



# STEAM Platform Progress Report 2018-2019

Lerwen LIU  
Arslan Siddique  
Panitsara Nakseemok

# STEAM PLATFORM Annual Report (2018-2019)

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## Welcome Message



I am proudly presenting you the STEAM Platform Annual Report for 2018-2019. STEAM Platform has provided life changing experience for many young people at the King Mongkut's University of Technology Thonburi (KMUTT) who received personalized mentorship and training in the past year. The STEAM Platform executive team (including Chanika Puridetvorakul, Arslan Siddique and Panitsara Nakseemok) and interns have inspired thousands of youth globally wherever STEAM Platform has reached. STEAM Platform's amazing website, social media and roll ups for innovation showcase thanks to the creative and professional team of design interns from KMUTT including Waricha Henchobdee, Kunthara Poonjaruwat, Sara Bowman, Warunyou Niminaram, Teeramate Nuanplub, Sawaros Thongkaew, Suppakit Muksarn and many others who have contributed to the impressive look of STEAM Platform.

We are extremely grateful to Prof. Supapan Seraphin (Senior Advisor to the President of KMUTT) & Ms Eliza Stefaniw (Advisor of Innovation Ecosystem Development, KMUTT) for their strong support of STEAM Platform with her amazing mentorship with passion and compassion for youth empowerment. STEAM Platform won't be successful without the continuous support of the KMUTT executive management including Vice Presidents Dr Warinthorn Songkasiri, Dr Montira Nopharatana, Dr Tippawan Pinvanichkul, Dr Pornapit Darasawang. Last but not the least, we very much like to thank the RIPO staff including especially Dr Phong斯里 Waysarach (Acting Director of RIPO), Kanitha Sukprot, Kanitha Sonta, Monrudee Sukontasup, Boonlert Saeoung, Wongsiya Lertriruk and others for their very patient and responsive administration support.

We invite you to join us, and together we will transform the world towards a more sustainable future.

A handwritten signature in black ink, appearing to read 'Lerwen LIU'.

Lerwen LIU  
Founding Director, STEAM Platform

Advisor of King Mongkut's University of Technology Thonburi (KMUTT, 2017-present)

Email: [lerwen.liu@kmutt.ac.th](mailto:lerwen.liu@kmutt.ac.th)



“Congratulations on the completion of the first year of STEAM Platform. I know how much time you put into planning the flurry of activities and their execution, and I really appreciate the innovation and the attention to detail you brought to the program. We knew we had put the right person on the job!

At KMUTT, we are committed to training graduates who would become social change agents, particularly with the right mindsets for innovation, entrepreneurship, and sustainability. The STEAM Platform is the right initiative at the right time. For it not only motivated a select group of students and staff but also provided them personalized coaching in an experiential learning setting that empowered them to address their shortcomings and bring out their potential. The ability of STEAM Platform participants to showcase and present their results at the world stage speaks volumes about the effectiveness of STEAM.

Thank you so much for your and your staff's hard work! We look forward to seeing even more successes with the STEAM Team in the coming years and that you will be able to incubate and accelerate students and staff at scale.”

**Assoc. Prof. Bundit Fungtammasan, PhD**

Former Senior Vice President (Research and Innovation) of King Mongkut's University of Technology Thonburi (2015-2019)

Advisor to the President (Research and Innovation)



“STEAM platform provides a wonderful addition to KMUTT learning and sharing ecosystem at the right time and has filled in significant missing gaps in internationalization and linking of research groups. While improving KMUTT exposure internationally, students improve their confidence, networking, communication and presentation skills. Stressing the important of our contributions to SDG is an important element to help build KMUTT Social Change Agent, for sustainability and inclusivity are the key and where “Sufficiency Economy Philosophy” is the decision making tool for the success.

Our thanks to the powerful “STEAM team” for contributing to the KMUTT culture! With our belief in ever improving, we are looking forward for more. THANK YOU!“

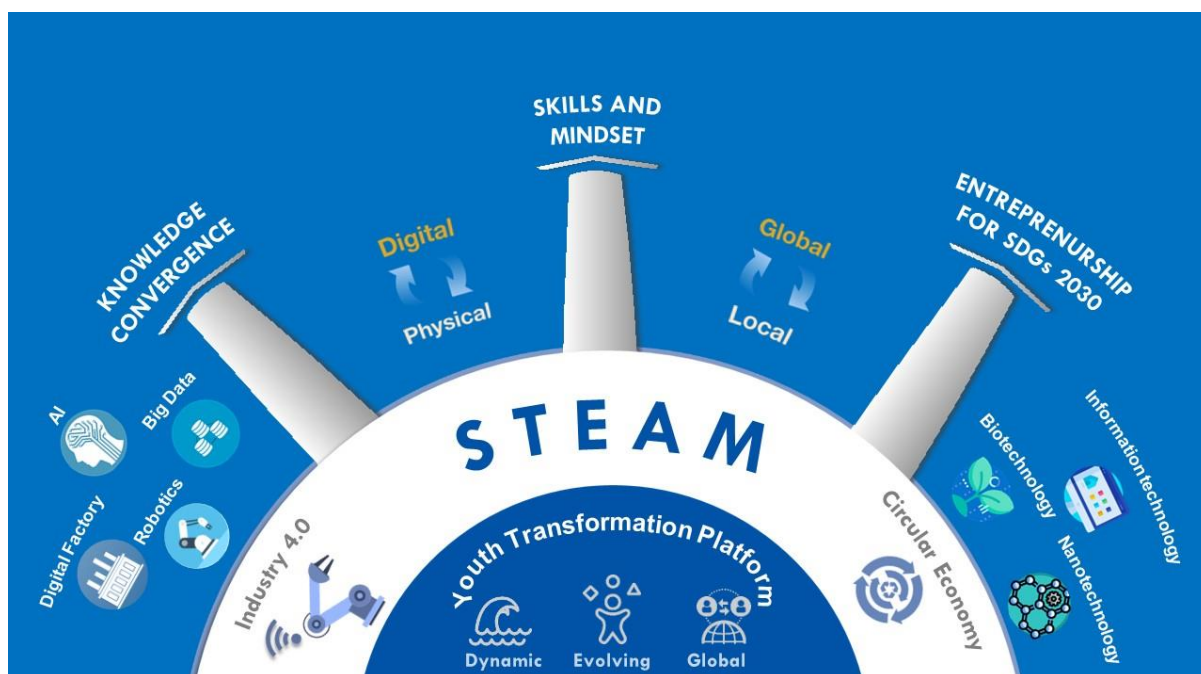
**Sakarindr Bhumiratana, PhD**

Former President of King Mongkut’s University of Technology Thonburi (KMUTT, 2011-2019)

Advisor to the University

# 1. Executive Summary

STEAM PLATFORM empowers youth in Asia to become global leaders equipped with convergence of STEM knowledge, life cycle thinking & strategic communication skills and entrepreneurship practices towards SDGs2030 and the Smart Circular economy transformation. It provides internship, training and 1-1 mentorship for youth in Asia by forming teams of STEM students/researchers with diverse technical background and design/communication expertise guided by technical experts and entrepreneurs. The output of STEAM Platform includes confident and excellent communicators of STEM knowledge and motivated/passionate technopreneurs who transform the perception of Asia as global leaders in 4<sup>th</sup> Industrial Revolution and Circular Economy Transformation. STEAM Platform builds partnership with stakeholders and global players in transforming the world for sustainable development. STEAM integrates AI, Biotech, Nanotech, ICT and Communication with sustainable biz model (ethics in responsible development) in solving problems and empower young entrepreneurs in driving the green economic transformation.



STEAM Platform's progress is being live-updated at its website [www.steamplatform.org](http://www.steamplatform.org), Facebook-STEAM Platform and YouTube Channel- STEAM KMUTT.

STEAM Platforms adopts unique approach in transforming youth of Thailand and promoting Thailand's global leadership in sustainable development through smart circular economy:

- a) Globalization couples with Localization
- b) Digital couples with Physical
- c) Peer-to-Peer couples with Senior-to-Youth
- d) Entrepreneurship driven by convergences of STEAM knowledge and business model designed according to the sustainable development principle, circular economy and SDGs2030
- e) Skills and mind-set developed experientially through STEAM Platform internships



STEAM Platform has built, within a year, strategic partnerships with global organizations around the world.



Overall, within a year, STEAM platform has influenced over 10,000 people worldwide digitally, and over 3000 physically through events organized and participated as well as training workshops. It provided personalized training for over 300 students and researchers. It connected with over 100 companies globally and showcased over 50 innovations from KMUTT at global forums.



STEAM Platform has positioned KMUTT as a representative of Thailand being a regional/global leader in the areas of Industry 4.0 and Circular Economy in research, innovation, education and entrepreneurship. And KMUTT youth have been transformed to become confident, motivated, more innovative & entrepreneur with a global mindset.

## 2. Context

KMUTT, although it is a top-ranking university in Thailand especially in the area of engineering and known as MIT of Thailand, I, as a foreigner who has worked with many universities worldwide, was not aware of KMUTT's excellence in research and innovation. And yet, every week of my time at KMUTT, since Aug. 2017, I have been discovering amazing innovation and talents as well as innovative practices in the framework of sustainable development.

