaluation of DEWATS performance base on hydraulic with organic load and modify the grain filter system using Drainblock filter for School Base Sanitation in Cambodia	2	2018	
242	BEANG Polingkong	F	Effect of the combination of pure strains on ethanol production during red rice fermentation process	2	2018	
243	Kong Channy	F	Study of technology for alcohol production from cane molasses	2	2018	
244	Thour Sokundara	M	Determination of food additive in soft drink and pickle fruits by using high performances liquid chromatography (HPLC)	2	2018	
245	Keo Rachana	F	Determination of eleven colors and three sweeteners in soft drink and sauce products by using high performance liquid chromatography	2	2018	
246	Suon Mala	F	Distribution of Arsenic in water and sediment in Mekong and Bassac river of Cambodia	2	2018	
247	Oeng Sivgech	F	Selection of plants species for plant-gravel-filter in DEWATS	2	2018	
248	HOEUN SEANGHAI	F	Optimization of White Pepper (Piper Nigrum L.) Processing by Enzymatic Activity	5	2020	

249	VANTHA DAROTH	F	Identification and Susceptibility of Antibiotic-Resistant Enterococcus Spp. in Fermented Vegetable	5	2020	
250	KAI SOKHENG	F	Analysis of pesticide residues in sediment from Chhnok Tru, Kampong Chhnang	5	2020	
251	PHOEM VISAL	M	Cambodian rice liquor product development: using Rhizopus Oryzae, Saccharomyces Cerevisiae and Alpha-amylase	5	2020	
252	LY LUKA	M	Market study and quality analysis of soy sauces sold in markets	5	2020	
M-ECS (MGIC)						
253	TITH Dara	M	Predicting user access goal based on user's	1	2015	
254	CHUOR Porchourng	M	Khmer optical character recognition using	1	2015	
255	LAY Vathna	M	Mobile document capture indexation and information retrieval	1	2015	
256	TENG Dola	M	Khmer and Latin optical character	1	2015	
257	HAN Sama	F	Agent-oriented mobile application	1	2015	
258	SEAK Leng	F	User centric travel recommendation system: case study tourist locations in Phnom Penh, Cambodia	2	2016	
259	PHAN Neth	M	Long short-term memory based for Khmer optical character recognition	3	2016	
260	THUON Nimol	M	Khmer semantic search engine	4	2017	
261	KUY Movsun	M	Data protection in IOT system: under context of lora network technology	4	2017	
262	DUCH Dynil	M	Romanization of Khmer language: automatic Latin-to-Khmer based text conversion	3	2017	
263	HENG Piseth	M	Performance analysis and implementation of the data protection algorithms between portable devices and temperature sensors in the area of internet of things	2	2017	
264	TAL Tong Sreng	M	Automatic Latin-to-Khmer-based text conversion	5	2018	
265	HEN Sodet	M	Synthetic data for Khmer ancient document analysis	5	2018	
266	HUY Viriya	M	Security and Privacy for the IOT Network by Block Chain	5	2018	
267	KHON Khemrin	M	Keyword Extraction Method on Khmer Digitalized Documents	5	2018	

268	HUY Ketya	M	Security and Privacy for the IOT Network by hyperledger	5	2018	
269	CHHUM Heng	M	Centralise Policy Administration Point for Smart Home system	5	2018	
270	HOURK Savet	M	Design and Implementation of metahub for Smart Home System	5	2018	
271	LENG Chanratanak	M	Ios Mobile Development: e-Komnob Platform: content management	5	2018	
272	NHIK KIM SANG	M	Cooperatives' Agricultural Products Mobile Application (CAP): Users & Transaction Management	6	2020	
273	CHOU SEAKNY	M	Cooperatives' Agricultural Products Mobile Application (CAP): Product Management & Seller Management	6	2020	
274	BORN SEANGHORT	M	Khmer language model for handwritten text recognition on historical documents	7	2021	Link with HEIP
275	LAY LEANGSROS	M	Designing blockchain application for information exchange of blood banks	7	2021	
276	NOP PHEARUM	M	Digital platform for Cambodian agricultural produce based on social and human values	7	2021	
277	CHOM SREYLAM	F	Mobile development for GIC department (GIC mobile app)	7	2021	
278	LY SIVHENG	F	Blockchain application for transparency, traceability and accessibility of the donated blood information for voluntary blood donors	7	2021	Link with LBE/JICA
M-TIE						
279	YANG PANHA	F	Impact of COVID-19 on paratransit services operating with ride-hailing apps : the Phnom Penh case	1	2021	
280	CHHENG RATHA	M	A study on improvement of traffic flow along Russian boulevard: from 5 Makara skybridge to Kdan Pir intersection	1	2021	
281	CHHIEV VANDA	M	Impact of COVID-19 on food delivery service in Phnom Penh city	1	2021	

Annex 6. List of Master Graduates Continued PhD Degree.

N°	Name	Sex	Promo.	Year in Master	Specialty	PhD			Source of Finance
						Year Start	Year Finish	Country	
1	Keo Pisey	M	1	2010-2011	MGCI	2013	2016	France	
2	Chhorn Chamroeun	M	2	2011-2012	MGCI	2013	2017	S. Korea	
3	KAN Kuchvichea	M	2	2011-2012	MGCI	2015	2020	Belgium	ARES
4	PROK Narith	M	2	2011-2012	MGCI	2013	2017	Japan	
5	HIN Sovannara	M	2	2011-2012	MGCI	2012	2016	France	
6	HENG Piseth	M	3	2012-2013	MGCI	2013	2017	Sweden	
7	Chhang Sophy	M	4	2013-2014	MGCI	2014	2018	Sweden	
8	Hin Raveth	M	4	2013-2014	MGCI	2014	2017	France	AUF
9	Sim Viriyavudh	M	4	2013-2014	MGCI	2015	In progress	S. Korea	
10	Ky Sambath	M	4	2013-2014	MGCI	2013	2017	France	AUF
11	Leang Enghok	M	5	2014-2015	MGCI	2015	2019	France	
12	Ho Lyheng	M	5	2014-2015	MGCI	2016	Drop	China	
13	Leng Khundadino	M	5	2014-2015	MGCI	2017	2021	France	BGF
14	Sok Tetsya	M	5	2014-2015	MGCI	2015	2020	S. Korea	
15	To Theany	M	5	2014-2015	MGCI	2015	2018	France	
16	Chhun Kean Tha	M	6	2015-2016	MGCI	2016	In progress	S. Korea	
17	Meng Try	M	7	2016-2017	MGCI	2017	2021	France	
18	Muy Yeakleang	F	7	2016-2017	MGCI	2017	In progress	France	BGF
19	Tith Dara	M	1	2014-2015	MGIC	2017	2021	Japan	MEXT
20	Lay Vathna	M	1	2014-2015	MGIC	2018	In progress	ITC	NIPTIC
21	Mom Sokvisal	M	7	2016-2017	MGCI	2018	In progress	France	BGF

22	Heng Sounean	F	8	2017-2018	MGCI	2018	In progress	France	BGF/ITC
23	CHUM Kimleang	M	5	2018-2019	MGRU	2019	In progress	China	
24	LIM Chhuong	M	9	2018-2019	MGCI	2020	In progress	South Korea	
25	YEAN Sopheak	M	4	2018-2019	MGIM	2020	In progress	Cambodia	NPIC
26	LAI Chenda	F	6	2019-2020	MGRU	2020	In progress	Belgium	HEIP
27	HEANG Latin	M	5	2019-2020	MGEE	2020	In progress	Cambodia	CCCA
28	LY Luka	M	5	2019-2020	MGCA	2020	In progress	Cambodia	HEIP
29	KUY Movsun	M	3	2016-2017	MGIC	2020	In progress	Belgium	ARES
30	OENG Thaileng	M	10	2019-2020	MGCI	2020	In progress	France	BGF
31	OUCH Vanthet	M	10	2019-2020	MGCI	2020	In progress	France	BGF
32	HENG Kimhong	M	11	2020-2021	MGCI	2021	New enrolment	France	HEIP
33	CHAO Vanyi	M	6	2020-2021	MGIM	2021	New enrolment	Korea	

Annex 7. List of PhD students enrolled in 2021-2022.

No.	Name	Sex	Type of degree	Year of Study	Source of Funding	Research Topic	Remark
<i>Field: Materials Science and Structures</i>							
1	BUN Polyka	F	Local degree	PhD 5	ITC	Valorisation de ressources naturelles et sous-produits locaux pour la fabrication d'éco-matériaux durables	Staff of ITC
2	HENG Sounean	F	Double degree with INSA de Rennes	PhD 4	BGF and ITC	Étude des matériaux de réparation pour les structures en béton armé via une approche performentielle	
3	MOM Sokvisal	M	Double degree with INSA de Rennes	PhD 4	BGF	Modélisation multi-échelle des propriétés thermiques des matériaux cimentaires : Influence des états d'endommagement	
4	KETH Kannary	F	Double degree with ULB	PhD 2	ARES-COMBOI A	The Managing Collaboration between Architecture, Structure and MEP in the Service of Construction 4.0: Workshop at ITC case	
5	TAING Kimnenh	F	Double degree with U.Liege	PhD 2	ARES-COMBOI A	Analysis of a BIM Approach for designing of a Bioclimatic building	
6	OENG Thaileng	M	Double degree with INSA de Rennes	PhD 2	BGF	Analysis of Composite Beams Taking into Account of Uplift at The Interface	
7	OUCH Vanthet	M	Double degree with INSA de Rennes	PhD 2	BGF	Behavior of Timber-concrete Composite Slab with new Notched Connectors	
8	HOUR Sokaon	M	Local degree	PhD 2	NPIC	Prediction of Properties Change of Materials Induced by Plastic Deformation	Staff of NPIC
9	KEAT Rayuth	M	Local degree	PhD 2	NPIC	Study on Furnace Glass Heat Treatment Technology	Staff of NPIC
10	HENG Kimhong	M	Double degree	PhD 1	HEIP	A study of high strength-to-weight ratio glass beam	
11	LONG Makara	M	Double degree with U.Liege	PhD 1	ARES-ITC	Sustainable design conception integrated in	

						architecture project in BIM environment	
Field: Food Technology and Nutrition							
1	PHUONG Hengsim	F	Double degree with Univ. Nantes	PhD 5	BGF, AUF and ITC	Valorisation, par extrusion réactive et/ou enzymatique des algues : extraction des différents composés et valorisation des extraits en Agroalimentaire	Staff of ITC
2	YIN Molika	F	Double degree with Univ. Montpellier Sup. Agro	PhD 3	BGF and ITC	Improvement High-Value Food Product in Cambodia: Drying Herbal and Spices	Staff of ITC
3	NGET Sovannmony	M	Double degree with Univ. Nantes	PhD 2	BGF	Comparative study of conventional and innovative technologies for a better conservation of meat and animal fish products of interest in Cambodia	
4	LY Luka	M	Local degree	PhD 2	HEIP	Evaluation of the quality of soy sauces sold in Cambodia	
5	THANH Channmuny	F	Double degree with U. Montpellier	PhD 1	BGF-ITC	Nutritional Interest of Different Fish Species and Valorization of By-Products	
6	CHIN Lyda	F	Double degree with Kasetsart U.	PhD 1	BGF-ITC	Impact of initial compositions and processing techniques on aromatic quality of Mango	
7	PHAL Sivchheng	F	Double degree with Kanazawa U.	PhD 1	BGF-ITC	New insights into Pharmaceuticals and Personal Care Products (PPCPs) removal from waters	
8	SAY Manit	M	Local degree	PhD 1	HEIP	Development of cooking oil processes for commercialization	
9	MAO Socheata	F	Double degree with U. Toulouse	PhD 1	ITC-Erasmus+	Lactic Acid Bacteria Strain Diversity	

						Depending on the Origin of the Product	
10	OEUM Kakada	F	Double degree with Chungnam National U.	PhD 1	IRD	Exploration and exploitation of root-associated bacteria for a sustainable rice agriculture in Cambodia	
Field: Water and Environment							
1	MUON Ratha	F	Double degree with Sorbonne Université	PhD 3	BGF and ITC	Termite bioturbation in Cambodia – From characterization to application	Staff of ITC
2	SANG Davin		Double degree with Ecole Nationale Supérieure de Chimie de Rennes	PhD 3	BGF and ITC	Micropollutant removal by activated carbon power injected at the flocculation-coagulation-settling step in drinking water plants	Staff of ITC
3	LAI Chenda	F	Double degree with U.Liege	PhD 2	HEIP	Optimization of Soil Nutrients for Rice Cultivation Using Experimental and Modeling Approach	
4	PHOEURN Chan Arun	F	Double degree with U.Liege	PhD 2	HEIP	Integrated approach of precise irrigation and sustainable Soil management to improve crop water productivity in Cambodia: the focus on rice farming	Staff of ITC
5	HIN Chandara	F	Local degree	PhD 2	NPIC	Development of Eco-Friendly and Low-Cost Wastewater Treatment System as an On-site Product	Staff of NPIC
Field: Energy Technology and Management							
1	KHON Kimsornn	M	Double degree with Univ. Grenoble Alpes.	PhD 4	BGF and ITC	Planning and Architecture of Micro-grid low voltage direct current (LVDC) system with integration of PV sources and storage means	Staff of ITC
2	ETH Oudaya	M	Local degree	PhD 3	ITC	Study on Impacts of the Integration of Renewable Energy Resources to Distribution System in Cambodia	Staff of ITC

3	PECH Sopheap	F	Local degree	PhD 3	ITC	Source Rock Evaluation and Depositional Environment of Sediments in Western Tonle Sap Lake, Onshore Cambodia	Staff of ITC
4	SIO Sreymean	F	Local degree	PhD 3	ITC	Applied Geophysics for Investigation Hydrocarbon Potential on the west and southwest of Tonle Sap Lake, Onshore Cambodia	Staff of ITC
5	HEANG Latin	M	Local degree	PhD 2	CCCA	Study on Heat Stress impact to Construction workers by Investigating and Simulating the Optimum Work-rest schedule: case study in Phnom Penh, Cambodia	
6	CHEA Vabotra	M	Local degree	PhD 2	MoE	Study on Impact of Heat Stress on Human Productivity and Economics in Cambodia	Staff of NPIC
7	MEAS Saran	M	Local degree	PhD 2	NPIC	Study on Taking charge of electric vehicles both in the vehicle and on the grid	Staff of NPIC
8	CHHLONH Chhith	M	Double degree with ITSN	PhD 1	BGF-HEIP	Optimal fault location, isolation, and restoration procedure for LV microgrids	Staff of ITC
9	NEAK Kimhak	M	Local degree	PhD 1	HEIP-ITC	The impacts Assessment of Gasoline and Diesel Quality in Cambodian Fuel Market on Economic and Environment	
10	CHHENG Monyvathna	M	Local degree	PhD 1	HEIP	Design and Techno-economic analysis of plug-in electric vehicle-integrated Hybrid solar PV charging system for Cambodia	
Field: Mechatronic and Information Technology							
1	HEAN Samboeun	M	Local degree	PhD 4	NIPTICT	Research & development mathematical model as a machine learning system for Cambodia's digital economy	Staff of NIPTICT
2	LAY Vathana	M	Local degree	PhD 4	ARES	Secure and interoperable communication protocols for industrial automata	