Meanwhile, I also discovered the lack of confidence and skills of communication among youth in KMUTT who are the horse power of KMUTT research and innovation. This has motivated me to build the STEAM Platform enabling the KMUTT youth to communicate their research and innovation globally, build confidence in further advancement and be transformed. The STEAM platform also accelerates their innovation impact towards sustainable development and transforms young researchers (students and faculty members) to becoming international spokes persons of Thailand's research, innovation and sustainability practices. During the past one year of hard work within Thailand and globally, STEAM platform has positioned Thailand on the global stage as a leader of research & innovation in the area of industry 4.0 and circular economy as well as sustainable development in ASEAN through its partnership with the Asian Development Bank (ADB), United Nations, World Banks and GIZ. STEAM Platform has trained over 300 students and faculties some of who have set up companies and STEAM Platform continues to accelerate their progress through assisting in strategic financing, partnerships and business development.

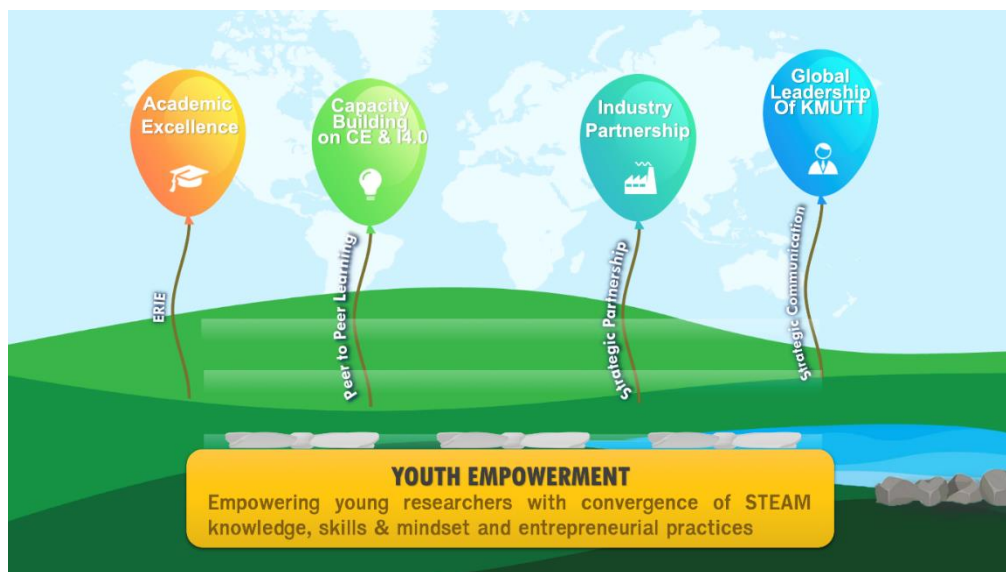
STEAM Platform has been recognized by the International Strategy Office of ONES (Office of the National Higher Education, Science, Research and Innovation Policy Council) to become a national platform for promoting Thailand research and innovation internationally.

## 3. About STEAM

The **STEAM Platform** is a program funded since June 2018 under Research, Innovation and Partnerships Office (RIPO) of King Mongkut's University of Technology Thonburi (KMUTT) to promote research, innovation, education and entrepreneurship (RIEE) of KMUTT globally focusing on youth leadership. The platform conducts:

- 1) Capability & capacity assessment on KMUTT's RIEE through site visits, interviews, value chain positioning, and market opportunity analysis in the areas of
  - a) **Industry 4.0 - Advanced Robotics, Digital Factory, Big Data Analytics, IoT, and Machine Learning**
  - b) **Circular Economy - Energy (solar PV, bio-energy and system solutions), Food/Agriculture and Materials**
- 2) Strategic Communication Training for young researchers to create visibility in RIEE, build confidence, acquire presentation skills and global perspective
- 3) Skills and Mindset Training on life cycle and critical thinking, media communication skills, and entrepreneurship & global mindset
- 4) Creating global platform for young researchers to showcase their RIEE in Austria, Hong Kong, Singapore, South Korea, and the Philippines as well as to strategic partners including the Asia Development Bank, World Bank, and the United Nations,

- 5) Piloting a general education module GEN352 to scale STEAM Platform program to undergraduate students
- 6) Creating global partnership for KMUTT's RIEE to impact and add value to industry and society



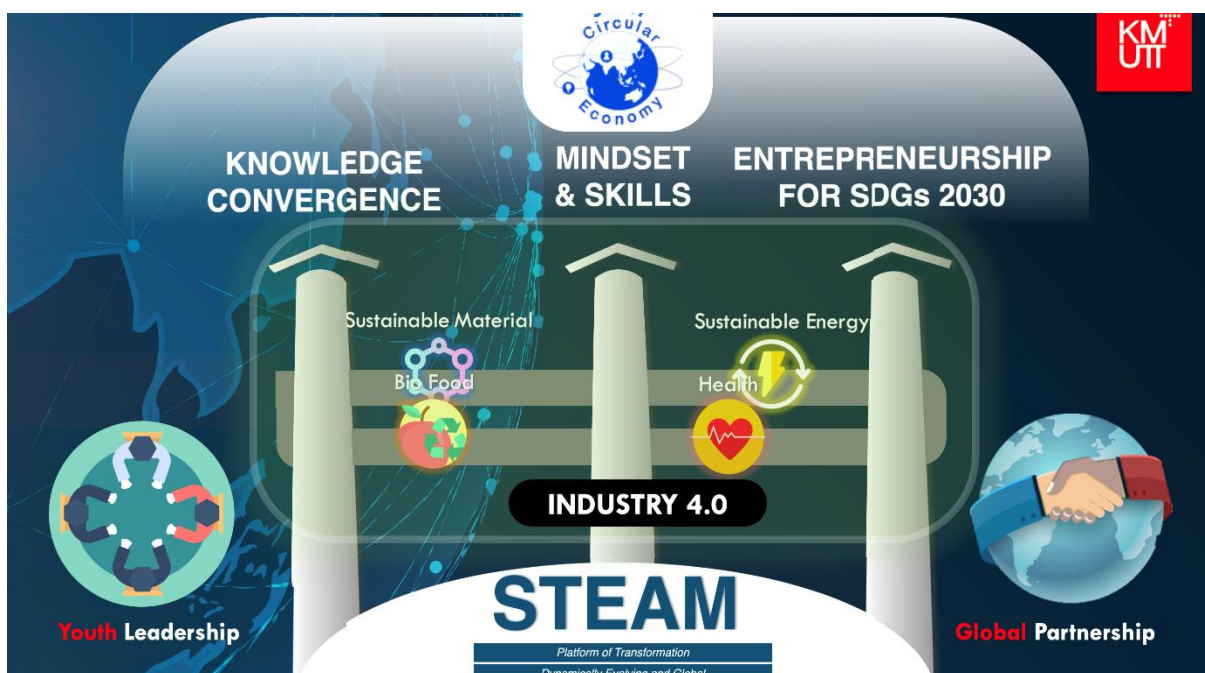
### The STEAM Platform

1. Enhances KMUTT's Academic Excellence in Education & Research and their impact in Thailand, the ASEAN region and the rest of the world. We have established strategic partnership with various divisions in the Asia Development Bank (ADB) Education, Rural Development & Food/Agriculture, Energy Division, Healthcare as well as ADB Investments and ADB Ventures. ADB invited KMUTT to be a knowledge partner, a MoU has been discussed and is expected to materialize at the end of 2019.
2. Supports KMUTT Technology Transfer office in communicating and promoting patented innovations in infographics matter and train undergraduate students to conduct those communication practices and value chain positioning as well as market opportunity assessment.
3. Builds Government/Academic Partnership
  - a. KMUTT Offices of Student Affair, International Affair, and PR as well as various faculties in promoting visibility of students' RIEE and improve quality and performance of KMUTT students
  - b. Office of the National Higher Education, Science, Research and Innovation Policy Council (ONES) in promoting Circular Economy policy, communication and entrepreneurship and promoting Thailand RIEE globally
4. Establishes Industry & Global Partnership
  - a. ADB- Education, Rural Development, Food/Agriculture, Energy, Healthcare and ADB Investments & ADB Ventures
  - b. GIZ –Energy, Food/Agriculture and Circular Economy
  - c. UNDP Co-lab & UNEP– Industry 4.0 & Circular Economy, youth entrepreneurship/leadership
  - d. Leave a Nest – youth entrepreneurship, food/agriculture, robotics/drone and bio/green materials
5. Transforms the global perception of Thailand as an innovative and entrepreneur nation.

## 4. STEAM Platform Practices

Founded in May 2018 at Research, Innovation and Partnerships Office (RIPO) of KMUTT, STEAM Platform was created to

1. Promote global visibility of KMUTT research and innovation
2. Accelerate the impact of KMUTT research and innovation in sustainability (social, economic and environment) for academic excellence
3. Create global mindset and strategic communication skills for young researchers in KMUTT
4. Enhance KMUTT young researchers' capability and capacity in research & innovation, and global sustainability impact
5. Build KMUTT national and international leadership in research, innovation and education towards sustainable development goals and the transformation of circular economy
6. Incorporate STEM/STEAM education in today's curriculum
7. Focus on verticals of Food/Agriculture, Energy, Materials and Healthcare.