3	SIV Ratha	M	Double degree with UMONS	PhD 4	ARES and ITC	Crowds Analysis and Augmentation	Staff of ITC
4	SOK Kimheng	M	Double degree with Univ. Namur	PhD 4	ARES and ITC	Building trustable and privacy aware IoT systems using blockchain and smart contacts	Staff of ITC
5	BAN Sam	M	Double degree with IMT Mines Albi	PhD 3	BGF and ITC	Developing Countries' Transportation Enhancement through the Application of Physical Internet Paradigms	Staff of ITC
6	KEAN Judy	M	Toulouse INP	PhD 3	BGF and ITC	Etude et dimensionnement d'une chambre réverbérante à méta-matériaux pour les études de Compatibilité Electromagnétique CEM	Staff of ITC
7	SOK Song	M	Local degree	PhD 2	HEIP	Development of Non-Intrusive Appliance Load Monitoring and Diagnostic System for Residential Home	Staff of NUBB
8	TEP Sovichea	M	Double degree with INP Toulouse	PhD 2	HEIP	Power quality monitoring based on the deployment of sensors in the grid and parameter measurement	Staff of ITC
9	KUY Movsun	M	Double degree with UMONS	PhD 2	ARES	Automatic security assessment of IoT devices using machine learning	Staff of ITC
10	KARTHIKEYA N Dinesh Kumar	M	Local degree	PhD 2	KIT-ITC	Image or Video Visualization of Text (Book) using Deep Convolutional Generative Adversarial Networks (DCGAN) Approach	Staff of KIT
11	CHHOUR Vongchivorn	M	Local degree	PhD 2	NPIC	Real time control of Electromyography on forearm	Staff of NPIC
12	PEOU Thura	M	Local degree	PhD 2	NPIC	Mobile robot navigation with machine learning implementation	Staff of NPIC

13	SREY Sophyn	M	Local degree	PhD 2	NPIC	Intelligent prosthesis for Above knee amputees	Staff of NPIC
14	SRUN Channareth	M	Local degree	PhD 2	NPIC	FPGA-Based Integrated Control Unit for Micro/Home Grid Scale Power Supply Equipment	Staff of NPIC
15	THUOK David	M	Local degree	PhD 2	NPIC	Multi agency communication and distributed computing	Staff of NPIC
16	UN Sok Oeun	M	Local degree	PhD 2	NPIC	Cambodia Disaster Back up Connection by Amateur Radio Operator	Staff of NPIC
17	YEAN Sopheak	M	Local degree	PhD 2	NPIC	Parameter Identification and Automatic Control for a System with Friction	Staff of NPIC
18	PICH Reatrey	M	Double degree with KMITL	PhD 1	ARES-ITC	Anomaly Detection in networks based on DNS's data analysis	
19	BUN Menghorng	M	Double degree with SIIT/TU	PhD 1	HEIP	Study of feasibility and control of solar electric tuktuk	

Abbreviations:

ARES	Académie de Recherche et d'enseignement Supérieur
ARES-COMBOdIA	Académie de Recherche et d'enseignement Supérieur-COMBOdIA
BGF	Bourse du Gouvernement Français
CCCA	Cambodia Climate Change Allian
HEIP	Higher Education Improvement Project
KIT-ITC	Cofunding Kirirom Institute of Technology - Institute of Technology of Cambodia
MoE	Ministry of Environment
NPIC	National Polytechnic Institute of Cambodia
LBE	Laboratory Based Education

Annex 8. ITC lecturers in overseas post-graduate program (2021-2022)

No	Nom et prénom	Sexe	Dépt.	Diplôme préparé	Université	Pays	Financement
1	NAT Yukleav	F	GCA	Master	Sirindhorn International Institute of Technology, Thammasat University	Thailand	
2	HOUNG Peany	F	GCA	PhD	Tokyo Institute of Technology	Japan	
3	LIM Phing	M	GEE	Master	Chulalongkorn University	Thailande	Thai Govt
4	Seng Theara	M	GEE	Master	Grenoble INP	France	BGF
5	VANN Veasna	M	GEE	Master	National Chung Cheng University	Tawain	National Chung Cheng University Scholarship
6	BUN Menghorng	M	GEE	PhD	ITC-Toulouse INP	Cambodge +France	HEIP+ITC
7	Chheng Monyvathana	M	GEE	PhD	ITC	Cambodge	ITC
8	Chhlonh Chhith	M	GEE	PhD	Grenoble INP	France	BGF
9	CHHORN Sopheaktra	M	GEE	PhD	TIT	Japon	Jica
10	ETHOudaya	M	GEE	PhD	ITC	Cambodge	ITC
11	HOR Mangseang	M	GEE	PhD	Hokaido University	Japon	AUN/Seed-Net
12	KEAN Judy	M	GEE	PhD	Toulouse INP	France	BGF+ITC
13	KHON Kimsrornn	M	GEE	PhD	INP-Grenoble	France	BGF+ITC
14	SOK Vattanak	M	GEE	PhD	Myongi University	Corée du sud	Laboratory
15	TEP Sovichea	M	GEE	PhD	ITC-Toulouse INP	Cambodge-France	HEIP+ITC
16	Chhun Chanmaly	F	GGG	Post-Doctor	Khyushu University	Japan	JICA
17	Mao Pisith	M	GGG	Post-Doctor	China University of Mining and Technology (CUMT)	China	CUMT
18	Ngo Ichhuy	M	GGG	Post-Doctor	China University of Mining and	China	CUMT

					Technology (CUMT)		
19	Ban Sam	M	GIM	PhD	IMT Mines Albi-Carmaux, Université Fédérale Toulouse Midi-Pyrénées	France	BGF
20	Seng Sunhor	M	GIM	PhD	Kanazawa Univeristy	Japan	MEXT
21	Ban Sam	M	GIM	PhD	IMT Mines Albi-Carmaux, Université Fédérale Toulouse Midi-Pyrénées	France	BGF
22	Seng Sunhor	M	GIM	PhD	Kanazawa Univeristy	Japan	MEXT
23	MUON Ratha	F	GRU	PhD	Université Paris-Sorbonne	France	Cofinancement (BGF+MEJS)
24	SANG DAVIN	F	GRU	PhD	École nationale supérieure de chimie de Rennes	France	Cofinancement (BGF+MEJS)
25	SAO Sochan	F	GRU	PhD	Yamagata University	Japon	MEXT-JAPAN
26	SENG Theara	M	GRU	PhD	Kyoto University	Japon	MEXT-JAPAN
27	THENG Vouchlay	F	GRU	PhD	Tokyo Institute of Technology	Japon	AUN-SeedNet

Annex 9. ITC students in overseas post-graduate program (2021-2022).

No	Name	Sex	Dept.	Degree	Receiving University	Country	Financing
1	CHIN Lyda	F	GCA	Doctorat	L'Institut Agro Montpellier SupAgro	France	Bourses du Gouvernement Français
2	OEUM Kakada	F	GCA	Doctorat	University of Montpellier	France	IRD
3	PHAL Sivcheng	F	GCA	Doctorat	INSA Toulouse	France	Bourses du Gouvernement Français
4	THANH Channmuny	F	GCA	Doctorat	L'Institut Agro Montpellier SupAgro	France	Bourses du Gouvernement Français
5	BORN Seanghort	M	GIC	Doctorat	Le Mans Université	France	Bourses du Gouvernement Français
6	CHAO Van Yi	F	GIM	Doctorat	Kyushu Institute of Technology	South Korea	UTS Scholarship
7	ANG Raksmeay	M	GRU	Doctorat	Tokyo Institute of Technology	Japon	MEXT schilarship
8	CHUM Kimleang	M	GRU	Doctorat	Hohai University	Chine	Chinese Government Scholarship
9	KAING Vinhtang	F	GRU	Doctorat	Tokyo Institute of Technology	Japon	MEXT schilarship
10	LY Steven	M	GRU	Doctorat	Kyoto University	Japon	MEXT schilarship
12	SOK Kimhuy	M	GRU	Doctorat	Chulalongkorn University	Thailande	AUN/SEED-NET
13	THA Theara	M	GRU	Doctorat	Chulalongkorn University	Thailande	Joint CU-SEI PhD program
14	CHHAY Ly An	M	GIC	Engineering	Telecom SudParis	France	Bourse EIFFEL
15	KHENG Piseth	M	GIC	Engineering	ENSIIE	France	Project's budget

16	YOU Borachhun	M	GIC	Engineering	ENSIIE	France	Bourse EIFFEL
17	KHAN Sopanha	M	GEE	Master	Sepuluh Nopember Institute of Technology (ITS)	Indonesia	KNB-ANU Seed Net
18	LORM Rathana	M	GEE	Master	Sirindhorn International Institute of Technology, Thammasart University	Thailand	EFS-Excellent Foreign Students
19	SENG Ou	M	GEE	Master	Sepuluh Nopember Institute of Technology (ITS)	Indonesia	KNB-ANU Seed Net
20	SOUN Dalin	F	GEE	Master	Mine Ales	France	Bourse EIFFEL
21	SUK Sievlong	M	GEE	Master	Sepuluh Nopember Institute of Technology (ITS)	Indonesia	KNB-ANU Seed Net
22	LANN Tongsan	M	GGG	Master	Chang'an University	China	Chinese Government Scholarship
23	ROEUN Daro	M	GGG	Master	Chulalongkorn University	Thailand	Asean and Non-Asean Scholarship
24	SAY Sokvireak	M	GGG	Master	Gadjah Mada University	Indonesia	AUN/SEED-Net Scholarship
25	SOEURN Prasal	M	GIC	Master	Sirindhorn International Institute of Technology (SIIT)	Thailand	Thai Royal Scholarship for Cambodia
26	CHROEUN Sokay	M	GIM	Master	Université Sorbonne Paris Nord (UP 13)	France	Bourses du Gouvernement Français
27	IM Polymey	M	GIM	Master	Kyushu Institute of Technology	Japan	MEXT

28	SAVOEURN Nary	M	GIM	Master	King Mongkut's University of Technology of Thonburi	Thailand	TAIST-Tokyo Tech program "Automotive and Advance Transportation"
29	SOKHAL Aylık	M	GIM	Master	IMT Mines Alès	France	Bourse EIFFEL
30	SUON Sophy	M	GIM	Master	Institute Technology Sepuluh Nopember (ITS)	Indonesia	KNB Scholarship AUN/Seed-Net Scheme "Mechanical Engineering"
31	VISETH Putsaccada	M	GIM	Master	King Mongkut's University of Technology of Thonburi	Thailand	TAIST-Tokyo Tech program "Automotive and Advance Transportation"
32	YUNE Thearith	M	GIM	Master	Institute Technology Sepuluh Nopember (ITS)	Indonesia	KNB Scholarship AUN/Seed-Net Scheme "Mechanical Engineering"
33	CHIEN Sothearath	M	GRU	Master	Hohai university	Chine	Mekong Lancang Cooperation
34	HAK Guekleang	F	GRU	Master	Kyoto University	Japon	MEXT schilarship
35	HARN Norak	M	GRU	Master	University of Liège	Belgique	Erasmus+
36	HENG Seangmeng	F	GRU	Master	Hohai university	Chine	Mekong Lancang Cooperation
37	KET Dydarong	M	GRU	Master	Chulalongkorn Universtiy	Thailande	ASEAN countries program
38	KHEN Chanlyda	F	GRU	Master	Universiti Teknologi Malaysia	Malaysie	AUN/SEED-NET scholarship
39	KONG Leangkım	F	GRU	Master	Universiti Teknologi Malaysia	Malaysie	AUN/SEED-NET scholarship
40	KONG Phearun	M	GRU	Master	Hohai University	Chine	Mekong Lancang Cooperation

41	KUN Vicheka	F	GRU	Master	Tokyo Institute of Technology	Japon	MEXT scholarship
42	MAN Sokseyla	M	GRU	Master	Chulalongkorn University	Thailande	CU ASEAN
43	NAI Chhaiheang	M	GRU	Master	Hohai University	Chine	Mekong Lancang Cooperation
44	NY Sithy	M	GRU	Master	Chulalongkorn Universtiy	Thailande	ASEAN countries program
45	PANG Sreynich	F	GRU	Master	Chulalongkorn Universtiy	Thailande	ASEAN countries program
46	PECH Ponleu	M	GRU	Master	Chulalongkorn Universtiy	Thailande	ASEAN countries program
47	PHY Sophea rum	M	GRU	Master	Kyoto Univesity	Japon	MEXT
48	RY Nakrin	M	GRU	Master	Hohai University	Chine	Chinese Government Scholarship program
49	THOY Sophon	M	GRU	Master	Hohai University	Chine	Mekong Lancang Cooperation
50	VET Sreyla	F	GRU	Master	Kanazawa Univesity	Japon	MEXT
51	YOS Chantharath	F	GRU	Master	Chulalongkorn Universtiy	Thailand	ASEAN countries program
52	CHUY Voucheng	F	GRU	Master	Chulalongkorn Universtiy	Thailande	ASEAN countries program
53	ANG Mengchhuong	M	GIC	Master 2	Université de Grenoble	France	Bourses du Gouvernement Français
54	VUTH Nakanyseth	M	GIC	Master 2	Grenoble INP	France	Bourses du Gouvernement Français
55	TRY Sophal	M	GRU	Post-PhD	Kyoto University	Japon	Japan Society for the Promotion of Science (JSPS)

Annex 10. Short-term overseas capacity building for lecturers (2021-2022).

No	Nom et prénom		Dépt.	Université d'accueil	Titre	Date de mission	Financement
1	Dr.	OEUM Kakada	GCA (FTN)	University of Montpellier	Ph.D student	1 février 2022→31 juillet 2022	IRD
2	Dr.	LIM Sovanvichet	GCI	Université de Liège	Transfer Pédagogique	11-18 juin 2022	ARES
3	Dr.	AM Sokchea	GEE	University of Colorado	Visiting Researcher	28 août 2021→28 décembre 2021	Fulbright U.S.-ASEAN Visiting Scholars Initiative
4	Dr.	Am Sokchea	GEE	Toulouse INP	Visiting Professors	09 mai 2022 →22 mai 2022	HEIP
5	Dr.	Vai Vannak	GEE	Grenoble INP	PLC Training	30 janvier 2022 → 12 février 2022	Erasmus+ Factori 4.0 project
6	Dr.	Kim Bunthern	GEE	Grenoble INP	PLC Training	30 janvier 2022 → 12 février 2022	Erasmus+ Factori 4.0 project
7	M.	Chou Koksai	GEE	Grenoble INP	PLC Training	30 janvier 2022 → 12 février 2022	Erasmus+ Factori 4.0 project
8	Dr.	CHRIN Phok	GEE	Toulouse INP	Visiting Professors	09 mai 2022 → 22 mai 2022	HEIP
9	Dr.	ENG Chandoeun	GGG	Kyushu University	Xray diffraction	mars 2022	JICA-LBE
10	Dr.	ENG Chandoeun	GGG	University of Liege	Geophysics equipment training	juin 2022	HEIP Project
11	Dr.	KRET Kakda	GGG	Kyushu University	Remote Sensing	mars 2022	JICA-LBE
12	Dr.	HENG Mouy Yi	GGG	University of Liege	Geophysical application on geotechnical engineering	septembre 2021→janvier 2022	Impulse Program, Belgium
13	Ms	Heng Mouy Yi	GGG	University of Liege	Geophysical application on geotechnical engineering	Sept 2021 → Jan 2022	Impulse Program, Belgium
14	Dr.	Eng Chandoeun	GGG	Kyushu University	Xray diffraction	Plan in October, 2022	JICA-LBE
15	Dr.	Dr. Eng Chandoeun	GGG	University of Liege	Geophysics equipment training	Plan August , 2022	HEIP Project
16	Ms	Heng Mouy Yi	GGG	University of Liege	Seismic Survey	Plan in August, 2022	Impulse Program, Belgium
17	Dr.	Kret Kakda	GGG	Kyushu University	Remote Sensing	Plan in October, 2022	JICA-LBE
18	Dr.	TITH Dara	GIC	Université de Namur	Attending the Mid-term evaluation of Doctoral students Explore new research skills	29 octobre 2021→15 décembre 2021	Erasmus+
19	M.	SOK Kimheng	GIC	Namur, Belgium	Join conference	06-02-2022→08-02-2022	ARES