The STEAM platform consists of following 3 pillars:

### 4.1 Knowledge Convergence

- a) Build synergy among KMUTT Researchers through strategic roundtable discussions initiated and organized by STEAM Platform and helps researchers to position their research in the technology value chain and business supply chain as well as identifying industrial applications
- b) Build KMUTT Research, Innovation and Education Strategy for KMUTT through Research & Innovation Capability and Capacity Assessment in the areas of Industry 4.0 and Circular Economy

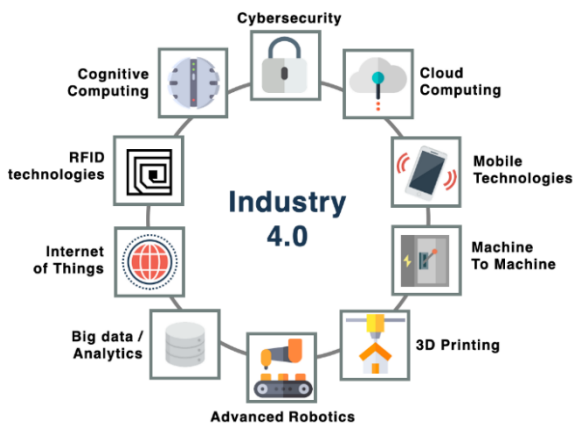
#### 4.1.1 Roundtable Discussions on Industry 4.0 & Circular Economy

Knowledge Convergence is a key pillar of STEAM Platform enabling more competitive research, innovation and education that will significantly improve KMUTT Global ranking and its impact to the world. The STEAM Platform practices Knowledge Convergence through

- i) Organizing roundtable discussions on strategic areas such as Industry 4.0 and Circular Economy which are seamlessly aligned with Thailand 4.0 and BCG Economic Strategy. The roundtable also brings first time different players on campus (different research groups, departments, centers, and faculties) together within KMUTT and assists synergizing intra-campus research, innovation and education efforts.

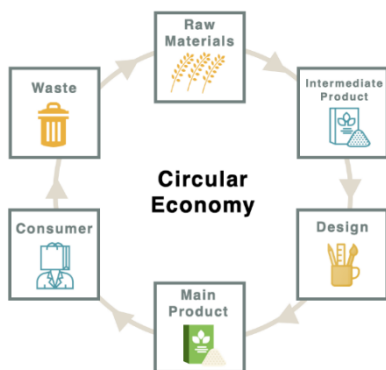
**Roundtable on Industry 4.0**

The objective of bringing faculty members of KMUTT together with different expertise for the collective impact was realized in this roundtable meeting on Industry 4.0. Faculty members from faculty of engineering, science, robotics, as well as President Sakarindr actively participated to explore the opportunities available for them to contribute towards I4.0 deploying their unique expertise. We invited an I4.0 expert, Ms. Parvathy Krishnan, from JADS in the Netherlands explained how I4.0 and data-science will transform the future industries and contribute towards SDGs 2030 fostering smart circular economy. This event not only gave faculty members an exposure to European leadership in I4.0 but also make them understand the synergy between their research & development capabilities to drive KMUTT towards a leading university developing next-generation technologies in I4.0.



**Roundtable on Circular Economy**

It was the first of its kind roundtable meeting on circular economy (CE) organized by STEAM that brought together faculty members from different faculties of KMUTT including Science, Engineering, Robotics, Bioresources, JGSEE etc. This roundtable was purposely organized to identify the key players of KMUTT in CE, and perform capability assessment across different faculties to bridge the gap in research & development, and offer strong expertise to global partners. Following-up on this roundtable meeting, STEAM team led by our technology analyst (Mr. Arslan Siddique) conducted holistic mapping & positioning of KMUTT’s R&D and innovations contributing towards CE as portrayed in the image below, which was further presented at 11<sup>th</sup> Nanotruster Conference in Vienna, Austria at ITA, Austrian Academy of Sciences during Oct. 30<sup>th</sup> to Nov. 1<sup>st</sup> 2018.





- i) Following up through site visits of laboratories and interviewing researchers, especially youth researchers and students
- ii) Conducting training for young researchers on strategic communication with value chain position, market opportunity assessment, industry partnerships and business model design through infographic representations (e.g. Antimicrobial Peptide)
- iii) Creating global platform for KMUTT young researchers to showcase their research and innovation to build confidence, obtain industry feedback and connect with global partners

## Strategies for R&D&I Capability Mapping

### 1. Identify Key Players

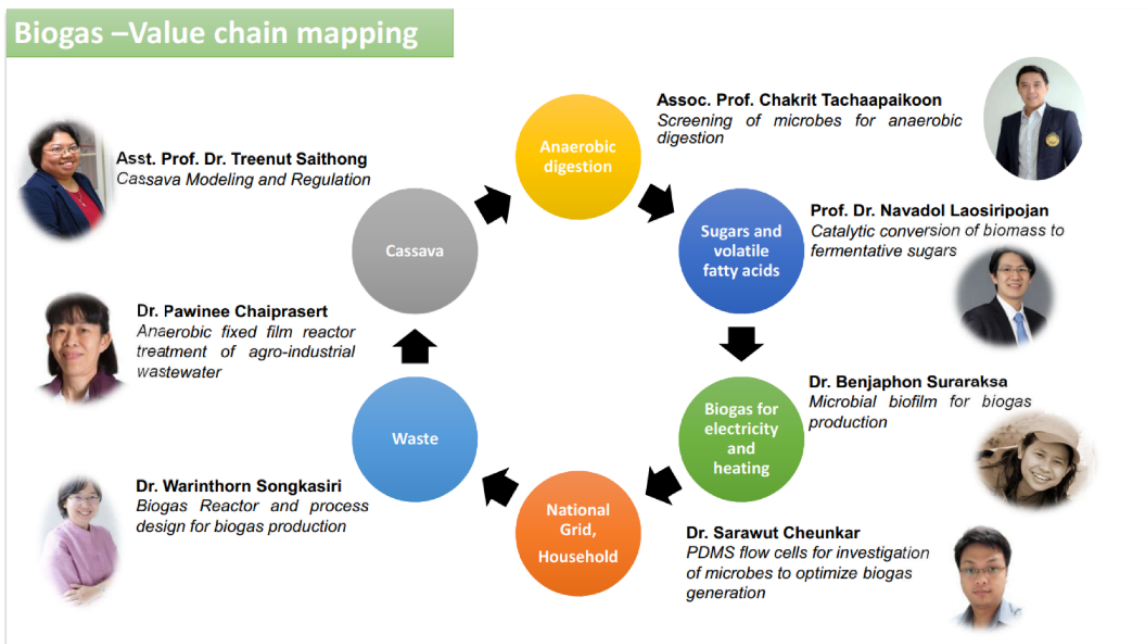
- ❑ Strategic Roundtable: Circular Economy, Industry 4.0
- ❑ Technical Insights via Site Visits

### 2. Technical & Market Analysis

- ❑ Value Chain Positioning
- ❑ Technology Comparative & Market Competitive Analysis

### 3. Industry & Global Partnerships

- ❑ Creating Strategic Communication Scenarios:  
e.g. Smart Sustainable Agriculture 4.0



## 4.1.2 Government Strategy Support in Circular Economy Policy

STEAM Platform co-organized a first of its kind workshop entitled “STI- STEAM workshop –Accelerating Circular Economy Transformation” Circular Economy (CE) with Science, Technology, Innovation (STI) and Policy Office. Three key areas were touched upon including Thailand Bio, Circular, Green (BCG) economy policy, trade policy & global value-chains, importance of media in accelerating CE, and STEAM educational platform driving CE. This event has led to the strategic partnership between STI and STEAM KMUTT to do capacity building of the future generation in future. This event was attended by policy makers from different Ministries such as the Ministry of Science and Technology, Ministry of Digital Economy and others who learned the first time about the efforts and status of Thailand in CE that leads to better coordinated policy for CE in Thailand.



## 4.1.3 Global Outreach

### KMUTT- Austrian Academy of Sciences Joint Workshop

STEAM-KMUTT co-organized 11<sup>th</sup> Nanotrust workshop entitled “Advanced materials and Circular Economy” with Institute of Technology Assessment (ITA), Austrian Academy of Sciences (OEAW) in Vienna Austria during Oct 31<sup>st</sup> to Nov. 1<sup>st</sup>, 2018. The delegates from KMUTT presented topics on various key research areas such as Food Technology, Biogas Technology, Life Cycle Analysis, Biorefinery, Supply Chain Management, and Eco-Design as well as STEAM Platform for accelerating the smart circular economy transformation. Furthermore, KMUTT’s R&D capabilities and innovations in Circular Economy were presented that were holistically mapped by the STEAM team, as aforementioned. This was the first of its kind global event where 30% youth delegates from KMUTT were given an opportunity to speak at the global platform. The impressive presentations of KMUTT delegates were complimented by the Austrian counterparts and they manifested high interest towards innovative research of KMUTT.



Notably, one of the young researchers of KMUTT Dr. Suvalak was followed-up on food Safety & security management with a counterpart at OEAW. This event resulted in an invitation of global partnership (worth 300,000 Euro) with a well-known Austrian based company Alchemia Nova in an application of Direct HUB (EU Horizon 2020, call titled CE-SFS-24-2019 Innovative and citizen-driven food system approaches in cities) with project proposal “DIstributed and REgenerative food supply systems in Cities applying nature-based Technologies and co-creating local innovation and transformation HUBS”. KMUTT delegates also attended the European Union (EU)’s European Industrial Technology Forum 2018 where we networked and learned EU policy.

### Supporting & Participating the “Responsible Business Forum on Food & Agriculture 2019”- Positioning KMUTT’s Youth Leadership in Smart Circular Economy

Responsible Business Forum (RBF) was held in Bangkok during March 26-27<sup>th</sup>, 2019 where STEAM team was the key knowledge partner, where our team together with KMUTT faculty members Prof. Shabbir Gheewala (LCA expert), Charoenchai Khompatraporn (supply chain management expert), Suvaluk Asavasanti (food engineering expert), participated in panel, workshop and group discussions and helped note-taking throughout the event. This event was attended by people from different walks of life including dignitaries from ASEAN countries. At the end of RBF, the organizers (global initiatives) followed-up with STEAM-KMUTT for strategic partnership on circular economy education, research and development. Moreover, we are invited to co-organize the upcoming event “Circularity 2030” – global movement of circular economy, in November 2019 with global initiatives Singapore, which stems from our active participation in RBF 2019.