20	M.	LAY Heng	GIC	Surakarta, Indonesia	Working on activities plan of HITIHE	14-05-2022→21-05-2022	Erasmus+ KA2 HITIHE
21	M.	BOU Channa	GIC	Surakarta, Indonesia	Working on activities plan of HITIHE	14-05-2022→21-05-2022	Erasmus+ KA2 HITIHE
22	Dr.	Srang Sarot	GIM	ECAM La Salle de Lyon, France	Cooperation in ECAM Program with ITC	4-11 April 2022	ECAM la Salle de Lyon
23	Dr.	Sok Piseth	GIM	ECAM La Salle de Lyon, France	Cooperation in ECAM Program with ITC	4-11 April 2022	ECAM la Salle de Lyon
24	Dr.	CHHUON Kong	GRU	UNIVERSITAS GADJAH MADA	13th AUN/SEED-Net Regional Conference on Geological and Geo-Resource Engineering	20-21 décembre 2021	JICA
25	Dr.	CHHUON Kong	GRU	University of the Philippines Diliman	15th Regional Conference in Environmental Engineering	17-18 janvier 2022	N/A
26	Dr.	CHHUON Kong	GRU	Universidad de Guanajuato	18th World Lake Conference	9-11 novembre 2021	N/A
27	Dr.	CHHUON Kong	GRU	Asian (ASEAN) Science Diplomats and Environmental and Climate Change Research Institute (ECCRI)	3rd Climate Smart and Disaster Resilient ASEAN International Conference	23-25 novembre 2021	N/A
28	Dr.	EANG Khy Eam	GRU	Asian Institute of Technology	Inception Work on Strengthening Groundwater Governance in Rapidly Urbanizing Areas of the Lower Mekong Region	19 janvier 2022	GIRA/SUMMER 4 ALL
29	Dr.	EANG Khy Eam	GRU	Kimdaejung Convention Center, Gwangju, Republic of Korea	35th Congress of the International Society of Limnology (SIL 2021 conference)	22-27 décembre 2021	SATREPS/JICA

30	Dr.	HANG Leakhena	GRU	University of the Philippines Diliman	15th Regional Conference in Environmental Engineering	17-18 janvier 2022	AUN-Seed/net-JICA
31	Dr.	HANG Leakhena	GRU	Youth International Cooperation Development Center (CYDECO)	The ASEAN virtual young scientist conference 2021	8-9 décembre 2021	MOEYs
32	Dr.	SONG Layheang	GRU	Université Toulouse III - Paul Sabatier	Doctoral Defense: Land use, surface runoff, soil erosion: multi-scale impact assessment of teak tree plantation management in a tropical humid mountainous agro-ecosystem	23 novembre 2021	BGF financé par MoEYS
33	Dr.	EANG Khy Eam	GRU	University of Hong Kong and RUPP	Teaching and Learning in Higher Education including Curriculum Development and Planning, Instructional Design, Educational Assessment, and Educational Action Research	January-May 2022	HEIP
34	Dr.	KET Pinnara	GRU	University of Hong Kong and RUPP	Teaching and Learning in Higher Education including Curriculum Development and Planning, Instructional Design, Educational Assessment, and Educational Action Research	January-May 2022	HEIP

35	Dr.	CHHUON Kong	GRU	University of Girona - UdG	Biannual Steering Committee of the INOWASIA project, Development of innovative multilevel formation programs for the new water leading professionals in South-East Asia	01-07 May 2022	Erasmus+ InowAsia
36	Dr.	ANN Vannak	GRU	University of Girona - UdG	Biannual Steering Committee of the INOWASIA project, Development of innovative multilevel formation programs for the new water leading professionals in South-East Asia	01-15 May 2022	Erasmus+ InowAsia
37	Dr.	EANG Khy Eam	GRU	University of Girona - UdG	Biannual Steering Committee of the INOWASIA project, Development of innovative multilevel formation programs for the new water leading professionals in South-East Asia	01-15 May 2022	Erasmus+ InowAsia
38	Dr.	CHAN Rathboren	GRU	University of Liege	Land Management	15 April - 15 June 2022	ARES
39	Dr.	EANG Khy Eam	GRU	Chulalongkorn University	Academic collaboration and Improvement of Techno-Science Research Journal in Preparation for applying for ASEAN Citation Index (ACI)	06 - 10 June 2022	HEIP-ITC
40	Dr.	THOURN Kosorl	GTR	Grenoble INP	Cybersecurity in industrial automation	30 January-12 February 2022	ASEAN Factory 4.0 Erasmus+ Project
41	Dr.	SRENG Sokchenda	GTR	Czech Technical University in Prague	Biomedical teaching methods	25-29 April 2022	Czech Development Agency
42	Dr.	SRENG Sokchenda	GTR	Toulouse INP	Curriculum and pedagogy development	09-20 May 2022	HEIP Partnership Project
43	Mr.	HEL Chanthan	GTR	Toulouse INP	IoTs and cloud technology	09-20 May 2022	HEIP Partnership Project

Annex 11. Short-term overseas capacity building for students (2021-2022).

No	Nom et prénom	Sexe	Dépt.	Université d'accueil	Titre	Date de mission	Financement
1	Buth Chitra	M	GGG	Kyushu University	Join international conference and lab training	22 novembre – 2 décembre 2021	JASSO
2	Chan Chhayo	M	GGG	Kyushu University	Join international conference and lab training	22 novembre – 2 décembre 2021	JASSO
3	Chork Sokheng	M	GGG	Kyushu University	Join international conference and lab training	22 novembre - 2 décembre 2021	JASSO
4	Heng Ratha	M	GGG	Kyushu University	Join international conference and lab training	22 novembre - 2 décembre 2021	JASSO
5	Kov Rathanak	M	GGG	Kyushu University	Join international conference and lab training	22 novembre - 2 décembre 2021	JASSO
6	Ly Suytry	M	GGG	Kyushu University	Join international conference and lab training	22 novembre - 2 décembre 2021	JASSO
7	OEUM Kakada	F	GCA	University of Montpellier	Ph.D student	1 février - 31 juillet 2022	IRD

Annex 12. Local capacity building for lecturers and students in form of seminar (2021-2022).

No	Titre du séminaire	Objectif du séminaire	En coopération avec	Nombre de participants	Venant de	Résultats attendus
1	Practical Knowledge, Career Path and Prospect of Thermal Energy Engineering	to provide a helpful resource for students who are unsure about which field is the best choice for their future careers.	AUF	The total number of registered participants was 109 persons—44 persons for the intensive and 65 persons for the discussion panel	GIM (95%) + GRU (2%) + RUPP (2%)	
2	Soft-Skills Training	to share your experience and and to provide training on soft skills to students and faculty staff	AUF	21 participants. Most of them are students of the department GIM	students and staff of department GIM, ITC	
3	Training of Trainer Workshop on “Installation and Maintenance of Air-conditioning System”	to fill gaps of practical work for mechanical staff on the Installation and troubleshooting arising in the air-conditioning systems	AUF	18 Participants	Private AC companies and students and staff of department GIM	
4	GEE workshop 1	Improve Course Learning Outcome	Internal	10	Local ITC	Course content
5	GEE workshop 2	Improve Course Learning Outcome	IG Technology	15	Local ITC	Course content
6	GEE workshop 3	Improve Course Learning Outcome	Internal	10	Local ITC	Course content for year 5

7	Reservoir Engineering	<ul style="list-style-type: none"> - To introduce the students about the role of oil and gas engineerirng - To calculate and define the reservoir properties 	Total Associate Professor April 04 -08, 2022	60	Online	Passed examination (Successfully Completed)
8	Seismic Reservoir Characterization	<ul style="list-style-type: none"> - To identify the hydrocarbon reservoir base on seismic data '- To do seismic stratigraphy correlation 	Total Associate Professor June 06 -10, 2022	60	Online	
9	Oil and Gas Field Development	<ul style="list-style-type: none"> - To introduce the field development facilities '- To introduce the drilling technics 	General Department of Petroleum, Cambodia June 2022	60	GGG, ITC	

10	The 1st International Conference on Earth Resources and Geo-Environment Technology (EraGET2022)	<ul style="list-style-type: none"> - To enhance education and strengthen the research capabilities for young geoscientis - To share the recent research trend among researchers, industries, community, and international institutions - To extend and strengthen the research network among industries, community, and international institution 	JICA	200+	<ul style="list-style-type: none"> - GGG staffs and students - Private companies, Ministries - Professors, Researchers, and Students from Kyushu University, Hokkaido University, Japan, University of Liege, Belgium, Chulalongkorn University, AIT, Thailand, Gadjah Mada University, Indonesia, Malaysia, Srei Langka 	
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11	Practical Tips to Transform from IT Staff to Become a CEO	To introduce students about Moha Kruosar IT Association and to provide job opportunities. They also give share experiences of how to become a CEO	Moha Kruosar IT Association	120	GIC	Students get to know about the association what they have done so far about their activities and build more closed relationship for internship and job opportunities
12	Endpoint Security Training	To introduce students about endpoint security in cybersecurity	Kaspersky Cybersecurity Company	120	GIC	Students get up to date on cybersecurity and learn how to protect the network from cyber attacks
13	Practical Knowledge, Career Path and Prospect of Thermal Energy Engineering	to provide a helpful resource for students who are unsure about which field is the best choice for their future careers.	AUF	The total number of registered participants was 109 persons—44 persons for the intensive and 65 persons for the discussion panel	GIM (95%) + GRU (2%) + RUPP (2%)	

14	Soft-Skills Training	to share your experience and and to provide training on soft skills to students and faculty staff	AUF	21 participants. Most of them are students of the department GIM	students and staff of department GIM, ITC	
15	Training of Trainer Workshop on “Installation and Maintenance of Air-conditioning System”	to fill gaps of practical work for mechanical staff on the Installation and troubleshooting arising in the air-conditioning systems	AUF	18 Participants	Private AC companies and students and staff of department GIM	

Annex 13. Dispatch Professor at ITC (2021-2022).

No	Nom et prénom	Université d'origine	Matière enseignée	Date	Départ. d'accueil
1	Yann Charles	Université de Paris Sorbone Nord (UP13)	Discussion on Numerical simulation using Abaqus	21-30 novembre 2021	GIM-Embassy of France
2	HENG Samedi	University of Liège, Belgique	Digital Transformation, Business Process	10 janvier 2022 → 14 janvier 2022	GIC
3	PONTHOT Jean-Phillipe	Université de Liège	Méthode des Eléments Finis	27/05 → 03/06/22	GCI
4	Christophe LEYS	Université Libre de Bruxelles, Belgique	Data Analysis with SPSS	2-6 mai 2022	3 ^{ème} cycle
5	FADEL Maurice	Toulouse-INP	Commande des machines	2 juin 2022	GEE

Annex 14. List of LBE Research Project.

LBE Research List

	Batch	Name (Sir, Given)	Position	Gender (M/F)	Department	Research Title	Research Objectives	Budget on Application			
								2019	2020	2021	2022
1	1	BUNTHERN, KIM	Lecture	M	Electrical and Energy Engineering	MPPT control of a standalone 3-phase variable speed induction generator using PWM-VSI and low voltage batteries storage for single-phase load	The objective of this research is to study and implement the optimal control of a standalone single-phase generator based on three-phase induction machine and low-voltage batteries storage operating at variable rotation speed (Figure 1). While the generator will be turned by a micro-hydro turbine under actual situation, in this research the turbine will be emulated using a torque-controlled electric motor	\$ 8,630.00			
2	1	AM Sok Chea	Deputy Head of Department	M	Electrical and Energy Engineering	Optimization design for wireless power transfer and its control system	1. Study about the WPT system topology and its control system without using additional power converter part (eliminate regulation at the secondary part). 2. Optimization design of the proposed topology by using Genetic Algorithm (GA): optimize geometry of transformer (using finite element), associate power electronics components. 3. Final prototype to validate proposed design 4. This project will also support the 5th year students or Master students for the final report	\$ 8,700.00			
3	1	VAI Vannak	Researcher	M	Electrical and Energy Engineering	A low-cost device for estimating energy production of a PV system in faulty conditions	The objective of this research work is to produce a low-cost device which is able to estimate the energy produced from a small-scale PV system, both in normal and abnormal operating conditions. The proposed device is expected to perform the following tasks: - Determine the instant when the fault occurs - Identify the type of faults - Quantify the magnitude of the fault - Estimate the energy produced by the PV system	\$ 8,200.00			
4	1	PEC Rothna	Lecturer-Researcher	M	Electrical and Energy Engineering	Development and Design of Monitoring System for Data Collection and Analysis	The research is divided into two phases: 1. Electronic System design phase: - Circuit analysis - Design of the electronic system that conforms to IPC-2221 standard - Testing and Standardization of the electronic system 2. Cloud platform integration phase - Network topology for connecting monitoring system and the cloud - Implementation of cloud platform to be accessed in ITC - Perform a case study with one of the departments in ITC to evaluate the system - Integration of the said platform with CamREN (Cambodia Research and Education Network)	\$ 8,700.00			
5	1	KRY Nallis	Dean of Faculty of GGG	F	Geo-Resources and Geotechnical Engineering	A Development of Geological Mapping at Te Teuk Pus Hot Spring, Kampong Speu Province, Cambodia	The objective of research is to create the geological mapping of Te Teuk Pus hot spring, Kampong Speu Province, Cambodia. To accomplish this objective, the geological field work and rock analysis along with desk study are required. The rock analysis is conducted by microscope, x-ray fluorescence (XRF), and x-ray diffraction (XRD).	\$ 9,169.00			
6	1	ENG Chandoeun	Researcher-Lecturer	M	Geo-Resources and Geotechnical Engineering	Depositional Environment and Reservoir Characterization of Outcrops in Oil and Gas Prospect, Northern Tonle Sap Lake, Onshore Cambodia	1. To characterize the depositional environment of outcrops in study area 2. To determine the reservoir quality and heterogeneity of sandstones in study area	\$ 11,224.00			
7	1	KRUY Sothea	Lecturer	M	Industrial and Mechanical Engineering	Development of Recycle Plastic Machines to Boost Recycling Application in Cambodia	1. Development of shredding, extrusion machine, and injection machine for production of plastics materials (resin) from plastics waste. 2. Fabrication of plastics filaments for using in 3D printing machine for making the three-dimensional parts. 3. Analysis on the mechanical properties, size exclusion and melt flow index of plastics materials	\$ 8,150.00			