### ADB STEM Inaugural Annual Symposium on K-12 Education

The ADB annual STEM annual workshop titled Regional STEM Symposium 2019 was held at Knowledge Exchange (KX), KMUTT, co-organized by STEAM-KMUTT with the HEAD Foundation and Education sector of ADB. This symposium was attended by 20 ADB staff members and a total of 40 dignitaries from nine Asian countries (India, Mongolia, Myanmar, Cambodia, Kyrgyz Republic, the Philippines, Singapore, Thailand, Uzbekistan, and Vietnam), who presented their STEM education practices in respective countries. STEAM Platform took this opportunity to showcase Thailand innovative STEM education practices particularly for K-12 and teachers training. We facilitated the ADB event delegates’ visits of two innovative schools (Draunsikhilai & Rungaroon) located in Bangkokhuentien campus and Bangmod respectively. ADB was so impressed by their visits and funded the Academic Director Mrs Suwanna Chivapruck to give an invited talk at the ADB 8<sup>th</sup> International Skills Forum held during Aug 27-29<sup>th</sup>, 2019. STEAM Platform offered to collaborate with ADB in compiling a book on



STEM education in Asia where Thailand innovative practices will be featured and shared. STEAM Platform organized half day workshop at our Bangmod campus where KMUTT innovative education programs and practices were showcased including STEM for Rural Development, Teachers Training, STEAM GEN352 module, BioEnergy, Supply Chain Management and Robotics for Agriculture and Food sectors.



#### ADB 8<sup>th</sup> International Skills Forum- Future of Skills and Jobs in the Age of Digital Disruptions

KMUTT was invited as a partner for the ADB's 8<sup>th</sup> International Skills Forum with the theme of Future Skills and Jobs in the Age of Digital Disruptions during Aug. 27-29<sup>th</sup>, 2019 at ADB HQ in Manila. STEAM Platform coordinated with the KMUTT President's office and faculty members from Institute of Field Robotics (FIBO), Faculty of Engineering and Social Labs in preparing content for showcasing KMUTT's Innovative Practices in education/training in

- a) Food Engineering Practice School
- b) Food Safety Certification Training for Food Processing Industry Operators
- c) Advanced Robotics and AI Education Platform (Work Integrated)
- d) Social Labs for Empowering Farmers in Food Production and Processing as well as Supply Chain Management
- e) AI Platform for Healthcare in Developing World
- f) STEAM Youth Leadership Platform for Industry 4.0 and Circular Economy

STEAM negotiated the full financial support of Dr Suvaluk Asavasanti as a resource person and an invited speaker at the event. STEAM facilitated the invitation of Roong Aron School Academic Director Mrs Suwana Chivapruk to be an invited speaker (fully funded by ADB and its partner Head Foundation) at the STEM Education for K-12 Session.

STEAM Platform provided this unique opportunity for KMUTT and its 7 faculty members to interact with global education players and well positioned KMUTT's unique Work Integrated Learning Approach in education especially in the area of Food Engineering and Industry 4.0 including Advanced Robotics, Digital Factory, and AI. The following summarizes the outcome of the event for KMUTT:

1. ADB used STEAM 3 Pillars to summarize the 8th International Skills Forum:

Convergence of STEM Knowledge, Life Cycle Thinking & Strategic Communication Skills and Entrepreneurship for SDGs2030.

2. Promoted KMUTT FIBO spin offs in the AI for healthcare including Perceptra to ADB Investments and ADB Ventures as well as other interested financing partners

3. ADB invited KMUTT to be a Knowledge Partners in Food/Argiculture, Energy and Education as well as Digital Health. STEAM is drafting an MoU in Sept. to follow up on details and collaborative projects

4. Close Discussion on Strategic Partnership with TrakLabs in Launching Digital AI Education Platform in partnership with Amazon Web Services (AWS)



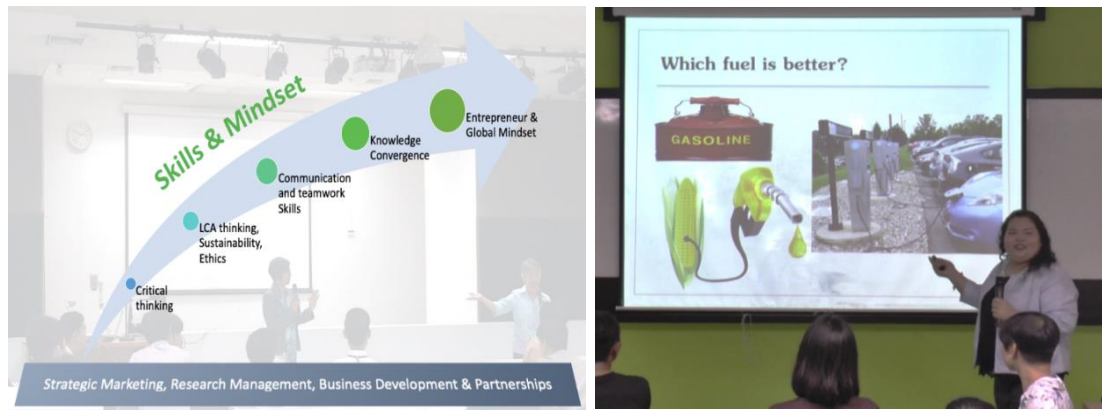
## 4.1.4 Capacity Building of KMUTT Students and Young Researchers

### Data Science Boot camp and Hackathon

This bootcamp was organized during January 10-13<sup>th</sup>, 2019 with the aim to equip the young undergrad/grad students of KMUTT with the emerging discipline, data science, which is another example of Knowledge Convergence. It was attended by over 80 participants where basics of python coding, data visualization software like Tableau were taught by the invited young trainers from a renowned data science institute, Jheronimus Academy of Data Science (JADS) from the Netherlands. Moreover, this event was divided into two days bootcamp and two days hackathon. Three qualifying teams were selected from bootcamp for two days hackathon on the following days where they were given real data from Thai Red-Cross to work on. All the teams built innovative dash-boards for the efficient inventory management of the supplies of Thai Red-Cross. Finally, the winning team was announced by the judges from Thai Red-Cross who praised the efforts of STEAM data-science bootcamp and how it transformed young Thai students from KMUTT, and they also offered volunteering opportunities to the youth after this event. This event demonstrates the power of peer-to-peer learning especially in the emerging disciplines and the purpose of technology, innovation and entrepreneurship towards SDGs2030.



## 4.2 Skills & Mindset



### 4.2.1 Mindset Training

#### *The Power of Vulnerability*

STEAM Platform invited Dr Terry Chilcott, an expert in Biosensor and Membrane technologies during Sept. 4-8th 2018 to conduct a series of seminars and workshops on technical and mindset training for our students. We collaborate with Department of Environmental Engineering and Department of Mathematics in organizing technical seminars and mentorship on Biosensor and membrane technologies and applications. In addition, we organize a special workshop on the Power of Vulnerability where Terry shared with our students his amazing accomplishment in his personal and professional life for someone who suffers from polio disease when he was a baby. He demonstrated his incredible mental, emotional and physical resilience through examples of his life experience. We learnt that everyone is special one way or another, a "disability" is an "ability", and "vulnerability" can be converted to power or strength. It is all in the mind which we can change.



## Communication Skills & Youth Empowerment Training

STEAM invited a youth leadership trainer Ms. Pris Lam from Sydney during Sept. 13-18<sup>th</sup>, 2018 to train KMUTT students in improving the communication skills and empower our youth through peer to peer influence. We are glad to say that more than 120 undergraduate and graduate students benefited from these workshops. One of that workshops entitled “How to Break the Barriers” was held in KMUTT Bangmod campus and other one “How to find you passion” was held in Bangkhuntien campus as indicated in the following images. Moreover, she has had one-on-one coaching session with STEAM executives to make their strategic communication better, helped in goal setting and gave personalized advises for effective outcome.



## *Empowering Future Leaders of KMUTT with Sustainability Mindset Through Life Cycle Thinking*

STEAM was invited by the Student Affairs & Student Financial Aid Office (FAO) of KMUTT to deliver workshop on November 28<sup>th</sup>, 2018 to the undergraduate students where three key topics including English communication, Innovation & Entrepreneurship and Sustainability for SDGs 2030 were covered. Importantly, this workshop was conducted by STEAM youth leaders (shown in the image below) who were trained in accordance with our mission of peer-to-peer learning and youth leadership. Undergraduate students felt emotionally empowered and mentally committed to be an effective communicator, build innovative startups impacting society and lead the future generation fostering sustainability. A special guest speaker Ms Kunnika Changwichan, who is a PhD student at KMUTT conducting her research on Life Cycle of Bioplastics, was invited to elaborate on the Life Cycle Thinking.



## 4.2.2 Broadcasting Innovative Research & Development of KMUTT

### *Power of Media for Innovation and Entrepreneurship*

To train young innovators and entrepreneurs of KMUTT, STEAM invited, one of the renowned sciences & technology reporters from TRT world, a prominent global news channel based in Istanbul, Turkey, Mr Sourav ROY during 20-23 February 2019 to conduct training to KMUTT students and staff on media communication. Sourav highlighted the importance of media inclusiveness in entrepreneurship practices. He showed the exemplary evidence of how different startups were able to receive significant investment after they were broadcasted on mainstream media. Also, the speaker explained how the European parliament is pushing the circular economy movement and how it could be replicated in Asian context. This event further leads to partnership with Faculty of Industrial Education & Technology (FIET) of KMUTT that showed interest in STEAM capacity building program for youth and we later trained their PhD students. Details will be elaborated in the following section.