LBE Research List

	Batch	Name (Str, Given)	Position	Gender (M/F)	Department	Research Title	Research Objectives	Budget on Application			
								2019	2020	2021	2022
8	1	LIV Yi	Research Lecturer	M	Industrial and Mechanical Engineering	Establishing a platform for studying Cambodian railway track geometry irregularities	We aim to establish a measurement system that allows us to study Cambodia railway track geometry irregularities, and map them on spatial coordinates of the track. The track irregularities includes—but not limited to—track alignment, gage, cross level and longitudinal level.	\$ 10,560.00			
9	1	CHHUN Sophea	Master program coordinator/ researcher	F	Information and Communication Engineering	Real-life and Real-time Video-based Human Tracking and Grouping	This research focuses on “How can we have real-life online people groups behaviour extraction from video data”. To answer to this unique question, two main steps are necessary. It is first needed to establish a stable and real-time people tracking architecture which is general and can adapt to any possible new algorithms arising during the research project. In a second part, grouping people based on individual tracking results should be as fast and effective as possible to provide usable information in real-life situations.	\$ 7,585.00			
10	2	Vannak, VAI	Researcher	M	GEE	Development of Open-Source Tool for Teaching and Research in Distribution System Topology with Distributed Generation	The objectives of this research work are to develop a novel optimization algorithm, automated topology and open-source distribution system tool which is able to analyze the performance and visualization of the system without and with integrated distributed generation in both normal and abnormal conditions.		\$ 14,920.00		
11	2	Chandoeun, ENG	Researcher-Lecturer	M	GGG	Distribution of black shale and sandstone formations for hydrocarbon potential in northern Tonle Sap Lake, Onshore Cambodia	Characterizing the distribution of hydrocarbon source and reservoir from black shale and sandstone formations in northern Tonle Sap Lake. 1. To evaluate the quality and quantity of black shale formation 2. To characterize the geometry of sandstone reservoir		\$ 14,996.00		
12	2	Rothna, PEC	Lecturer-Researcher	M	GEE	Development of Control and Monitoring System for Efficient Cultivation and Growing Modeling of Mushroom in Cambodia	There are 2 main objectives of this work: 1. Development of practical control and monitoring system of mushroom house: the monitoring and data collection system will be modified and adopted from the previous project “Development and Design of Monitoring System for Data Collection and Analysis” to fit the requirement of the mushroom growing. Then collected data will be used as inputs for the system to control the environment of the house. Equipment for control environment such as humidifier, air ventilator will be selected to equip in the real mushroom house. 2. Mushroom growth model, a model or pattern of mushroom growing in function of the environment such as temperature, humidity, CO2 and O2, will be developed and validated. The best growth model to achieve the maximum yield will be set as input of the above system for automatic control of environment. Only oyster and straw mushroom will be studied.		\$ 15,000.00		
13	2	Kakda, KRET	Lecturer-Researcher	M	GGG	Mapping of hydrothermal alteration associated with porphyry Cu-Au and epithermal gold deposits using ASTER and Landsat 8, northeast Cambodia.	This research is purposefully aimed: 1. To define method for delineating of hydrothermal alteration mineral in northeast Cambodia by using ASTER and Landsat-8 image 2. To verify hydrothermal alteration between remote sensing and laboratory analysis of porphyry Cu-Au and epithermal deposits		\$ 14,977.00		

	Batch	Name (Sir, Given)	Position	Gender (M/F)	Department	Research Title	Research Objectives	Budget on Application			
								2019	2020	2021	2022
14	2	Phok, CHRIN	Head of the Department of GEE	M	GEE	Pesticide and temperature control in durian farm by using Glocal Control System	The research topic focus on Glocal Control System for durian farm which apply for: pest control, temperature control and irrigation control will be achieved with local availability and eased to use. On the other hand, the output results of the prototype system will be used to share local farmer and publish in an international conference to disseminate the new technique of smart control for agriculture section. In the future work, this research team will be an expertise in the fields of applied control for agriculture where it response to the need of Cambodian farmer.		\$ 14,718.00		
15	2	Bunthern, KIM	Lecturer-Researcher	M	GEE	Assessing the local power quality using data logger and the development of a single-phase voltage stabilizer.	The objective of this research is divided into two main goals. First, the objective is to design and put in use power monitor system which is capable of logging the measured voltage and current data of the power line in a resident. Once the device is built and tested, it needs to be installed in a number of selected households at different time for a period of time. The second objective is to develop a prototype of a power converter which is used to stabilize the voltage of the power line.		\$ 13,843.00		
16	2	Rithea, NGETH	Lecturer	M	GTR	Implementation of Data Transmission Testbed Focused on Channel Access Protocol Design with Physical-layer Network Coding for Low Latency Transmission	The target of this research is to achieve end-to-end latency of data transmission less than one milliseconds. The main work content is as below: - Implement an experiment testbed with five nodes equipped with multiple antennae as two-source two-relay one-destination scenario - Employ OCC with/without feedback and CAP designed based on the previous collected CSI to reduce the end-to-end latency caused from retransmission and feedback overhead - Collect experiment data by comparing with simulation data while the end-to-end latency is in average for all nodes - Modify the designed protocol until reaching the goal.		\$ 13,200.00		
17	2, 3	Phanny, YOS	Vice Dean of Faculty of GGG	M	GGG	Geothermal Source and Reservoir Investigation in Te Teuk Pus Area, Phnom Te Village, Sangke Sap Commune, Oral District, Kampong Speu Province, Cambodia	The objectives of this research are to define the potential renewable energy resource (geothermal energy) at Te Teuk Pus area, Phnom Te village, Sangke Sap commune, Oral district, Kampong Speu province, Cambodia such as: - To identify the area with potential geothermal resource - To determine the geothermal source and its characteristic - To characterize the thermal fluids and heat flow - To identify geothermal reservoir properties		\$ 10,040.00	\$ 21,070.00	
18	2, 3	Easeng, SIV	Lecturer-Researcher	M	GIM	Design and built a light weight of mini electric vehicle	We aim to study the EV structure and its power consumption through the design and built a prototyping of a lightweight vehicle. The research focus mostly on the design and build a lightweight chassis		\$ 21,336.00	\$ 8,630.00	
19	2, 3	Sirisokha, SEANG	Lecturer-Researcher	F	GGG	Hydrothermal alteration, Mineralization, Fluid inclusion, Geochemistry, and Geochronology of Porphyry Cu-Mo-Au Prospect, Ratanakiri, Cambodia	1. To identify the lithology and geochemistry of the host sequence and mineralized intrusion of Halo prospect, Okalla prospect and Andong Meas prospect 2. To delineate the spatial and temporal distribution of porphyry intrusion, hydrothermal alteration and Cu-(Au-Mo) mineralization 3. To study in detail the origin of hydrothermal fluid responsible for alteration and mineralization 4. To determine the Zircon U-Pb ages of intrusive rocks in order to constrain the emplacement ages of the intrusive rocks, and to provide a better understanding of the geological history in those prospects.		\$ 17,256.00	\$ 10,463.00	

	Batch	Name (Sir, Given)	Position	Gender (M/F)	Department	Research Title	Research Objectives	Budget on Application			
								2019	2020	2021	2022
20	2, 3	Saret, BUN	Lecturer- Researcher	M	GRU	Addressing Water Scarcity in a Rural Community of Cambodia through Groundwater Use	The objective of this study aims to address the water scarcity in a rural community of Cambodia through groundwater use, which is mainly divided into three sub-objectives: (1) To estimate the daily household water use using structured questionnaire survey (2) To identify groundwater quality through primary data collection for estimating water quality index (3) To study the potential and suitable groundwater treatment processes for removal of main contaminant previously found for rural community case		\$ 15,000.00	\$ 15,000.00	
21	2, 3	Vannei, SRY	Lecturer	M	GIM	Composite 3D Printing based on Filament Developed from Natural Fiber	We aim to develop filament from natural fibers as reinforcement and Polylactic acid (PLA) as the matrix for composite 3D printing material. The first natural fiber to be selected is sugarcane as there are lot of waste in Phnom Penh. After obtained filament from natural fibers, composite 3D printing is carried out with PLA material. Then, their mechanical properties are determined based on ASTM standard testing method.		\$ 15,988.00	\$ 14,012.00	
22	2, 3	Kinnalet, VONGCHANH	Lecturer- Researcher	F	GIM	Investigation of mixing ratio of biomass to wasted cooking oil used as binder for producing solid fuel for community use in Cambodia	This study aims to verify the use of biomass briquettes by investigating its property values and obtaining the right mixing ratio between biomass briquette having wasted cooking oil as a binder and finally to confirm the type of raw materials using with the existing small-scale briquetting system. Therefore, the specific objectives are following: 1. Investigate the use of waste cooking oil as binding material 2. Determine the properties biomass briquettes after with/out applied binder such as calorific value, flame temperature, volatile matter, fix carbon and ash content, moisture content, etc. 3. Conduct impact resistance and water resistance tests 4. Measure the gas emission of the new biomass briquetting, CO, CO ₂ , N, SO Study on possibility of applying the briquettes in the Cambodia's society		\$ 14,165.00	\$ 14,031.00	
23	2, 3	Kosori, THOURN	Vice Head of DTC	M	GTR	Non-intrusive appliance load monitoring and diagnostics in residential homes	This research aims to produce a device/ tool that is able to monitor the energy consumption of each electrical appliance in a residential home and to provide feedback to end consumer to take any action for energy saving. The built device is expected to perform the following task: • Detect the operating status, i.e. on-off and multi-state operation, of electrical appliance • Detect the anomaly status of electrical appliances to prevent malfunction and to reduce energy consumption because when an appliance malfunctions, it would consume more energy than normal operation. • Breakdown the energy consumption of each electrical appliance from the aggregated energy data			\$ 15,500.00	

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	Batch	Name (Sir, Given)	Position	Gender (M/F)	Department	Research Title	Research Objectives	Budget on Application			
								2019	2020	2021	2022
24	3, 4	Vannak, VAI	Lecturer- Researcher	M	GEE	Planning and Operation of Active Distribution Systems	The objectives of this research work are to develop novel optimization algorithms and towards a small-scale prototype as an emulated system for planning and operation of active distribution systems to improve quality, reliability, and economy in the systems. This project has four specific objectives as follows: - Objective 1: To improve the algorithms of optimal phase connection, reconfiguration, and restoration based on existing algorithms (i.e. the project in 2nd batch). - Objective 2: To develop algorithms for improving the unbalanced system through the phase sweep concept. - Objective 3: To develop algorithms for the quality and reliability of services through fault location and isolation. - Objective 4: To develop a graphical user interface (GUI) and prototype of active distribution systems as emulated systems based on three previous objectives.			\$ 18,158.00	\$ 11,842.00
25	3	Rathborey, CHAN	Lecturer- Researcher	M	GRU	Development of Electrocoagulation Reactor Integrated Sedimentation for Turbidity and Color Removal from Industrial Wastewater	The objective of this present study is to develop and evaluate the hybrid Electrocoagulation Reactor (ECR) combining both EC and sedimentation units in terms of design criteria and operation condition in both batch and continue mode for decolorization and turbidity removal.			\$ 15,000.00	
26	3	Dara, TITH	Researcher	M	GIC	Proof-of-Concept of Applying Blockchain Technology for Decentralized Identification Management of Medical System	What is the important of using smart card or smart phone to preserve patient's privacy and integrating patient's id? Ans: We proposed using smart card or smart phone to secure storing unique id and secret key of patients for our application. They will use it for identifying themselves, encrypt and decrypt the sensitive information stored in the blockchain. After we find the solutions to store above information in the secure devices, patients can use it to search for data in the blockchain about information of past visiting hospitals and provide the right patient's id to medical staffs in which they use it to search for medical data.			\$ 14,925.00	
27	3, 4	Chandoeun, ENG	Lecturer- Researcher	M	GGG	Geological and geophysical studies of hydrocarbon potential in Tonle Sap Basin, Onshore Cambodia	Geological and geophysical investigation for hydrocarbon potential in Tonle Sap Basin, onshore Cambodia. 1) To characterize the subsurface geological structures and hydrocarbon accumulation 2) To characterize and evaluate source and reservoir rocks			\$ 17,308.00	\$ 12,663.00
28	3, 4	Kakda, KRET	Lecturer- Researcher	M	GGG	Integration of Landsat-8, ASTER, and Sentinel-2 for mapping of mineral prospective map, hydrothermal alteration and geological structures for porphyry copper and epithermal gold deposits in the north Cambodia.	This research is purposefully aimed: 1. To develop methods using band ratios and Principal Component Analysis (PCA) techniques to Sentinel-2, Landsat-8, and ASTER datasets 2. To provide a detailed description of the mineral prospective zones using weight of evidence method 3. To verify remote sensing results by laboratory analysis and field observation			\$ 19,701.22	\$ 10,279.22

	Batch	Name (Sir, Given)	Position	Gender (M/F)	Department	Research Title	Research Objectives	Budget on Application			
								2019	2020	2021	2022
29	3, 4	Reasmey, TAN	Deputy Director of Research and Innovation Center	F	GCA	Development of Cambodian Fermented Cucumbers by using Freeze-Dried Lactic Acid Bacteria with their Potential Use as Aromatic and Bacteriocin-producing Starters	The objective of this research is to develop fermented cucumbers by using freeze-dried LAB that are useful for taste and preservation. To achieve this, the specific objectives are the followings: 1. To isolate LAB from fermented vegetables in Phnom Penh; 2. To test enzymatic activities and bacteriocin production of isolated LAB; 3. To identify the species of isolated LAB that are useful for taste and preservation; 4. To further characterize the isolated LAB for optimum pH, optimum temperature, resistance to salt concentration and volatile compounds; 5. To investigate the effect of single culture and co-culture of isolated LAB on cucumber fermentation using new designed bioreactor; 6. To make freeze-dried LAB and study different ratio of LAB during cucumber fermentation; 7. To produce healthy and tasty fermented cucumber with different tastes; 8. To prolong its shelf-life during storage in different packaging materials.			\$ 20,627.00	\$ 9,373.00
30	3, 4	Pinnara, KET	Lecturer-Researcher	F	GRU	Prototype of Low-cost and Smart In-vessel Composter for converting Spent Mushroom Substrates to Bio-Organic Fertilizer	The three objectives of this project are i) To calibrate and validate mathematic modelling of compost process of spent mushroom substrates (SMS) ii) To prototype an automatic composter for rapid fermentation of SMS iii) To implement the prototype composter at mushroom production farm to evaluate the quality of the SMC produced Our main research questions are: 1) What are the dynamic decomposition rates effected by the temperature and moisture control? 2) How can the prototype rapid composter achieve the good quality of the compost for agricultural production?			\$ 18,610.00	\$ 11,390.00
31	3	Khy Eam, EANG		M	GRU	STUDY OF ACID MINE DRAINAGE (AMD) IN CAMBODIA AND ITS COUNTERMEASURES	The objective of this research is to evaluate on the effectiveness of low-cost adsorbents on the acid mine drainage from three active mining provinces, Mondulkiri, Ratanakkiri, and Kratie. To achieve this objective, the specific objectives are the followings: 1. To evaluate the characteristics of low- cost adsorbents, tailings, and rocks 2. To study on the behavior of heavy metals leaching in AMD 3. To evaluate the adsorption capacity of low-cost adsorbents in AMD remediation and metals removal 4. To study on the isothermal and kinetic model of adsorption process			\$ 14,996.00	
32	4	Sophea, BOEUT	Lecturer-Researcher	F	GGE	SUBSURFACE MAPPING OF SOIL BEARING CAPACITY IN PHNOM PENH AREA, CAMBODIA	This research project is to create 3D modeling of subsurface soil bearing capacity in Phnom Penh Area up to the depth of 50 meters underground based on secondary (previous data log from 2012 to 2021) and new date logs (which will be drilled during the period of the project). The main tool is to apply GIS related software in combined with other opensources such as QGIS to thematic mappings of bearing capacity of Phnom Penh enh subsoil. Thus, the main objectives of the study are: • Soil stratigraphy of Phnom Penh city • Geological and Engineering soil properties of Phnom Penh, Cambodia • Subsurface Mapping of Soil Bearing Capacity in Phnom Penh, Cambodia				\$ 14,996.08