## 4.2.3 KMUTT Faculty Outreach

### *Innovative Learning in Youth Leadership for Smart Circular Economy*

STEAM team was invited by the Faculty of Industrial Education and Technology (FIET) to conduct a



training workshop to its PhD students on Mar. 19<sup>th</sup>, 2019. This is another STEAM ongoing effort to the Innovators & Entrepreneurs across KMUTT. STEAM team focused on training the PhD students on smart circular economy, and how CE education learning can be innovated. STEAM team described their practices in scenario creation explaining cutting-edge technologies, which is an innovative approach to bring technologies to the ground-level for social impact, which is the key message of STEAM in all of our teachings/practices to incorporate sustainability (Economic, Environmental, Social) in technology research & development and education.

## 4.2.4 STEAM Platform Internship

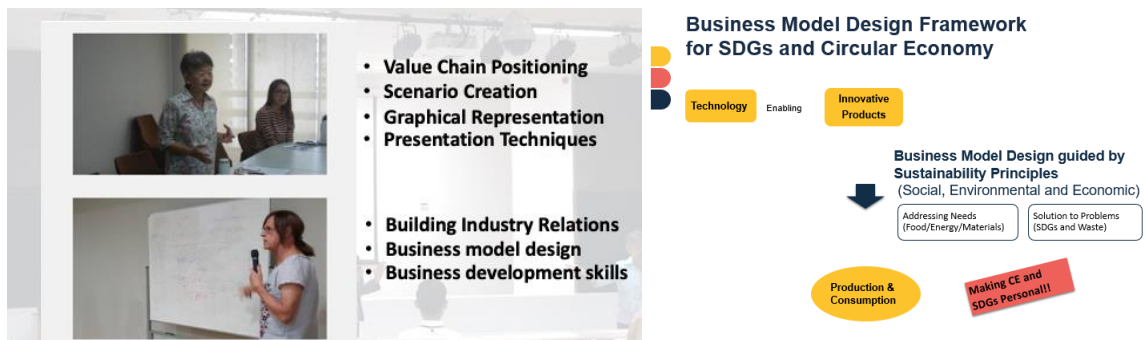
STEAM Platform invites KMUTT students and graduates to join the STEAM team involving in all STEAM Platform activities summarized in this report. The STEAM Platform interns consist of design team, analyst team and management team coming from faculty of design & architecture, faculty of Industrial Education and Technology (FIET), Faculty of Engineering, Faculty of Science and Institute of Field Robotics (FIBO). Each intern receives customized and personalized mentorship from the Founding Director Dr Lerwen LIU, Senior Advisor Prof. Supapan Seraphin and other invited experts from overseas as well as STEAM leadership team including Arslan Siddique (Biotechnologist), Chanika Puridetvorakul (Material Scientist), Panitsara Nakseemok (Nanotechnologist) and Parvathy Krishnan (Data scientist). The STEAM internship graduates have all been transformed and become confident, articulate, fluent in English and outstanding in public speaking & professional performance.



## 4.3 Entrepreneurship

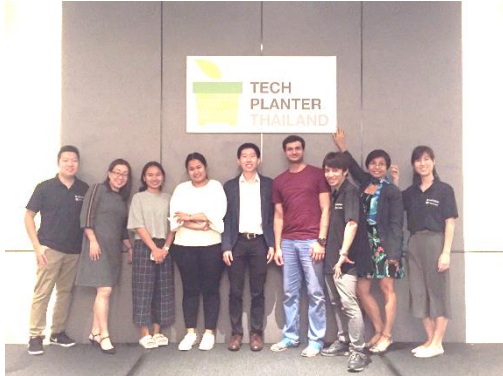
### 4.3.1 Building Future Workforce of Globally Competitive Entrepreneurs

We train students on innovation communication, holistic technology analysis including value-chain position, business model, market assessment etc. as indicated in the following figure.



### 4.3.2 Partnering with Leave A Nest (a Japanese deep-tech accelerator)

We actively participate in Tech Planter Thailand 2019 to seek strategic partnerships and funding for KMUTT start-ups & industry partnerships on 6 July 2019 and following projects from KMUTT were presented at that event.



1. Rice seed sowing drone
2. Protein from insects
3. Underground sensitive polymer for preventing road damage
4. Antimicrobial peptide for preventing food spoilage

### 4.3.3 Global Industry Partnership & Impact

One of the STEAM trained teams (Pacharavajee Duangkaew & Neeranuch Rukyng) developed bio-active peptides (with innovative processes resulting in improved functionality and lower cost) during their undergraduate final year project under the supervision of their advisor Dr Nujarin Jangruja (an assistant professor of dept. of microbiology in KMUT's faculty of science). After receiving intensive training at STEAM platform, the team together with their advisor won first prize in a startup competition organized by National Innovation Agency (NiA) of Thailand on Feb. 2<sup>nd</sup> 2019 during Thailand Inventors' Day 2019. They received first prizes in innovation competitions in Malaysia and Singapore. Importantly, their innovation was highly recognized by the expert (Jacky Seo, CEO of Hurimbiocell from South Korea) at Asia Youth Forum (AYF) 2018 (in Incheon), who also personally paid a visit of Dr. Nujarin's lab at end of Oct. 2018 and explored possibility of building a company as can be seen in the following images.





### 4.3.4 Competing in International Innovation Contest (iCAN) 2018

One of the world's leading technology innovation competition, iCAN2018 was held in Hong Kong where 4 teams from KMUTT participated as competitors. STEAM team first carried out a university wide campaign to identify and select competitive innovations for competing in iCAN 2018 on June 24<sup>th</sup>. Over 30 innovations were submitted by students and 5 were selected for intensive training after 2 rounds of mentorships by experienced international academic and industry mentors. The intensive training involved forming a team mixed with technical and design students as well as their advisors with personalized training by STEAM Founding Director Dr Lerwen LIU, Strategic Advisor Prof. Supapan Seraphin and Communication & IP Specialist Ms Eliza Stefaniw for 3 weeks. Five teams were intensively trained on strategic communication (explaining their innovation to laymen, English speaking and writing and infographic representation), business models, and effective pitching techniques. Outstanding performance of KMUTT team at iCAN2018 is available at STEAM youtube channel (STEAM KMUTT). This was STEAM Platform's initial effort to transform KMUTT students and faculty members in their strategic communication and confidence building and to globalize KMUTT'S innovative research & development and ground-breaking technologies. KMUTT's performance at iCAN2018 transformed the perception of Thailand in the arena of technology and innovation. The founding director of iCAN Prof. Alice ZHANG from Peking University was particularly impressed and invited STEAM Platform to be a iCAN partner in ASEAN. Given below is the list of final projects selected and presented at iCAN 2018 and posters of the showcase is available at STEAM Platform website:

1. Innovative pressurizer for engineered-cartilage
2. Agoribot
3. Environmentally friendly and machinable lead free brass
4. Sustainable replacement of antibiotics and preservatives



### 4.3.5 International Young Technopreneur Engagement in Asian Youth Forum (AYF) 2018

Asian Youth Forum 2018 was attended by the participants, during Aug. 8-12, 2018, from over 25 countries organized by Asian Development Bank (ADB) in Incheon, South Korea. This event was held under the theme “Welcoming 4<sup>th</sup> Industrial revolution”, and KMUTT was the only university that showcased innovative technologies developed at KMUTT to the international audience as shown in the following images. Dr Lerwen LIU was invited as an VIP by Asia Development Bank to chair a theme session on 4<sup>th</sup> Industrial Revolution and the Construction of Sustainable Occupation which was also joined by one of KMUTT faculty members Dr Charoenchai Khompatraporn. One of the most notable features of KMUTT technology showcase is the scenario of Smart and Sustainable Agriculture 4.0 where 5 key innovative technologies developed by KMUTT students were linked together in a smart and sustainable village scenario. This has attracted hundreds of participants to KMUTT exhibition areas where KMUTT students were able to explain to non-technical youth their innovative technologies relevant to the theme of the event. STEAM Platform training prior to the event at KMUTT has transformed those student inventors to perform strategic innovation communication at such a grand global platform. The head of ADB's NGO and Civic Society Dr Christopher Morris who is a founding director of ADB Youth Asia (organizer of AYF) together with his team were most impressed by our technology showcase, which has led to the initial discussion of a strategic partnership with ADB. More details of ADB partnership is shown in later section of this report. Given below is the list of innovative technologies showcased at AYF 2018.

1. Modular Farmbotics
2. Intelligent Production Management
3. Protein design and production
4. Smartening biogas production optimization
5. Advanced Green Materials



### 4.3.6 Technopreneurship Training at ADB Asia Clean Energy Forum (ACEF) 2019

STEAM team was invited by ADB's Asia Clean Energy Forum (ACEF) 2019 held during Jun. 17-19<sup>th</sup> to run a crash course entitled "Sustainable Energy & Entrepreneurship" to the young students from Asian & the Pacific region. This one-day long course included training students on clean energy sources, opportunities for youth in energy sector and implementable business models for generation of clean energy. Furthermore, attendees were completely trained on how to find problem statements, propose innovative solution and impact of the innovation linked to sustainability and circular economy. Also, STEAM youth leaders shared their practices in smart circular economy and youth leadership in clean energy. This event was graced by the presence of several key personnel of ADB like Christopher Morris, head of NGO and Civic society sector, Brajesh Panth, head of ADB's education sector, and Akmal Siddiq, head of rural and agriculture division. STEAM youth team also showcased innovative technologies at the premises of ACEF 2019, and one of the STEAM trained entrepreneur participated in "Dim Sum with Entrepreneurs" along with other 25 startups from across the globe. This event has been tremendously great in term of showcasing strength of KMUTT in education, research & development, which obviously makes KMUTT stand out from other Asian universities.



### 4.3.7 Strategic Support of KMUTT's Technology Transfer and Commercialization

The Managing Director of the Technology Transfer Office from Hong Kong University (HKU), Shin Cheul Kim, was invited by STEAM Platform, during Nov. 26-27<sup>th</sup>, 2018, to conduct a) a seminar on Maximizing Impact through Strategic Innovation to the KMUTT executive management and b) a workshop on Technology Transfer Innovation Strategy and Entrepreneurship to the KMUTT's technology transfer team by sharing his expert practices in Singapore and Hong Kong. Dr. Kim has over 20 years of experience in building high-tech companies and commercializing technologies through strategic partnership and business model. STEAM team also organized a visit for Dr. Kim at KX to initiate a discussion on strategic partnership between HKU and KMUTT in fostering youth entrepreneurship.



### 4.3.8 Promoting KMUTT's Smart Circular Economy Youth Leadership in Singapore

STEAM Platform was invited by Leave a Nest (a Japanese accelerator with its ASEAN base in Singapore operating in across ASEAN countries) to showcase KMUTT technology innovation at its Career Discovery Forum (CDF) in Singapore where a number of Japanese and Singapore companies/organizations including Toppan Printing showed strong interests in KMUTT technology innovation in the areas of bioeconomy, food/agriculture and green materials. STEAM Platform was also invited by Head Foundation to present STEAM Platform practices at its monthly seminar series on May 9<sup>th</sup>, 2019 where over 120 participants from academic, government, NGO and industry joined our flagship talk titled STEAM- A Driver of a Circular Economy. During STEAM team's visit in Singapore, STEAM team was also invited to give seminars on STEAM Platform – Youth Leadership for driving the Circular Economy at National University of Singapore (NUS) and Nanyang Technological University (NTU) to inspire students in Singapore in developing the mindsets of sustainability and SDGs2030 and youth leadership for driving the circular economy transformation. We showcased KMUTT's innovative technologies developed by students in sector of food/agriculture, materials and energy were showcased as listed below.

- i) Edible plastic-FilmCarb
- ii) Gluten Free Rice Flour
- iii) Cassava waste into Bioethanol
- iv) Rice Seed Sowing Drone



STEAM team also promote KMUTT expertise of faculty members by co-organizing a seminar at the Department of Industry System Engineering and Management (ISEM where Dr Lerwen LIU has been an adjunct professor) of National University of Singapore for Asst. Prof. Charoenchai Khompataporn to speak on Sustainable Logistics and Supply Chain: Cases in Thailand on May 6<sup>th</sup>, 2019.



### 4.3.9 Business Development for KMUTT Young Start-ups

Having conducted assessment on KMUTT global competitiveness in education, research, and innovation and identified core competence of KMUTT and global positioning, STEAM Platform focuses on supporting start-ups in the areas on Agriculture and Healthcare verticals utilizing competitive capabilities in advanced robotics, machine learning and data analytics.

In addition to promoting KMUTT education, research and innovation globally, STEAM Platform provides strategic mentorship to student and young faculty members on their entrepreneurship journey. We also provide business development support to promising start-ups on a) business model/strategy, identifying strategic partners, marketing materials preparation & design as well as financing. To complement Hatch (KMUTT student start up accelerator), STEAM Platform connects KMUTT capability and capacity to global partners strategically positioning Thailand contribution to the region and the world. During May to August 2019, we mentored 3 spin-offs from Institute of Field Robotics. We have identified their regional competitiveness being able to solve some of the critical problems in agriculture and healthcare and improve life of people addressing SDGs2030.

They include NEF: On-bed Movement Monitor and Alarm, Perceptra and ANT Robotics. In particular, we provide intensive business development support to ANT Robotics (founded by 5 graduate students from FIBO led by Mr Podsawat Worakuldumrongdej). We are training Podsawat to be a CEO with global vision, strategic mindset and communication skills as well as business model design. STEAM Platform is currently producing a 90 seconds promotion video for ANT Robotics envisioning a new generation of farms empowered by Industry 4.0. We strategically connected ANT robotics to investment division and rural development & food/agriculture division of Asia Development Bank (ADB) which is very keen to collaborate. We are preparing Podsawat to showcase his Drone for rice seed sowing capability at the upcoming Rural Development and Food Security Forum during Oct. 28-30<sup>th</sup>, 2019, invited by ADB. The Chief of ADB Rural Development & Food/agriculture Akmal Siquiq has arranged Podsawat to conduct the rice seed sowing with his drone (with 5 cm precision) at the International Rice Research Institute (IRRI) beginning of Nov. 2019.

**STEAM**

**Transformation**

1. Communication skill
2. Strategic & Global mindset
3. Business model design

**Singapore**

- CDF 2019
- NUS, NTU
- Head foundation
- Leave a nest

**Philippines**

- ACEF 2019
- ADB Ventures
- IRRI

**Thailand**

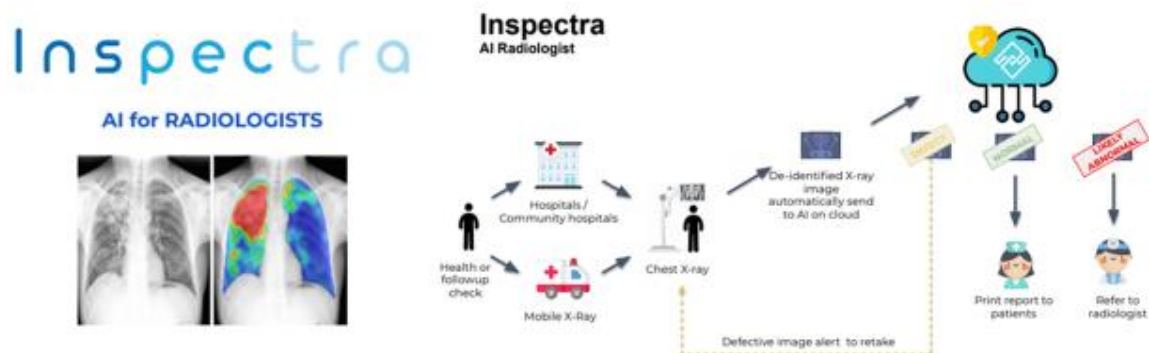
- Tech planter 2019
- KMUTT Social lab (Nan Province)

**ANT**  
ROBOTICS CO., LTD.

- Leadership
- Identification of customers
- Business development
- Project management

We also provided a strategic business development support to the promising Perceptra which is building an AI Platform for Healthcare with the aim of saving lives in the developing world. Perceptra was founded by Dr Warasinee Chaisangmongkon who is a rising star in AI Thailand. She is passionate about utilizing emerging technology to empower the development world youth and to improve life of people especially in the developing world. The 1<sup>st</sup> product of Perceptra is Inspectra

which is the AI for Radiologists. We assist Perceptra in producing marketing materials to showcase its capability to ADB, designing business model together with experienced investment banking partners, connecting strategic partner with ADB investment and ADB ventures as well as their partners.



Seeking partnership with ADB Ventures for scaling-up Inspectra and ADB Education Sector for promoting regional multilingual course on Artificial Intelligence (AI)

## 5. STEAM Module GEN352- Technology, Innovation & Entrepreneurship for Sustainable Development

To scale STEAM Platform, allowing more students to access to STEAM training, the undergraduate module (GEN 352) was launched in semester 2/2018 to nurture the minds of young students with emerging next generation technologies where range of different topics were covered such as life cycle analysis, circular economy, Industry 4.0 including advanced robotics, digital factory and big data analytics, SDGs 2030, waste management, sustainable financing & business models etc. The module involved a number of faculty members who are experts in the topics mentioned above as well as guest speakers from UNDP, investment banking sector and social enterprise. Another key feature of this module is peer to peer learning where students learn from each other in a group and among groups. STEAM Platform executive team, Arslan Siddique and Panitsara Nakseemok (who are graduate students), co-taught the module with Dr Lerwen LIU to conduct classes and mentoring students during the entire semester. Students were specifically trained on innovation communication, and business models for SDGs 2030 for the selected 9 patented technologies of KMUTT listed below. Students received one-on-one mentoring for their final presentations and posters, and their performance were assessed by KMUTT technology transfer team and external invited industry experts as well as STEAM team. KMUTT technology transfer team were particularly impressed by our students' outstanding performance and requested us to continue this effort and train the tech transfer team as well. STEAM team selected some of the posters to showcase at international events like CDF Singapore and ACEF 2019, where global audience witnessed the transformation of young undergraduate students trained by STEAM teaching team in GEN 352 in addition to learning the innovative technologies from KMUTT.