	Batch	Name (Sir, Given)	Position	Gender (M/F)	Department	Research Title	Research Objectives	Budget on Application			
								2019	2020	2021	2022
33	4	Veng Kheang, PHUN	Head of Master Program	M	Master of Transportat Eng.	How the Poor Commute in Cambodian Cities and Their Intention towards Public Transport System	1) Examine how low-income people commute in urban areas (identify opportunities/challenges for commuters and public transport systems) 2) Develop an accessibility index to/from urban public transport system. 3) Feasible solutions to maximize the use of urban public transport systems via low-income citizens (policy discussion and formulation)				\$ 14,350.00
34	4	Rothborey, CHAN	Lecturer-Researcher	M	GRU	Influence of locally made effective microorganisms (EM) on the treatment of domestic wastewater using conventional septic tank	The primary objective of this study was to devise a method for producing effective microorganisms in Cambodia utilizing raw materials or organic waste. Following that, locally made EM products were employed to improve conventional septic tanks' performance.				\$ 15,000.00
35	4	Saret, BUN	Lecturer-Researcher	M	GRU	Kinetic and Influence of Iron Co-Presence on Arsenic Removal from Groundwater	The objective of this study is to study a relative effect of ferrous iron co-presence on arsenic removal in batch experiment and continuous mode system. Various influent parameters, including supplied gas flow rate, initial pH, aquatic pH, initial concentration of ferrous iron, and additional ferric hydroxide particle will be examined. To archive this main purpose, the following sub-objectives are designed. (1) To study on ferrous iron removal kinetics as batch experiment (2) To investigate the relative effect of iron co-presence on arsenic removal (3) To evaluate the simultaneous removal performance through continuous system				\$ 15,000.00
36	4	Phok, CHRIN	Head of GEE	M	GEE	Smart farming for qualified vegetable using mechatronics techniques	The first objective of this project is to do comprehensive literature review as well as to perform site surveys in order to collect necessary information and data related to Cambodia vegetable farming style and behavior and the necessity for technological adoption. The second objective is to conceptualize and perform the detailed analysis of an appropriate automation system integrated with a smart system. The third objective is to develop and design a prototyping system which will be later installed for testing and validation. The prototype work involves farm-field construction, system setup, mechatronics design and development, and information processing.				\$ 14,990.00

	Batch	Name (Sir, Given)	Position	Gender (M/F)	Department	Research Title	Research Objectives	Budget on Application			
								2019	2020	2021	2022
37	4	Siriskokha, SEANG	Lecturer- Researcher	F	GGE	Geological, Geochemical Characteristics and Genesis of Gold Mineralization, Gemstone and Rare Earth Element in Ratanakiri, Kampot, and Pailin province, Cambodia	1. To provide the geological background, hydrothermal alteration, mineralization, and geological characteristics for porphyry copper-molybdenum, and gold-copper exploration, in Koh Sla prospect and Canada Wall prospect. 2. To investigate physicochemical processes related to the evolution of the gossan cover and the supergene gold enrichment 3. To identification of mineralogical and textural and geochemical characteristics of rare earth elements along the gossan profile 4. To study the petrography, mineralogy, and geochemical characteristic of gemstone in Pailin 5. To determine the Zircon U–Pb ages of intrusive rocks and gemstone to constrain the emplacement ages of the intrusive rocks, age of gemstone, and to provide a better understanding of the geological history in those prospects.				\$ 14,998.08
38	4	Phanny, YOS	Head of RU	M	GGG	Physical properties and Mineralogy of ancient brick from temples at Sambor Prei Kuk area, Kampong Thom, Cambodia.	The research objective tends to characterize and determine the physical and chemical properties of ancient brick, sandstone, laterite rocks from the Sambor Prei Kuk area. In order to reproduce the material with similar properties to rehabilitate and conserve the ancient temple. There is two sub following objectives such as: - To characterize physical properties (texture, color, size) of brick from each temple. - To identify chemical properties (XRD, XRF, MP-AES) of brick from each temple				\$ 14,970.00
39	4	Sengly, SROY	Lecturer- Researcher	M	GCA	Assessment on nutritional profiles, storage stability and sensory evaluation of dried fish powder made by low-value small fish species	The overall aim of this study is to assess the nutritional profile of low-value small fish species and develop low-cost nutrient fish powder by following the sensory and nutritional profile along storage. Q1: What are the interesting nutrients of the low-value market of small fish species? Q2: How do nutrients change after processing and during storage conditions based on type of packaging? Q3: How does the sensory quality of dried fish powder change during storage?				\$ 15,000.00
40	4	Piseth, DOUNG	Lecturer- Researcher	M	GCI	Evaluation of Mechanical Behavior of Post-Installed Bundled Reinforcement Used for Concrete Connections	The purpose of this research study is to evaluate the mechanical behavior of post-installed bundled reinforcement. In order to achieve this purpose, three objectives have been established as described below. 1) To fundamentally investigate the pull-out strength and failure modes of post-installed bundled reinforcement considering the mortar and epoxy as adhesive materials. 2) To evaluate the effects of embedded length and concrete cover on the mechanical behavior of the post-installed bundled reinforcement using a pull-out test 3) To establish the conformity to the existing design codes in order to use in practices				\$ 14,900.00

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	Batch	Name (Sir, Given)	Position	Gender (M/F)	Department	Research Title	Research Objectives	Budget on Application			
								2019	2020	2021	2022
41	4	Ritheha, NGETH	Lecturer- Researcher	M	Telecommunicati ons and Networks	Design and Implementation of Health Data Collection Communication Protocol Using Physical-Layer Network Coding	The main objective is to implement a healthcare platform that allows users can monitor the patient's condition and to propose a data collection communication protocol. Specific objectives of this research are as below: - Design data collection communication protocol for two sources and one receiver and conduct simulation; - Implement a platform to collect patient real-time health data such as electrocardiogram and location without using designing protocol; - Design an interactive interface that allows user to view the real-time health data via smart phone or computer; - Integrating the designing protocol on software defined radio hardware and conduct the experiment.				\$ 14,980.00
42	4	Dona, VALY	Lecturer- Researcher	M	Department of Information and Communication Engineering	Plagiarism Detection System for Khmer Language	The main objective of this research work is to develop a plagiarism detection framework to find duplicated texts and similarities of an input text in a document (document to be analyzed) compared to existing referenced documents. The framework is designed to accommodate different characteristics and properties of Khmer language and script. The framework consists of two principal modules: the construction of referenced text corpus and the development of a plagiarism detection system for documents written in Khmer				\$ 14,380.00
								\$ 80,918.00	\$ 195,439.00	\$ 238,031.22	\$ 219,111.38

Annex 15. Research Topics in 2021-2022 of ETM Unit.

No.	Project/Research Topic	Name of Researcher	Funding sources	Period (2020-2023)	Objectives	Outputs
1	Applied geophysics for investigating hydrocarbon potential and depositional environment of sediments at onshore prospect, southern Cambodia	Dr. Or Chanmoly Dr. Eng Chandoeun Dr. Kret Kakda Mrs. Sio Sreymean Mr. Kan Rithy Ms. Heng Mouy Yi	HEIP	2021-2023	Intergrade geophysics and geological data for investigating the geological structures, the hydrocarbon system and depositional environment of sediments in Southern Cambodia	2 PhDs candidate, facility building-resistivity and extend collaboration with petroleum company
2	ASEAN Factori 4.0	Dr. Thourn Kosorl Dr. Vai Vannak Dr. Kim Bunthern	Erasmus+	2020-2022	1) To introduce manufacturing and processing subject areas in partner country HEI using an innovative approach, a set of pedagogical labs and a dedicated center of excellence for vocational and classical learners , 2) To enhance the impact of the project	1) Capacity building of at least 6 staffs in both GIM and GEE in the field of industrial automation 2) A center of excellence equipped with a set of PLC system and 8 PCs (planning to set up at the existing room 316-B)
3	Design and Installation of Off-Grid PV System for Clean Water and Electricity Supply in Ta Mat Primary School, Cambodia	Dr. Vai Vannak Ms. Eng Samphors Mr. Chhith Chhlonh	JASTIP	2021-2022	1) To design and analysis of PV pump system 2) To install the proposed system 3) To analysis quality of life	1) One international peer-reviewed conference 2) PV pumping system in a rural village
4	Development of a Virtual Cambodian Power System-Towards an Innovation Micro-Grid in Cambodia	Dr. Vai Vannak Ms. Eng Samphors Dr. Bun Long Mr. Eth Oudaya Mr. Khon Kimsrornn Mr. Chhith Chhlonh	HEIP	2020-2024	1) To develop tools for distribution system architectures 2) To develop tools for microgrid architectures 3) To develop tools for self-healing operation of distribution systems and microgrids 4) To set-up a testbed for distribution system and microgrid	1) Upgrade three ITC staffs from master to Ph.D., 2) At least four master students will graduate 3) At least five international peer-reviewed journals will be published 4) At least ten international peer-reviewed conferences will be published 5) A testbed platform at ITC
5	Integration of Landsat-8, ASTER, and Sentinel-2 for mapping of mineral prospective, hydrothermal	Dr. Kret Kakda Dr. Seang Sirisokha Dr. Kong Sitha	JICA-LBE	2021-2023	1. To analyze band ratios and Principal Component Analysis (PCA) using Sentinel-2, Landsat-	- Exploration of potential mineral deposits in Cambodia using remote-sensing datasets

	alteration and geological structures for porphyry copper and epithermal gold deposits in the north Cambodia.	Dr. ENG Chandeoun Dr. Boeut Sophea Dr. Boeut Sophea			8, and ASTER datasets for delineating of hydrothermal alteration mineral 2. To delineate mineral prospective zones using weight of evidence method 3. To verify remote sensing results by laboratory analysis and field observation	- Journal publications, research cooperation with local and international companies and Universities - Capacity building for students and researchers mining company and train students to work and do research
6	Investigation of mixing ratio of biomass and wasted cooking oil used as binder for producing solid fuel for community use in Cambodia	Dr. Kinnalesh Vongchanh Dr. Sarin Chan 3. Mr. Latin Heang	JICA-LBE	2020-2022	1. Turn waste to energy. City waste such: tree leaves, saw dust, waste papers, bagasse. 2. Reuse of the waste cooking oil as binding material 3. Investigate gas emission of the new biomass briquetting, CO, CO ₂ , N, SO 4. Continue to improve system of the production process for producing briquettes 5. Study on possibility of applying the briquettes in the Cambodia's society	1. Improve knowledge background on biomass briquettes, skill on machine design and product processing 2. Reduce waste in ITC, save cost for waste management, obtain energy sources 3. Publications 4. Local briquette machine technology
7	Investigation on Source and Reservoir of Geothermal, Te Tek Pos Hot spring, Kompong speu Province	Dr. NGO Ichhuy Ms. HENG Muoy Yi Dr. ENG Chandeoun Dr. KRET Kakda Dr. KRY Nallis	JICA-LBE	2020-2022	Exploring the source and reservoir of hot spring	Capacity building, Increase the number of researches and train students to work and do research
8	Investigation the production potential of the Cambodian offshore reservoir considering effects of phase behavior and rock-fluid interaction	Dr. Ngo Ichhuy Dr. Or Chanmoly Dr. Eng Chandoeun Dr. Boeut Sophea -Dr. Mao Pisith -Ms. Pech Sopheap	HEIP	2021-2023	Integrate phase behavior, rock-fluid interaction and numerical simulation to determine the production potential of Cambodian offshore reservoir	Facility building-PVT equipment, extend collaboration with ministry and private company
9	Planning and Operation of Active Distribution Systems	Dr. Vai Vannak Ms. Eng Samphors Mr. Chhith Chhlonh Dr. Bun Long	JICA-LBE	2021-2023	1) To improve the algorithms of optimal phase connection, reconfiguration, and restoration 2) To develop algorithms for improving the unbalanced system	1) Four undergraduate students will graduate under this project 2) Three international peer-reviewed journal will be published 3) Seven international peer-reviewed

					3) To develop algorithms for the quality and reliability of services through fault location and isolation 4) To develop a small scale prototype	conferences will be published 4) GUI of an active distribution system will be developed 5) Small scale prototype of the active distribution system
10	Pushing Energy Efficiency in Cambodia	Dr. Chan Sarin Dr. Kinnalesh Vongchanh Dr. Vai Vannak	CCCA3	2020-2022	The creation of a self-sustaining, multi-year building Energy Efficiency contest to help EE adaptation in Cambodia, development of awareness and capacity on climate change mitigation and adaptation amongst the youth and a policy advocacy work.	1-Showing active role in EE in Cambodia for supporting country energy sector and the Climate Change Strategic Plan 2014-2023 2-Development of awareness and capacity on EE and Climate Change to students 3-Creating partnership with private sector and related ministries 4-Providing 1 topic for master student and 2 topics for undergraduate students 5-Providing incentives for lecturers who develop training materials
11	Quality Assurance of Concrete Pile Integrity Soil Properties Investigation in Phnom Penh City using Seismic and Electrical Resistivity Tomography Approaches	Dr. Eng Chandoeun Dr. Ngo Ichhuy Dr. Kret Kakda Dr. Boeut Sophea Dr. Mao Pisith Ms. Heng Muoy Yi	HEIP	2021-2023	Integrate seismic and electrical resistivity methods to qualify concrete pile integrity Progress/ status: Start in 01/2021	Facility building-seismic and resistivity equipment, extend collaboration and private company
12	Study on impact of heat stress to human productivity and economic in Cambodia	Dr. Kinnalesh Vongchanh Dr. Sarin Chan Mr. Latin Heang	CCCA3	2020-2023	1. Build human resources in the heat stress field 2. Investigate the impacts of heat stress on productivity 3. Develop an economic model on the impact of heat stress 4. Build evidence on the impacts of heat stress on productivity in three selected sectors including the construction, garment, and education sectors. 5. Identify the work rest schedule for the construction worker.	1. Min. 2 international journal 2. 2 Ph.D. candidates, 1 master student 3. Establish the measurement tools/devices in Cambodia for investigation of heat stress 4. Create local experts on economic forecasting for heat stress 5. Introduce research area on heat stress to Cambodia. 6. Enhance and strengthen activities between ITC and MoE. 7. Expand the research and academic collaboration with research partners 8. Publications 9. Collaboration with Local and international institution

						10. Collaboration with garment, construction, and education sectors
13	Study on the Impact of Phase Reconfiguration in Unbalanced Distribution System	Dr. Vai Vannak Ms. Eng Samphors Mr. Chhith Chhlonh	ZE	2021-2022	1) Develop a novel algorithm for phase arrangement 2) Compared to existing algorithms in terms of economic and quality	1) One international peer-reviewed journal 2) Simulation tool for phase arrangement

Annex 16. Research Topics in 2021-2022 of FTN Unit.

No.	Project/Research Topic	Name of Researchers	Fund	Period (2016-2023)	Objectives	Outputs
1	Biotechnology for Integrated Pest Management towards pesticide reduction in Cambodia	Dr. SUONG Malyna Ms. HENG Soukim Ms. SIENG Sreyvich	Government of Cambodia (HEIP)	2019-2023	To rescue all Cambodian crops from pest and diseases by integrating biotechnology into IPM approach	<ul style="list-style-type: none"> - Lab equipment - Graduation of undergraduate and graduate students - Staff capacity building - Publications - Abstract and/or extended abstract to international conference/symposium
2	Valorization of high-value dry food products (agricultural products including herbal and spices) and other by-products in Cambodia	Dr. IN Sokneang Dr. PHAT Chanvorleak Ms. Heng Soukim Dr. KHOEURN Kimleang	Government of Cambodia (HEIP)	2019-2023	To set up the drying excellence center (the pilot scale of drying processing center) of agricultural products, by-products, to develop the capacity building of human resource on drying technology (including technology transfer and industrial collaboration) for agricultural products in Cambodia	<ul style="list-style-type: none"> - Drying excellence center - Lab equipment - Graduation of undergraduate and graduate students - Staff capacity building - Publications - Abstract and/or extended abstract to international conference/symposium
3	Improvement and development of rice-based products toward the growth of SMEs/Industries in Cambodia	Dr. MITH Hasika Ms. MOM Vattana Ms. CHIN Lyda	Government of Cambodia (HEIP)	2019-2023	To set up a rice-based product development platform, improving the quality of rice-based products locally produced and available in markets and to diversify rice-based products, human resource development, and enhancing collaborative research between university and SMEs	<ul style="list-style-type: none"> - Center for training of rice-based products - Lab equipment - Graduation of undergraduate and graduate students - Staff capacity building - Publications - Abstract and/or extended abstract to international conference/symposium
4	Development of Cambodian Soy Sauce by Fermentation Method	Dr. TAN Reasmey Mr. LY Luka	Government of Cambodia (HEIP)	2019-2023	To produce Cambodian soy sauce by fermentation method with good quality and transfer the developed technology of soy sauce to the private sector	<ul style="list-style-type: none"> - Lab equipment - Graduation of undergraduate and graduate students - Staff capacity building - Publications - Abstract and/or extended abstract to international conference/symposiums
5	Development of Cooking Oil Processes for Commercialization	Mr. KONG Sela Ms. NAT Yukleav	Government of	2021-2023	To develop cooking oil processes in order to produce cooking oils with good quality, to transfer the technology to private sectors	<ul style="list-style-type: none"> - Graduation of undergraduate and graduate students

			Cambodia (HEIP)		for commercialization, to develop cooking oil research platform and to develop human resource in cooking oil processing	<ul style="list-style-type: none"> - One manual of cooking oil research will be done including hierarchy diagram - Staff capacity building - Oil processing Research platform at ITC - Collaboration with university partner - Publications - National and international conferences
6	Improvement and development of fish and meat products for better preservation using innovative technology	Dr. PENG Chanthol Dr. SROY Sengly Dr. MITH Hasika Ms. THANH Channmuny Mr. NGET Sovanmony	Government of Cambodia (HEIP)	2021-2023	To improve the quality, and add-value to the existing fish and meat products which are available on Cambodian market by applying different preservation technique	<ul style="list-style-type: none"> - At least one international peer reviewed paper is expected by the end of the project - Two peer reviewed papers published at local journal are expected - 10 local SMEs and local producer will be informed the research finding - Fish and meat processing lab will be established - Graduated students - Human resources capacity building
7	Valorization of agricultural by-products in Cambodia through extractions and formulations of essential oils and bioactive compounds	Dr. HOUNG Peany Mr. LAY Sovannmony	Government of Cambodia (HEIP)	2021-2023	To identify and screen essential oils/bioactive compounds in extracts obtained from varieties of Cambodia agricultural food products and wastes; then evaluate its applicability to be used as aromatherapy, food preservatives and active ingredients and to promote institutional Chemical Engineering Field, through university-SME technology transfers and strengthen university-university research collaborations	<ul style="list-style-type: none"> - Database of essential oils/bioactive compounds in agricultural by-products - Lab equipment - Graduation of undergraduate and graduate students - Staff capacity building - Publications - Abstract and/or extended abstract to international conference/symposiums
8	HEALTHYRICE	Dr. SUONG Malyna Ms. SIENG Sreyvich	IRD	2019-2022	To identify diversified agricultural rice systems allowing an increase in soil and plant health, and a decrease in pesticide use and their occurrence as residues in consumption products	<ul style="list-style-type: none"> - Lab equipment and Lab set up - Graduation of undergraduate and graduate students - Staff capacity building - Publications - Abstract and/or extended abstract to international conference/symposiums
9	FOODI (MSc course in Food Processing and Innovation)	Dr. TY Boreborey Dr. TAN Reasmey Dr. MITH Hasika	Erasmus+ KA2	2019-2021	To educate aspiring food entrepreneurs, healthcare professionals, government officials, and food industry professionals in the end-to-end value chain of food	<ul style="list-style-type: none"> - E-learning courses for master degree are developed - Mobility of staff - Strengthening network/collaboration

					processing: from understanding the elements of food, to starting a new venture for disrupting and enriching the food processing industry in Asia	
10	Training a new generation of entrepreneurs in sustainable agriculture and food engineering (FoodSTEM)	Dr. IN Sokneang Dr. HOR Sivmey	Erasmus+	2019-2022	To build the partnership between Cambodian and European universities, and to create a favourable condition in the 4 partners universities for the emergence of student entrepreneurship and micro or small enterprises	<ul style="list-style-type: none"> - Setting up of food safety lab - E-learning classroom is set up - E-learning courses are developed - Innovation challenge program for students - Strengthening network/collaboration
11	Agroecology and Safe Food System Transitions (ASSET)	Dr. HOUNG Peany Dr. SOUNG Malyna	EU/AFD and GRET	2020-2025	To make food and agricultural systems in Southeast Asia more sustainable, safer and inclusive, through harnessing the potential of agroecology to transform them	<ul style="list-style-type: none"> - Training/staff capacity building - Staff mobility - Strengthening network/collaboration
12	Reducing Foodborne Pathogen Contamination of Vegetables in Cambodia: Innovative Research, Targeted Interventions, and Impactful, Cambodian-Led Engagement	Dr. PENG Chanthol Mrs. CHANTO Monychot Tepy Mr. HENG Oudam	USAID	2020-2024	To reduce the prevalence and incidence of foodborne pathogen contamination of vegetables produced and sold in Cambodia	<ul style="list-style-type: none"> - Strengthen collaboration with local and international research institute - Capacity building of researcher - Human resource development through involvement of Engineering and Master students in the project
13	Development of Cambodian Fermented Cucumbers by using Freeze-Dried Lactic Acid Bacteria with their Potential Use as Aromatic and Bacteriocin-producing Starters	Dr. TAN Reasmey Ms. MOA Socheata	LBE/JIC A	2021-2023	To develop fermented cucumbers by using freeze-dried LAB that are useful for taste and preservation	<ul style="list-style-type: none"> - Graduation of undergraduate and graduate students - Publications - Abstract and extended abstract to international conference/symposium
14	ASEAN Network for Green Entrepreneurship and Leadership/ ANGEL	Dr. YOEUN Sereyvath Mr. KONG Sela	Eramus +	2021-2024	Green entrepreneurship and leadership	<ul style="list-style-type: none"> - IT equipment - Training/staff capacity building - Staff mobility - Strengthening network/collaboration
15	Removal of diclofenac and caffeine from different water sources using activated carbons made from different wastes	Dr. TAN Reasmey Ms. PHAL Sivchheng	EU/AFD	2022-2023	To remove the diclofenac and caffeine as micropollutants from different water sources using activated carbons made from different wastes	<ul style="list-style-type: none"> - Graduation of undergraduate and graduate students - Publications - Abstract and extended abstract to international conference/symposium - Lab equipment

						<ul style="list-style-type: none"> - Kinds of activated carbons are made by using locally available Nam Wa banana peels, coffee waste and pineapple peels - One activated carbon selected can be used to remove micropollutants present in real waters and wastewater
16	Assessment on nutritional profiles, storage stability and sensory evaluation of dried fish powder made by low-value small fish species	Dr. SROY Sengly Dr. IN Sokneang Dr. MORM Elen Dr. MITH Hasika	LBE- JICA	2022- 2023	To assess the nutritional profile of low-value small fish species and develop low-cost nutrient fish powder by following the sensory and nutritional profile along storage	<ul style="list-style-type: none"> - Graduation of undergraduate students - An article to submit in regional or international journal/ a communication in one conference - Improve fish powder shelf-life for Vissot Enterprise
17	Impact of initial composition and processing techniques on aromatic quality of mango	Ms. CHIN Lyda Dr. MITH Hasika Dr. HOR Sivmey	BGF & MoEYS	2021- 2024	To identify the biochemical composition (volatile compounds and aroma precursors) of three contrasted cultivars at three ripening stages before and after each processing (drying, puree, and vacuum frying)	<ul style="list-style-type: none"> - Staff capacity upgrade - Journal publications
18	Development of alternative salt process to manufacture refined table salt from coarse salt	Ms. SIENG Sreyvich Mr. KON Sela Dr. IN Sokneang Dr. PHAT Chanvorleak Dr. KHOEURN Kimleang Dr. HOUNG Peany	AFD	2022- 2023	To develop an alternative coarse salt refining process with affordable cost of production and acceptable quality on physical and chemical criteria in term of maintaining the original characteristics of salt for GI application	<ul style="list-style-type: none"> - Graduation of undergraduate students - Staff capacity building - Provide actual practical works on salt processing and technology design for salt processing plants in Kampot and Kep province

Annex 17. Research Topics in 2021-2022 of MIT Unit.

No.	Project/Research Topic	Name of Researcher	Fund	Period (2017-2023)	Objectives	Outputs
1	Toward Production Innovation via Fablab-ITC	Pec Rothna (Dr.)	RGC	2019-2023	(1) Install Measurement lab, workshop lab, PCB fabrication and assembly lab. (2) Develop management, control, and data collection system for smart agriculture	- One (1) Fablab at ITC and prototype controller and data collection system for mushroom house. - One (1) journal paper
2	Non-intrusive appliance load monitoring and diagnostics in residential homes	Thourn Kosorl (Dr.)	JICA research grant for LBE	2020-2022	(1) Develop inexpensive device (hardware) to measure current, voltage, power and EMI signal. (2) Create machine learning algorithm for energy disaggregation	- A prototype of inexpensive smart energy meter that provides information of energy consumption for each individual appliances - One Journal paper and two international conference papers
3	Initiative towards electrical and electronic products testing and certification by EMC Laboratory	Thourn Kosorl (Dr.)	HEIP, MoEYS	2019-2023	1) To set up an anechoic chamber at ITC. This chamber will be used for conducting research and development (R&D) on related EMC issues. 2) To analyze and design electromagnetic wave absorber using time domain techniques. 3) To study a new topology of reverberation chamber by using meta-material to improve spectral richness, reduce size and control direction of arrival.	Output 1.1: EMC laboratory is built (one conference paper and one seminar) Output 2.1: a design method using time domain technique for electromagnetic wave absorber is archived (one conference paper and one seminar) Output 2.2: a composite material is developed for application of electromagnetic wave absorber (one conference paper) Output 3.1: the meta-material is designed for application in reverberation chamber (one conference paper, and one seminar) Output 3.2: a new topology of reverberation chamber for EMC measurement application is

						designed (one conference paper, one journal, and one workshop)
4	"Flight Controller and Structural Design for Small Unmanned Aerial Vehicle.	Keo Chivorn (Mr.)	AOARD	2021-2023	-Objective 1: Design of aircraft body and autopilot simulation. -Objective 2: Design and implement autonomous flight controller and equip surveillance sensors.	-Output 1.4: State Estimation for fixed-wing UAV (accepted bachelor thesis). -Output 2.1: Operational autonomous self-made VTOL fixed-wing UAV (Accepted local journal paper/ conference paper).
5	Development of Nanosatellite	SRANG Sarot (Dr.)	MoEYS	2021-2024	1. To conduct background research and formulate mission objective 2. To create concept design of the satellite and create a report 3. To submit the CubeSat mission application form to KiboCube program	Three B. Eng thesis is expected. One international conference is expected
6	Indoor mobile robot localization using multisensor data fusion	YONRITH Phayuth Boreth (Mr.)	Takahashi Foundation	2020-2021	1. Implement and evaluate robot's localization and planned trajectory 2. Focus on multiple sensor scenarios 3. Established methods relying on sensor fusion	- A new prototype of indoor navigation system for autonomous robot approach - One local journal paper/conference paper
7	Investigation of configuration issues related to SDN/NFV deployments	KUY Movsun (Mr.)	ARES-CCD	2020-2024	1. Design NFV testbed with cluster of Raspberry Pi. 2. Benchmarking the testbed. 3. Investigate the various deployment issues.	1. Demo of using RPi for NFV deployment 2. Publication
8	Building trustable and privacy aware IoT systems using blockchain and smart contracts	SOK Kimheng (Mr.)	ARES-CCD	2017-2021	The objective of our research work is focusing on security, privacy and interoperability of the IoT network, which could take into account the architecture model, authentication, authorization, access control, policy and data protection.	Decentralized access control system using blockchain and smart contract
9	Building Blood bank eco-system using blockchain technology	TITH Dara (Dr.)	-	2020-2022	Apply blockchain technology for decentralized system to store those data and proposed using existing secure technique.	Blockchain for exchange the blood bags data

10	Smart card with blockchain system for decentralization of the patient identification	TITH Dara (Dr.)	JICA/LBE	2021-2022	1. Store patient's id in the smart card 2. Secure storing those id in the blockchain for validation	Apply smart card ISO/IEC 7816 part 4 to store patient's id
11	Ancient Manuscript Digitization and Indexation	VALY Dona (Dr.)	HEIP	2020-2023	- Standardized manuscript digitization and dataset construction - Improvement of existing content analysis approaches - Design of an interactive search engine - Knowledge transfer to potential institutions and users	A centralized system to store digitized palm leaf manuscripts with text search capability and publicly accessible
12	Applied Control and Automation for Agriculture in Cambodia.	Kim Bunthern (Dr.)	HEIP, MoEYS	2019-2023	Simulation study of electric drive using BLDC/PMSM motor. Study of new technique of sensorless vector control for BLDC/PMSM motor.	Simulated model and build as a prototype
13	Impact of Time-To-Live in Resource Record of Top-Level-Domain in Domain Name System	PICH Reatrey (Mr.)	ARES-CCD	2021-2025	Defining Dynamic TTL updating methods	Dynamic TTL updating methods
14	Development of Small Solid Fuel Rocket for Experiment	TIM Hoksong (Mr.)	MoE	2021-2022	Make a 300N solid fuel rocket	A rocket prototype that can be launched for avionic data recording

Annex 18. Research Topics in 2021-2022 of MSS Unit.