1. Rice flour from fermented germinated rice for application of bread products
2. Seaweed protein hydrolysate for flavoring agent and functional food
3. An edible protective packaging
4. The affordable smart healthcare sensor system made in Thailand
5. The innovative security film for classified document or large denomination banknotes
6. Antimicrobial coating for urinary catheter with silver nanoparticles produced by green chemistry
7. Ethanol production from water hyacinth with high yield
8. Ethanol production from cassava waste including pulp and/or peel
9. Eco smart resort with sandwich wall panel



## 6. Global Strategic Partnerships



Established partnerships with global institutions (ADB, UNDP, The World Bank Group) and nationally (STI/TCELS) for scaling-up STEAM platform nationwide

- Promoting youth innovators of greater Bangkok region with TCELS in a conference
- STEAM is in process of formulating MoUs with ADB on education platform for food/agriculture & healthcare
- ONES (STI), & GIZ MoUs on sustainable energy and rural development of Thailand

## **6.1 ADB**

Asia Development Bank (ADB)- STEAM has established partnership with different divisions in ADB including a) Youth for Asia headed by Chris Morris (Head NGO and Civic Society Center), Education headed by Brajesh Panth (Chief of Education Group), Rural Development & Food/Agriculture headed by Akmal Siddiq (Chief of Rural Development & Food Security) and Energy (led by Stephen Peters, Waste to Energy specialist) as well as ADB Investments and ADB Ventures. The continuous participation/partnership of ADB events showcasing KMUTT youth innovations and continuous dialogues/engagements with ADB team have strengthened KMUTT presence at ADB. ADB has already started engaging KMUTT experts in its event and projects. STEAM Platform is in the process of preparing a MoU as a Knowledge Partner in supporting ADB's regional developments in STEM education, food/agriculture, energy innovations and digital healthcare.

KMUTT is once again invited to participate in the upcoming ADB's Rural Development and Food Security Forum during Oct. 28-30<sup>th</sup>, 2019 at ADB HQ in Manila where KMUTT is invited to showcase its rural development and food security related education, research, innovation and related impactful activities and accomplishments.

## **6.2 UNDP & UNEP**

STEAM has become an innovation partner for the UNDP Co-Lab especially in the area of technologies related to Industry 4.0. STEAM Platform was invited to present at UNDP Asia Pacific Youth Leadership forum in Jul. 2018 in Beijing. Prior to this STEAM Founding Director initiated the UNV internship program in 2017 and initiated and organized and chaired the 1<sup>st</sup> joint international conference of entrepreneurship (ICE2019) for SDGs2030 in Feb. 2018 at UN and KX. STEAM Platform is currently working with UNEP in contributing a unique chapter on UNEP's holistic approach in circular economy for the upcoming textbook title "An Introduction to Circular Economy" to be published by Springer Nature at the end of 2019.

Together with KMUTT Joint Graduate School of Energy and Environment (JGSEE) and UNEP, STEAM Platform is co-organizing a special session on Smart Circular Economy- Roles of Digital Technology for Circular Economy & Youth Leadership during Dec. 11-14<sup>th</sup>, Bangkok as part of the International Conference on Sustainable Energy and Green Technology 2019. The outcome and content of the session will result in a report co-published with UNEP.

## **6.3 GIZ**

GIZ Bangkok team was most impressed by STEAM Platform's showcase of KMUTT innovations and experts in food/agriculture, energy, and circular economy as well as KMUTT social lab practices, GIZ Bangkok has drafted a MoU with STEAM/KMUTT with initial partnerships on energy starting Q4 2019. The MoU is currently being reviewed by KMUTT legal team.

## **6.4 Responsible Business Forum (RBF)**

STEAM Platform partners with RBF in supporting and participating the upcoming "Circularity 2030: Towards zero waste. Next Generation Leaders. Circular Economy Jobs of the Future" during Nov 18-19<sup>th</sup>, 2019 in Singapore. STEAM Platform supported RBF's Innovation in Value Chains for Food and Nutrition Security during Mar. 27-28<sup>th</sup>, Bangkok where STEAM team and KMUTT experts participated in its various workshops and roundtable discussions as well as notes taking contributing to the event reports and social media.

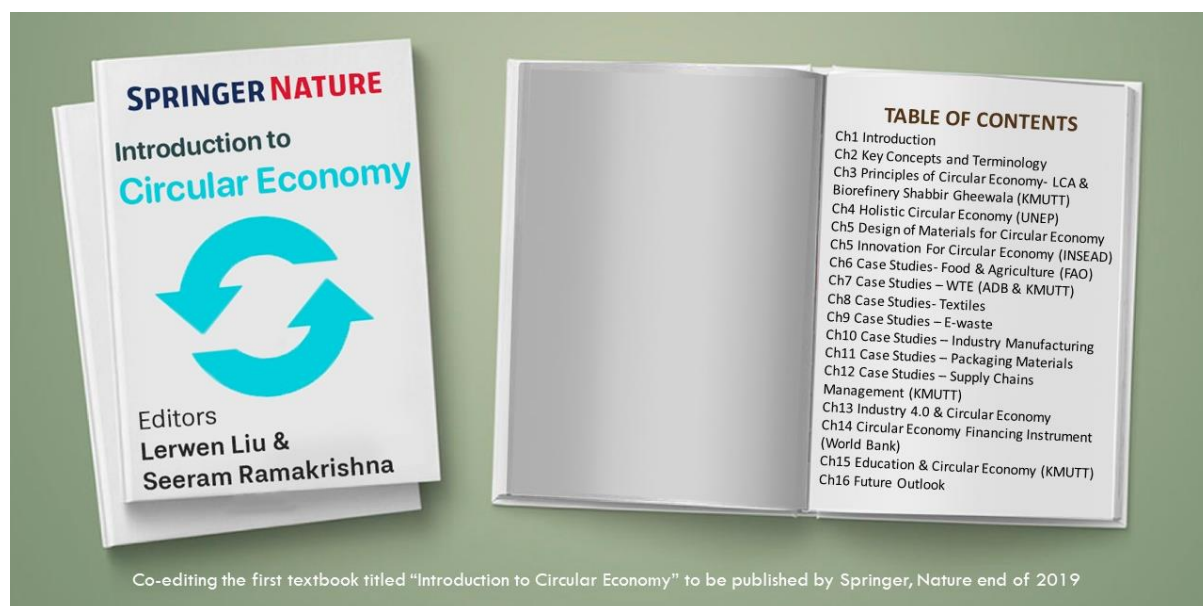


## 7. Global Visibility Enhancement through Digital Platforms

Creating digital legacy of STEAM-KMUTT's Research & Innovation and outreaching globally through website and social media

### 7.1 Textbook- An Introduction to Circular Economy

Springer Nature has approved to publish end of 2019 the 1<sup>st</sup> Textbook titled An Introduction to Circular Economy edited by Lerwen LIU (KMUTT) & Seeram Ramakrishna (NUS) where KMUTT faculty members are contributing 4 chapters including LCA, Supply Chain Management, Waste Management and education together with a group of world leaders in the field and contributions from ADB, World Bank and UNEP. In the process of editing this book, STEAM builds a network of experts along the value chain of CE as well as from different verticals of the circular economy. This book provides a prominent global visibility of KMUTT and position KMUTT as a global leader in CE. This book also creates globe partners for KMUTT in CE as well as positioning KMUTT as a leader in CE education.

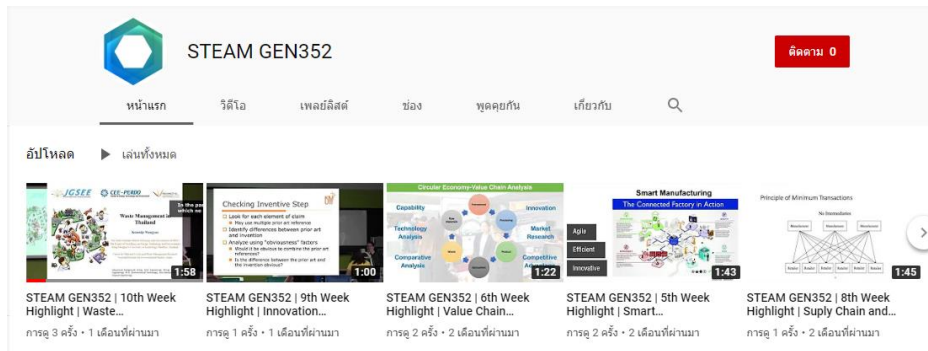


### 7.2 Website



<https://www.steamplatform.org>

### 7.3 Youtube



<https://www.youtube.com/channel/UCAooVdmiJ-ygRXLwBVDiLvA>

### 7.4 Facebook



<https://www.facebook.com/STEAM.KMUTT/>

## 8. What do people say about STEAM Platform?



### ADB

Mr. Chris Morris

Head of NGO and Civil Society Centre

Regional and Sustainable Development Department, ADB

*“Technology and Research from KMUTT is impressive, especially its “Social Labs”. We look forward to exploring partnership with KMUTT in the future.”*



### Head Foundation

Mr. C.D. Liang

Director, Development, Head foundation

*“STEAM presentation is excellent, unlike other seminar we had in the past, it demonstrated real people, real innovations”*

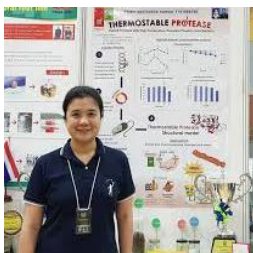


### KMUTT Faculty

Dr. Teeranoot Chanthasopeephan

Assistant Professor, Biological Engineering, KMUTT

*“After my students have joined “STEAM Platform” they have improved a lot of skills especially the way to communication our innovation, transforming technical word to be visual and layman interpretation”*