N o.	Project/Research Topic	Name of Researchers	Fund	Period	Objectives	Outputs
1	Cambodian natural rubber/different minerals composites for floor mat shock absorbing application	Dr. YOS Phanny Dr. SEANG Sirisokha	HEIP	2020-2023	To optimize mechanical and physical properties of Cambodian natural rubber composites by varying common clay mineral and limestone fillers content for shock absorbing applications such as floor tile.	- Rubber will be convert into value-added products
2	Physical Properties and Mineralogy of Ancient Brick from Temples at Sambor Prei Kuk area, Kampong Thom, Cambodia	Dr. Yos Phanny Mr. Heng Muoyyi Dr. Eng Chandoeun	LBE	2022-2023	- To characterize physical properties (texture, color, size) of brick from each temple - To identify chemical properties (XRD, XRF, MP-AES) of brick from each temple	Physical Properties and Mineralogy of Ancient Brick
3	Polyethylene (PE) Waste Recycling for Asphalt Concrete Pavement Application	Dr. Yos Phanny Dr. Pouv Keangse Dr. Kry Nallis	MoE	2020-2022	In this research, one type of plastic wastes called Polyethylene (PE) will be added into asphalt concrete with varying PE percentage for such applications. Furthermore, its physical and mechanical properties will be characterized.	Recycled-PE will be added into asphalt concrete for road construction
4	Initiative on the development of wind load for design of building structures in Cambodia	Dr. DOUNG Piseth	HEIP	2021-2023	To evaluate the wind load and establish its calculation procedure associated with low-rise and regular structures in Cambodia, which can serve for the structural analysis and design and to create collaborations with professionals and private company (SNP International) by providing training and workshop on how to apply the proposed calculation procedure in practice, and to promote research activities in civil engineering at Institute of Technology of Cambodia (ITC).	- Bachelor students graduated - Master student graduated - Conference and journal publications - Technical guidelines on wind load development in Cambodia
5	Steel ring damper for seismic application - collaboration with King Mongkut's University of Technology Thonburi	Dr. DOUNG Piseth	KMUTT	2020-2022	To develop a novel steel ring damper; To apply to a system called 'knee-brace frame' for seismic resistance	- Conference and journal publications - New seismic steel dampers are developed
6	Evaluation of Mechanical Behavior of Post-Installed Bundled	Dr. DOUNG Piseth	LBE	2022-2023	- To assess the bond strength and failure modes of the post-installed reinforcement for previous studies and application, and practical	

	Reinforcement Used for Concrete Connections				design codes such as ACI 318, Eurocode, and others. - To investigate the fundamental pull-out strength and failure modes of post-installed bundled reinforcement considering the mortar and epoxy as adhesive materials. - To evaluate the effects of embedded length and concrete cover on the mechanical behavior of the post-installed bundled reinforcement using a pull-out test - To establish the conformity to the existing design codes in order to use in practices	
7	Sustainable building design integrated life-cycle assessment (LCA), for best strategies to design the green residential building in Phnom Penh, Cambodia	Mr. Long Makara	ARES-Cambodia	2021-2025	- Analyze LCA towards the green residential building design by integrating with the sustainability aspect - Propose design strategies and guidelines to reduce the overall environmental footprint of buildings (built environment) by respecting SDB criteria, especially to ease decision making on choosing the right construction materials to employ in the project - Study on the green building life cycle and be aware of existing standards, methods, tools on LCA of buildings and construction products - Study and investigate the situation of residential building design in Phnom Penh	Residential buildings (affordable housing) in Phnom Penh could be labeled as green buildings and both designers and building occupants be aware of choosing the environmental friendlier construction materials and respecting SDB
8	Design and built a lightweight chassis of mini electric vehicle	Dr. SIV Easeng Dr. TO Dara	LBE/JICA	2021-2022	To study the EV structure and its power consumption through the design and built a prototyping of a lightweight vehicle.	NA
9	Composite 3D Printing based on Filament Developed from Natural Fiber	Dr. SRY Vannei Mr. MUT Mesa	LBE/JICA	2020-2022	To develop filament from natural fibers as reinforcement and Polylactic acid (PLA) as the matrix for composite 3D printing material	- Conference publication: November 2021 - Student thesis: End of July 2021 for Year 5, and early August 2022 for master student
10	Durability of concrete beam strengthened with	Dr. PROK Narith Dr. RATH Sovann Sathya	Fyfe Asia Pte Ltd	2020-2022	To study the durability of concrete beam strengthening with GFRP and GFRP laminate under different conditions and durations.	NA

	fibwrap® system and on fiber composite laminate					
11	Effectiveness and formulating of Tyfo FibrAchors with the Tyfo Fibrwrap Systems	Dr. PROK Narith Dr. RATH Sovann Sathya	Fyfe Asia Pte Ltd	2020-2022	To study the effectiveness and possibly formulating design formula for anchorage of Tyfo Fibranchor with the Tyfo Fibrwrap systems.	NA
12	Hydrothermal alteration, Mineralization, Fluid inclusion, Geochemistry, and Geochronology of Porphyry Cu-Mo-Au Prospect in Kampot and Ratanakiri, Cambodia	Dr. SEANG Sirisokha	LBE/JICA	2020-2022	-To identify the lithology and geochemistry of the host sequence and mineralized intrusion; - To delineate the spatial and temporal distribution of porphyry intrusion, hydrothermal alteration and Cu-(Au-Mo) mineralization; -To study in detail the origin of hydrothermal fluid responsible for alteration and mineralization; To determine the Zircon U–Pb	- To make geological map and alteration map in Koh Sla, Kampot - To confirm the deposit type in Canada Wall, Andoung Meas Ratanakiri - To identify the deposit type in Koh Sla, Kampot - Four undergraduate Thesis - Four proceeding paper - Two international journals and two conference publication
13	Development and optimization of ceramic tile using Cambodian clays incorporating with industrial wastes	Dr. BUN Kimngun Ms. BUN Polyka	HEIP	2019-2023	To develop high quality clay roof tile using local raw materials such as clay, alternative feldspar (waste rock) and silica sand and fired in different firing temperatures and to produce scientific manual for ceramic production technology and plus organizing dissemination workshop to share the research findings and technology to the private and public sectors.	- Raw samples for ceramic roof tile body formation are collected, - Mixture design formulation for optimizing formulation of ceramic roof tiles is being done, - Firing shrinkage, water absorption and bending strength of the ceramics are determined.
14	Chemical Strengthening of Large-scale glass Pieces for Construction and Other Engineering Applications	Dr. HIN Raveth Dr. SEANG Chansopheak	HEIP	2020-2024	To study on a glass strengthening process, which is chemical tempering, and its applications.	- Working on tempering optimization, preparing a publication - Submitting for bidding, - Designing 1 of them,

						- Waiting until next 2 years to be started. 1 master and 1 phd students are registered at GS of ITC
15	Green BIM - Analysis of BIM approach for designing a bioclimatic building	Ms. Taing Kimnenh	ARES	2020-2024	How to achieve bioclimatic design in building specific in tropical region by using BIM as instrument which take into account traditional, cultural and social aspect and to analyze how we can use BIM to facilitate and improve at the early stage for this design process	- New project
16	Managing the collaboration between architect, structure, and MEP in service of construction 4.0: ITC's workshop case	Ms. Keth Kannary	ARES	2020-2024	L'objectif principal de cette recherche est de proposer une méthodologie de projet pour l'enseignement de la conception intégrée en ingénierie architecturale : <ul style="list-style-type: none"> • qui soit alignée au contexte actuel de la construction au Cambodge, • qui prenne en compte les évolutions technologiques dans le domaine du CSCW et de la construction 4.0 • qui met la collaboration au centre de la question relative au management de projet 	- New project
17	Air Pollution Monitoring in Phnom Penh	Ms. Aun Srean	In kind	2019-2023	- Requirement from KU is to monitor air pollution in ITC campus (On the Top of Building H) for 10 years or more (3 days/month). - Send samples to KU and they send the filter back - Student internship	Air Pollution Monitoring in Phnom Penh

Annex 19. Research Topics in 2021-2022 of WAE Unit.

No.	Project/Research Topic	Name of Researchers	Source of Funding	Period (2016-2023)	Objectives	Outputs
1	SATREPS: Establishment of Risk Management Platform for Air Pollution in Cambodia	Dr. OR Chanmoly Dr. PENG Chanthol Dr. KHOEURN Kimleang	JST/JICA	2022-2027	To contribute to the creation and establishment of a safe and comfortable living environment from the viewpoint of air pollution, essential for the sustainable development of tourism, which leads to economic benefits to the Cambodian people and to creation of a far better and comfortable environment for residents and tourists from all over the world.	- New Project
2	SATREP: Establishment of Environmental platform of Tonle Sap Lake	Dr. TY Boreborey, Dr. PHAT Chanvorleak Dr. YOEUN Sereyvath Dr. MITH Hasika Dr. ANN Vannak Dr. TAN Reasmeay Dr. PENG Chanthol Dr. IN Sokneang Ms. HENG Soukim Ms. CHANTO Monychot Tepy Dr. KHOEURN Kimleang Mr. KIM Leangthong Mr. LUN Sambo Dr. CHHIN Rattana Dr. HEU Rina Dr. Sith Ratino	JST/JICA	2016-2022	To establish a framework to realize long-term environmental conservation of Tonle Sap Lake (TSL)	<ul style="list-style-type: none"> - Submitted a manuscript to Sustainability: "Sediment characteristics and water quality of Tonle Sap Lake, Cambodia" Chompey Den *, Boreborey Ty , Sokly Siev , Eden Gan Mariquit , Winarto Kurniawan , Hirofumi Hinode - Accepted to The 11th International Conference on Environmental and Rural Development: "Investigating hydraulic load with organic load for evaluation DEWATS and redesign DEWATS by using Drainblock as filter materials" 3. Submitted to SIL2020-Korea (international conference): Bacterial community structure and its relation to water quality in a large tropical flood pulse ecosystem - Tonle Sap Lake. Anna*, V., P. Ung, B. Ty, K. Miyanagad, M. Fujii, C. Yoshimura, Y. Tanji - Submitted to SIL2020-Korea (international conference): Assessment of Well Water Quality in the Floodplain Area around the Tonle Sap Lake Khy Eam EANG* , Kong Chhuon , Ratino SITH , Ratha DOUNG , Bunhuot RUOS, Ratana KHEANG , Sengheing, HUL, Boreborey TY , Sokly SIEV, and Chihiro YOSHIMURA

						<ul style="list-style-type: none"> - Policy recommendation book : Environmental Changes in Tonle Sap Lake and its Floodplain: Status and Policy Recommendations. - International symposium: (Wai M., Heu R.*, Chem V., Sen S., Thai K., EANG K., SIEV S. Assessment of Particle Size Fraction Distribution of Surface Sediment of Tonle Sap Lake, Cambodia: A Case Study in Chhnok Tru) and (Chem V., Heu R.*, Wai M., Sen S., Thai K., EANG K., SIEV S. Assessment of Particle Size Fraction Distribution of Surface Sediment of Tonle Sap Lake, Cambodia: A Case in Chhnok Tru)
3	Addressing Water Scarcity in a Rural Community of Cambodia through Groundwater Use	Dr. Chan Rathborey (Co-PI) and Dr Bun Saret (PI), Mr Hong Penghour	LBE/JICA	2020-2022	To observe the groundwater quality from Rural communities and define treatment process in purpose of drinking water use	<ul style="list-style-type: none"> - Field investigation at Prey Veng Province. - Completed 362 sheets of questionnaire survey and sampled 28 samples of ground water. - Joined the 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (3 Oral presentation and 2 posters) - Research students are working on varies treatment processes.
4	Collaborative Research Platform to Manage Risk and Enhance Resilience of Coral Reef in Southeast Asia	Dr. CHHIN Rattana	APN	2019-2021	<ul style="list-style-type: none"> - Understand the present and future scenario of the coral reef abundance and diversity - Assist in capacity development and policy formulation with evidence-based scientific outputs in managing coral reef and marine ecosystem services. 	<ul style="list-style-type: none"> - Process and analyze the sea surface temperature (SST) data - Process and analyze the bathymetry data over Gulf of Thailand
5	Water Evolution and Vulnerability Under Global Changes in Coastal Catchments of Cambodia	Dr. DOUNG Ratha Dr. PEN Sytharith	IRD	2019-2022	<p>To assess surface water resource and groundwater resource in the coastal area;</p> <p>Groundwater salinity monitoring and mapping</p>	<ul style="list-style-type: none"> - Field investigation and analysis - Installation of water level monitoring - Salinity contour map of the region
6	Understanding and Managing the Cambodian	Dr. CHHUON Kong, Dr. ENG Khyeam,		2019-2022	To understand and manage the floodplains in Kandal province	<ul style="list-style-type: none"> - Mapping flooding extension

	Floodplains, The Preks of Kandal Province	Mr. LUN Sambo				
7	Spatio-temporal assessment of surface and groundwater quality affected by urban wastewater: case study in Tamouk Lake Area	Dr. Chan Rathborey, Mr. Sok Ty, Mr Rathboren Chan	EU/AFD	2020-2021	To assess the spatial and temporal variability of water quality in term of physicochemical characteristics in Tamouk Lake.	<ul style="list-style-type: none"> - One conference paper and oral presentation in the 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 - 7 times of data collections (11 samples from Tamouk Lake and 4 samples from urban and aquaculture farms) - Progress on the first manuscript - Engaging student in the project (Real application and knowledge transfer) - Propose 2nd sub-topic on fate and transport of nutrients
8	Assessment of Silicon (Si) in water and bottom sediment in Tonle Sap Lake: an implication for highly productive ecosystem.	Dr. Heu Rina		2020-2021	<p>The proposed study aims to investigate role of Si in TSL by field observation and laboratory analysis. The following specific objectives are set:</p> <ul style="list-style-type: none"> - To measure basic water quality and chlorophyll-a (biomass indicator of phytoplankton) - To characterize Si and other available nutrients (N and P) in water and bottom sediment of TSL - To explore and discuss the statistical relationship between those nutrients with water quality parameters and Chlorophyll-a 	<ul style="list-style-type: none"> - Submitted and gave presentation in AUN/SEED-Net conference: - Wai M., Heu R.*, Chem V., Sen S., Thai K., EANG K., SIEV S. Assessment of Particle Size Fraction Distribution of Surface Sediment of Tonle Sap Lake, Cambodia: A Case Study in Chhnok Tru. - Chem V., Heu R.*, Wai M., Sen S., Thai K., EANG K., SIEV S. Assessment of Particle Size Fraction Distribution of Surface Sediment of Tonle Sap Lake, Cambodia: A Case in Chhnok Tru. - Meas M., Heu R.*, Eang K, and Siev S. Occurrence, Transportation, Regulation and Treatment Methods of Contaminant in Surface Water: A Review on Case of Well Water around Tonle Sap Lake. - Ma L., Heu R.*, Meas M., Eang K, and Siev S. Occurrence, Transportation, Regulation and Treatment Methods of Heavy Metals in Groundwater: A Review on Case of Well Water around Tonle Sap Lake20. - Field survey - Data of water quality analysis
9	Assessment of Flood Risk on Urban Areas due to Flow Alteration of Lower	Dr. Sith Ratino Mr. KIM Lengthong		2020-2021	The main purpose of this research proposal is to identify the flood dynamics in Cambodian lower Mekong and	<ul style="list-style-type: none"> - Modeling setup with iRIC model - Fail to simulate the model

	Mekong and Rapid Urban Development				its impacts on urban areas under extreme historical flow of Mekong river in combination with recent land reclamations.	
10	Formulizing the design criteria for the piped-water system in Cambodia	Mr. Lun Sambo		2020-2021	<ul style="list-style-type: none"> - Accessing consumption pattern of piped-water network - Determining the electricity consumption in water supply system - Determining the connection rate 	<ul style="list-style-type: none"> - Field survey report (Takeo and Kandal) - Review method and mapping - Waiting reply from supplier on monitoring equipment
11	Arsenic removal from groundwater using ECAR treatment technology	Dr. TY Boreborey Ms.SIENG Sreyvich		2020-2021	To optimize the best condition for Arsenic removal from groundwater using ECAR technology.	<ul style="list-style-type: none"> - 2 masters and bachelor student graduated - Submission an extended abstract for regional conference of AUN/SEED-Net. - Submission a paper to ITC journal.
12	Impact of climate and land use change on hydrology pattern in the Coastal Zone of Cambodia	Dr. DOUNG Ratha		2018-2021	Assess the hydrological characteristic of the coastal region under the landuse and climate change scenario	<ul style="list-style-type: none"> - Established water table, pH, ORP, and EC map - Figure out the potential zoon of groundwater water. - Product 3 catchent map. - Weather data are input into model for trail running. - Update landuse data from google earth digitilization for 2020 and figure out the location of changes and validate by site observation at the site.
13	Antibiotic-resistant bacteria in wastewater and their impact on receiving freshwater system	Dr. PENG Chanthol Ms.Chanto Monychot Tepy		2020-2021	To quantify the antibiotic-resistant bacteria in wastewater and the receiving freshwater systems	One proceeding in The 13th AUN/SEED-Net Regional Conference on Chemical Engineering 2020 (RCCHE-2020) Jointly held with The 5th International Symposium on Conservation and Management of Tropical Lakes

14	Application of Alternative adsorbents Wastewater Treatment Bio-in	Dr. Khoeurn Kimleang		2020-2021	<ul style="list-style-type: none"> - To evaluate the characteristics of bio-adsorbents, wastewater, and leachates - To study on the effectiveness of contact time, particle size and dose of bio-adsorbent on domestic wastewater treatment and leachates - To compare the effectiveness of three different bio-adsorbents domestic wastewater treatment and leachates - To study on the isothermal and kinetic model of adsorption process 	<ul style="list-style-type: none"> - One master student graduated under support of this project - Submitted a paper to Journal of Cambodian Chemical Society (CCS) - Prepare a paper to ITC journal
15	Enhancing green capability in HEI to foster sustainable development in Cambodia (GREENCAP)	Dr. TY Boreborey Dr. ENG Khyeam Dr. CHHUN Kong	Erasmus	2020-2022	<ol style="list-style-type: none"> 1. Enhancing green Capacity in higher education, 2. Increasing awareness of green business among students, 3. Improving student's employability for existing and future greens Jobs 	<ul style="list-style-type: none"> - Finished green survey among students - Published green job platform - Finished first green conference - Ongoing on green course training design and integrating green course with existing course in HEI - Ongoing on preparing for green career fair for 2021 <p>Ongoing on 2nd green conference preparation</p>
16	Air pollution in Phnom Penh/East Asia-Nanoparticle monitoring network (EA-Nanonet)	Ms.Thanh Channmuny	Kanazawa University	2011-2021	Through monitoring of ambient aerosol nanoparticles at more than 20 sites in 10 countries in East Asia, 1) Evaluation of status and characteristics of ambient nanoparticles in East Asian area, 2) Discussion on contribution of emission sources and possible trans-boundary transportation	Monthly sampling, monitoring source of air pollution in Phnom Penh area
17	Development of a bio-filter system model to control air pollution toward industrial application	Ms. Hang Leakhena	HEIP	2021-2023	<ul style="list-style-type: none"> - Characterization of air pollutant - Development of biofiltration system - Efficiency testing 	<ul style="list-style-type: none"> - Two conference proceeding - Two peer reviewed paper - Two undergraduate students involved and graduated from this project - One master student involved and graduated from this project

					- Technology transferring to industries/SMEs	<ul style="list-style-type: none"> - To host one dissemination seminar on air pollution control and technology transfer with participation of local industries and SMEs by the end of the project - To demonstrate testing of a biofiltration system at ITC to industries - Air pollution lab equipment will be installed at ITC
18	Improving Sustainable Water Supply and Sanitation in Cambodia: Case of Tonle Sap Lake's Floating Villages	Dr. Heu Rina		2021-2023	The objective of this research to provide a sustainable water supply and sanitation that are adapted to the socio-economic and environmental contexts of TSL by using pilot scale of advanced water treatment technologies.	<ul style="list-style-type: none"> - Revising proposal, budget and procurement plan. - Submitted and gave presentation in AUN/SEED-Net conference: Ma L., Heu R.*, Meas M., Eang K, and Siev S. Occurrence, Transportation, Regulation and Treatment Methods of Heavy Metals in Groundwater: A Review on Case of Well Water around Tonle Sap Lake.
19	Integrated approach of precise irrigation and sustainable soil management to improve crop water productivity in Cambodia through ITC soil laboratory development: the focus on rice farming	Dr. TY Boreborey Dr. Ket Pinnara Ms. Pheoun Chanarun		2021-2023	Develop advanced technology on irrigation system for rice farming	New project (co supervise a Ph.D student and 2 BS students)
20	Development of Eco-Friendly and Low-Cost Wastewater Treatment System as an On-Site Product	Dr. Chan Rathborey, Dr Bun Saret, Mr Sok Ty, Mr. Hong Penghour, Mr Heng Borin, Ms Seng Phaya,		2021-2023	To compare removal efficiencies of varies anaerobic reactors, optimize operation condition and observed removal efficient of pilot-scale anaerobic reactor	<ul style="list-style-type: none"> - Submitted revised proposal to HEIP coordinator - Learned about the processes for preparing procurement of HEIP project in joint meeting - Re-prepared budget plan and submitted specification of all lab equipment. - Signed contract - Assigned master and bachelor students to conduct experiment
21	Development of Climate Data Information System for Cambodia	Dr. CHHIN Rattana Dr. Chhuon Kong Mr. Song Layheang		2021-2023	<ul style="list-style-type: none"> - To construct gridded climate data from the historical point observation data over Cambodia. - To provide reliable climate data and downscaling climate data in Cambodia to users by using bias- 	<ul style="list-style-type: none"> - Prepare procurement document to purchase the equipment of the project. - Recruit research assistant and engineering students work in and support the project.

					<p>correction method and climate downscaling method, respectively.</p> <ul style="list-style-type: none"> - To share climate data and software developed in the sub-project with relevant governmental agencies and partner institutions by launching training workshops and supporting on utilizing the output herein for policy 	<ul style="list-style-type: none"> - Review necessary literature of the interpolation methods, bias-correction methods, climate downscaling methods. - Climate data collection for both observation and climate model data.
22	Strengthening Flood and Drought Risk Management and Early Warning System in Lower Mekong Basin of Cambodia	Dr. Oeung Chantha Mr. Sok Ty Mr. Song Layheang Mr. Chhin Ratana		2021-2023	<p>The main goal of the project is to improve flood risk management through integration of technical and institutional linkage into policy, and reducing vulnerability of local community livelihoods.</p>	<p>The study will be delivered as below: Flood risk assessment improved through integrating modelling and social approaches, and Capacity built on flood risk management and adaptation to climate change provided to local government and communities</p>
23	Termite bioturbation in Cambodia-From Characterization to Application (PhD project)	Ms. MUON Ratha	ITC, BGF, and IRD	2019-2022	<ul style="list-style-type: none"> -To identify the abundance of termite mounds -To analysis soil physico-chemical properties of termite mound soil -To study the impact of Termite mound soil on vegetable growth 	<ul style="list-style-type: none"> - 70% progress of Statistical analysis on physico-chemical of soil properties - Completed 4 soil profiles at Chrey Bak - 80% completed on Soil sampling and analysis - Completed field survey on the Termite Mound distribution and completed 80% survey on farmer perception termite mound soil for agricultural sector. - Co-authorship of submission a paper to Geoderma, "Is bioturbation by termites always significant? A functional group approach for the characterization of soil sheeting properties." Corresponding Author: Dr Pascal Jouquet Co-Authors: Ajay Harit; Vincent Hervé; Hemanth Moger; Tiago Carrijo; David A. Donoso; David Eldridge; Hélida Ferreira da Cunha; Chutinan Choosai; Jean-Louis Janeau; Jean-Luc Maeght; Thuy Doan Thu; Alexia Briandon; Myriam Dahbi Skali; John van Thuynes; Ali Mainga; Olga Patricia Pinzon Florian; Oumarou Malam Issa; Pascal Podwojewski; Jean-Louis Rajot; Thierry Henri-des-Tureaux; Lotfi Smaili; Mohamed Labiadh; Hanane Aroui Boukbida; Rashmi

					Shanbhag; Ratha Muon; Vannak Ann; Sougueh Cheik; Saliou Fall; Saran Traoré; Simon Dupont; Thomas Chouvenec; Aaron J. Mullins; Syaukani Syaukani; Rainer Zaiss; Tran Minh Tien; Jan Šobotník; Apolline Auclerc; Rongliang Qiu; Ye-Tao Tang; Hermine Huot; David Sillam-Dussès; Nicolas Bottinelli
24	Impact of Land Use Change and Climate Change on Surface Runoff and Suspended Sediment in the Mekong Basin (PhD project)	Mr. Song Layheang		2019-2022	<ul style="list-style-type: none"> - To assess surface runoff and soil loss on the microplot scale in the teak tree plantation, - To assess soil loss and trapping efficiency of surface runoff and sediment on the hillslope scale, and - To assess soil loss and sediment transport in the small headwater catchment. <ul style="list-style-type: none"> - 1st paper was published - An oral presentation in the international conference (EGU2020) - Writing result for 2nd paper - Performing multiple analyses
25	Dynamic Transport of the Sediment and Nutrient in the Mekong River Basin and the Role of the Tonle Sap: Assessment Coupling Data and Modelling Approaches (PhD project)	Mr. Sok Ty		2019-2022	<p>Present a quantification of annual, seasonal and monthly nitrate the sediment and nutrient transport exchange between Tonle Sap Lake and the mainstem Mekong River and sediment study of Mekong River basin</p> <ul style="list-style-type: none"> - Paper accepted: <i>Sok, T.; Oeurng, C.; Ich, I.; Sauvage, S.; Sánchez-Pérez, J.M. Assessment of Hydrology and Sediment Yield in the Mekong River Basin Using SWAT Model. Water 2020, 12, 3503.</i> - Two paper is under reviewed in Catena and Ecological Engineering - One presentation in international conference. - One paper is drafting for Science of Total Environment.
26	Aquaculture in Cambodia: Sustainability and Risk Prevention (Aquacam)	Dr. Peng Chanthol	French Embassy	2020-2022	<p>To contribute to Cambodia's public policies for the development of sustainable aquaculture, through adapted methodological tools shared between main stakeholders of the sector.</p> <ul style="list-style-type: none"> - Survey of aquaculture perception from different stakeholders was conducted
27	Development of Electrocoagulation Reactor Integrated Sedimentation for Turbidity and Color Removal from	Dr. Chan Rothborey, Dr. Bun Saret, Mr Hong Penghour, and Mr. Chan Ratboren	LBE/JICA	2021-2023	<p>To develop and evaluate the hybrid Electrocoagulation Reactor (ECR) combining both EC and sedimentation units in terms of design criteria and operation condition in both batch and continue mode for</p> <p>Proposal accepted</p>

	Industrial Wastewater				decolorization and turbidity removal	
28	Prototype of Low-cost and Smart In-vessel Composter for converting Spent Mushroom Substrates to Bio-Organic Fertilizer	Dr. Ty Boreborey Dr. KET Pinnara Mr. HEL Chanthan	LBE/JICA	2021-2022	-To calibrate and validate mathematic modelling of compost process of spent mushroom substrates (SMS) -To prototype an automatic composter for rapid fermentation of spent mushroom substrate from mushroom production And To implement the prototyped composter at mushroom farm to evaluate the quality of the SMC produced	Proposal accepted
29	Study of Acid Mine Drainage (Amd) In Cambodia And Its Countermeasures	Dr. Khoeurn Kimleang	LBE/JICA	2021-2022	To evaluate on the effectiveness of low-cost adsorbents on the acid mine drainage from three active mining provinces, Mondulkiri, Ratanakkiri, and Kratie.	Proposal accepted

Annex 20. List of publications in Techno-Science Research Journal in Volume 9 (2021).

No.	Title of papers published in volume 9 (2021)	Research Unit
1	Evaluation of Wastewater Treatment Efficiency Utilizing Coconut Fiber as Filter Media (Chenda Lai, Thary Vorn, Khy Eam Eang, Boreborey Ty)	WAE
2	Groundwater Arsenic Contamination and Social Needs of Economical Arsenic Removal Technology in Rural Areas of Cambodian Mekong Delta (Pisey Neang, Seingheng Hul, Ginro Endo, Keisuke Miyauchi)	WAE
3	Isolation and Characterization of Lactic Acid Bacteria from Soy-based Products (Samnes Chuon, Monychot Tepy Chanto, Reasmey Tan, Chanthol Peng)	FTN
4	Study on Nutrients and Heavy Metals in Bottom Sediment of Tonle Sap Lake (Darong Heng, Boreborey Ty, Seingheng Hul)	WAE
5	Urban Flood Modeling in Phnom Penh Using Flo-2D: Consideration of Climate Change Effect (Sokchhay Heng, Kimleng Kheav, Panha Hok, Kong Chhuon, Sarann Ly, Tsuyoshi Kinouchi)	WAE
6	Changes on Qualities of Gluten-free Chalky Rice Breadstick during Storage (Molika Yin, Wannasawat Ratphitagsanti, Nantawan Therdtai)	FTN
7	Development of Spicy Sweet Chili Sauce (Molika Yin, Soukim Heng, Saravdy Rem, Lyda Chin)	FTN
8	Design and Implementation of the Commercial Off-the-shelf Electrical Power System for the Satellite Training Kit – Demosat (Soun Dalin, Sakal Morokot, Sor Hokly, Srang Sarot)	MIT
9	A Study on Traffic Signalization to Improve Traffic Flow at Kdan Pir Intersection in Phnom Penh City (Ratha Chheng, Pharinet Pheng, Sovanndech Hun, Veng Kheang Phun, Panha Yang)	Other
10	Re-Engineering Kdan Pir Intersection to Improve Traffic Flow in Phnom Penh (Panha Yang, Veng Kheang Phun, Ratha Chheng)	Other
11	Application of SWMM to Explore Possible Climate Change Impact on Urban Stormwater Drainage (Ponlok Kol, Ratha Doung)	WAE
12	Hydrological Components and Catchment Scale Sediment Delivery in Prek Thnot River Basin, Cambodia (Chanlyda Khen, Ilan Ich, Ty Sok, Sophal Try, Chantha Oeurng)	WAE
13	Effects of Solvent and Time on Extraction of Bioactive Compounds from Cambodia Black Turmeric Using Ultrasound-Assisted Extraction (Sovannmony Lay, Peany Houng, Sokneang In)	FTN
14	Effects of Cambodian Clay on the Physical and Mechanical Properties of Natural Rubber Latex Foams (Laymey Sreng, Azura A. Rashid, Phanny Yos)	MSS

15	Preliminary Investigation on Organic Petrology of Shale in Phnom Mrech, Angkor Chum District, Siem Reap Province, Onshore Cambodia (Chandoeun Eng, Meta Chorn, Sopheap Pech, Muoy Yi Heng, Pidao Choon, Ratha Heng, Chita Buth)	MSS
16	Design and Prototyping of Solar Hybrid Switch Controller and Monitoring System (Sok An Siek, Sarot Srang, Hokly Sor, Dalin Soun)	MIT
17	Development of Orbital Simulator for Cambodian CubeSat Mission in LEO (Penghuy Srean, Morokot Sakal, Maximilien Berthet, Sarot Srang)	MIT
18	Helipad Detection for UAV based on YOLOv4 Transfer Learning Model (Vanyi Chao, Sarot Srang, Morokot Sakal, Chivorn Keo)	MIT
19	Mobile Robot Localization using Extended Kalman Filter with Kinematic Model (Phayuth Yonrith, Sarot Srang, Morokot Sakal, Boreth Sethy)	MIT
20	Simulation and Numerical Characterization of Gaseous Oxygen Injector for ABS/GOX Hybrid Rocket Motor (Hoksong Tim, Sarot Srang, Morokot Sakal)	MIT

Annex 21. List of Foreign Students at ITC.

No	Nom et prénom	Départ.	Date d'arrivée	Date de départ	Université d'origine	Pays	Thème (Quel est le sujet du stage?)	Financement
1	Antoine Paul Baptiste SAILLOUR	GIC	20 septembre 2021	1er mars 2022	Le Mans Université	France	Exchange Program Scheme	Le Mans Université
2	Eve DALLEINNE	ECAM	08 février 2022		ECAM LaSalle	France	Programme international	Personnel
3	Maeva GONIN	ECAM	03 février 2022		ECAM LaSalle	France	Programme international	Personnel
4	Adrien LASSERRE	ECAM	22 janvier 2022		ECAM LaSalle	France	Programme international	Personnel
5	Maxence ROUCHOU	ECAM	08 février 2022		ECAM LaSalle	France	Programme international	Personnel
6	Lucas DAVAL POMMIER	ECAM	04 février 2022		ECAM LaSalle	France	Programme international	Personnel
7	Alexandre CARTIER	ECAM	18 janvier 2022		ECAM LaSalle	France	Programme international	Personnel
8	Louise BOANA	GCI	14 février 2022	18 juillet 2022	INSA Rennes	France	Exchange I4	Personnel
9	Arthur PAUTREL	GIC	15 février 2022	14 juillet 2022	INSA Rennes	France	Exchange year 4	Personnel
10	Maïa LEGER	GEE	30 mai 2022	24 juin 2022	CESI La Rochelle	France	Recherche de system solar PV	LABORATORY PROJECT