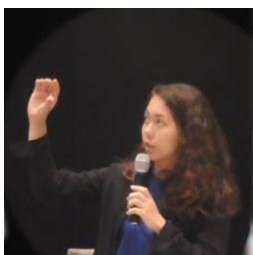


### KMUTT Faculty

Dr. Nujarin Jongruja

Department of Microbiology, KMUTT

*“We received the Gold Medal from National Research Council of Thailand, Thanks to STEAM Platform for empowering us with effective communication skills!”*



### KMUTT Student

Sara Bowman

Communication Design, Undergraduate Student, KMUTT

*“I met amazing youth leaders to talk about our future workforce, it was truly inspiring to be a part of this, all thanks to “STEAM””*



### KMUTT Student

Albert Warunyou Niminram

Applied Physics, Undergraduate Student, KMUTT

*“Thank you for the amazing opportunities.*

*Language is the future; communication is a wonderful network and creativity is my powerful stage “STEAM””*



### STEAM Manager

Mr. Arslan Siddique

Project Manager, STEAM

*“STEAM platform helped me in my research and innovation communication, professional grooming and provided experiential global youth executive training. STEAM has truly turned out to be a life-changing transformation platform for me”*



### STEAM Manager

Ms. Panitsara Nakseemok

Program Manager, STEAM

*“I never believed in myself until I met STEAM. STEAM has transformed me to a better person. I have more confidence, more important skill for professional future and also helped me in my research and innovation communication. STEAM has changed my life and I will not stop improving myself.”*



### GEN352 Student

Ms. Piyaporn Chairajsampan

Automation Engineering, GEN352 Students, KMUTT

*“I’m happy working with STEAM because the team helped me to improve myself to be more confident. I learnt many new things from STEAM such as how to analyze technologies, how to contact with other people etc. Aside from receiving more knowledge, I also received the concept of thinking that I can apply to any work in the*



### GEN352 Student

Ms. Marida Manothiang

Automation Engineering, GEN352 Students, KMUTT

*“Working with STEAM is a great experience for me. The team helped me to improve my English skills, thinking skills and presentation skills. STEAM provided me any opportunities to learn cutting edge technologies, practise entrepreneurship and networking with global leaders by volunteering at the RBF Food/Agriculture business conference. I would like to say thanks to STEAM for transforming me”*

## 9. Conclusion & Future Outlook

STEAM Platform has proven to be a powerful platform in transforming youth in a developing country especially where the communication skills and confidence in youth are low. The outcome of the transformation has been demonstrated in the drastic enhancement in confidence and strategic communication skills among the youth in Thailand (particularly in young female students and faculty members) which has resulted in a completely different perception of Thailand research and innovation during our numerous global & strategic outreach activities. STEAM Platform has been showcasing KMUTT's innovative practices in education, research and entrepreneurship at various global forums and to global organizations including the United Nations, Asia Development Banks and the World Bank Group positioning KMUTT youth leadership in driving the transformation of circular economy integrating with Industry 4.0. STEAM Platform also inspires the youth from other countries with excellent communications skills in English, innovative technology and solutions as well as artistic performance. Watch STEAM KMUTT YouTube channels to experience the pride of KMUTT youth excellent global performances and follow us at Facebook STEAM Platform.

In addition to attracting strong global partnerships with ADB, UN and WB, STEAM Platform has created strong interest in partnering from Thailand Center of Excellence for Life Sciences (TCELS) and the Office of the National Higher Education, Science, Research and Innovation Policy Council (ONES) as it was recognized STEAM Platform allows Thailand research innovations to be globally known and transforms global perception of Thailand to become an innovative leader in Industry 4.0 and Circular Economy.

We need stronger support and partnership within KMUTT and Thailand to grow this platform and accelerate the transformation of Thailand to becoming a global leader in Industry 4.0 and Circular Economy. And we are ready to take action.

## 10. Appendix

### 10.1 KMUTT's Innovation Showcased

Category	Innovation Title	Inventor's name
Food & Agriculture	Rice seed sowing drone	Podsawad Worakul
	Protein from insects	
	Antimicrobial peptide for preventing food spoilage	Neeranuch Rukying, Pacharavajee Duangkae, Warunyou Niminram, Dr. Nujarin Jongruja
	Agoribot	Natthanicha Jamroonpan, Ratchatida Phummapooti
	Sustainable replacement of antibiotics and preservatives	Neeranuch Rukying, Pacharavajee Duangkae, Warunyou Niminram, Dr. Nujarin Jongruja
	Modular Farmbotics	Asst.Prof.Dr.Diew Koolpiruck
	An assessment of potential and demand of fog water harvesting in Thailand	Tussanun Thunyaphun, Watusiri Suwannarat
	Plastic Boxes for Prolonging Storage life of Fruits.	Supawit Jitkongsong
	Rice flour from fermented germinated rice for application of bread products	Orapin Kerdchoechuen (Assoc. Prof.)
Seaweed protein hydrolysate for flavoring agent and functional food	Orapin Kerdchoechuen (Assoc. Prof.)	

Category	Innovation Title	Inventor's name
Energy	Smartening biogas production optimization	Arslan Siddique
	Solar panel cleaning robot	Podsawad Worakul
	Dc microgrid enabling smart home with an EV	Porntep Tubkan
	Peer to peer energy trading platform enabled by community VPP & Block chain	Jariyapohn Charkhonmattakul
	Ethanol production from water hyacinth with high yield	Asst. Prof. Jirasak kongkiatkajong
	Ethanol production from cassava waste including pulp and/or peel	Asst. Prof. Jirasak kongkiatkajong
	Underground sensitive polymer for preventing road damage	Saly Goldin & Rudahl

Category	Innovation Title	Inventor's name
<b>Materials</b>	Innovative pressurizer for engineered-cartilage	Thanyathorn Sathiansaowaporn, Nattaphol Thanchiang
	Environmentally friendly and machinable lead free brass	Pemika Suksongkarm, Sirintra Poonjaruwat
	Advanced Green Materials	Asst. Prof. Dr. Kheamrutai Thamaphat
	A novel material for latent fingerprint detection	Asst. Prof. Dr. Kheamrutai Thamaphat
	An edible protective packaging	Orapin Kerdchoechuen (Assoc. Prof.)
	The affordable smart healthcare sensor system made in Thailand	Yuttapong Jiraksopakun (Asiss.Prof.)
	The innovative security film for classified document or large denomination banknotes	Thorin Threeradejvanichkul (Asiss.Prof.)

Category	Innovation Title	Inventor's name
<b>Materials</b>	Antimicrobial coating for urinary catheter with silver nanoparticles produced by green chemistry	Asst. Prof. Dr. Kheamrutai Thamaphat
	A study of Nickel hydroxide electrode additive with graphene used for Nickel metal hydride battery	Warayut Srithongsuk
	Application For Smart Hub	Krittiya Wuti
	Chatbot for hospital patient care and customer service	Warat Kaweeponroj, Sirapop Wongstapornpat, Piyaphon Trangjirasathian
	D' Guardian: A smart monitoring system for elderly and disabilities	Tinnakorn Marlaithong, Napatsorn Pitakkotchakorn, Juthaporn Vipatpakpaiboon
	Development of nanocomposite materials for photocatalytic application	Ampawan Prasert
	Electrospun Nanofibrous Sheets mixed with Salicylalyl Azine Derivatives for Copper(II)ion Detection	Apisit Karawek
	Hydrogen production from waste water via photocatalytic process	Oranoot Sittipunsakda
	Hyperclean Pad	Sirikorn Yomchinda, Isaraphorn Tuntiamornpong, Worapong Chaiviratnugul
	inSpectra: Substances detection system based on multispectral image fusion	Pawin Taechoyotin

Category	Innovation Title	Inventor's name
<b>Materials</b>	Pill Dispenser and Physical Examination for Sudden Complications of Hypertension for Elderly	Pongpith Simmanee
	Preparation of Carbon Fibers from Bio-based Materials by Electrospinning	Tunnapat Worarutariyachai
	Recover precious metals and used acids from drain water in jewelry industry by using ion exchange membranes	Chutimon Vongpaung
	Robotic Screw Fastening	Dusida khunjan
	TiO2/Lignin-based Carbon Compositd Photocatalysts for Enhanced Photocatalytic Conversion of Lignin to High Value Chemicals	Nattida Srisasiwimon
	Device for improving movement efficiency of elder ( iME2 )	Supakorn Thakerngmahachoke
	Eco smart resort with sandwich wall panel	N/A

## 10.2 STEAM Platform Impact Statistics (2018 - 2019)

Period	Event (Physical Platform)	Location	Youth Leaders Trained	Impact No. of Students (KMUTT)	KMUTT Staff	Global Impact No. of People	Companies engagement
Jun. 2018	iCAN 2018	Hong Kong	20	100	6	120	30
Jul.-Oct. 2018	Roundtables on CE and I4.0	KMUTT			80		
Aug. 2018	UNDP youth leadership forum	Beijing				500	10
Aug. 2018	AYF2018	Incheon	16	30		400	1
Sept. 2018	Biosensor/Membrane/Power of Vulnerability	KMUTT	10	80	10		
Sept. 2018	Youth Leadership Training	KMUTT	30	120			
Nov. 2018	SUSNANO	Washington DC				100	
Nov. 2018	CE and Advance Materials	Vienna				200	1
Nov. 2018	Innovation Strategy Workshops	KMUTT			80		
Dec. 2018	fesTalk2018	Pune, India				500	
Jan. 2019	Data Science Bootcamp & Hackathon	KMUTT	10	80			1
Jan-May 2019	GEN352	KMUTT	5	40			3
Feb. 2019	Accelerating CE Workshop	STI	5		3	30	
Feb. 2019	Power of Media Workshop	Bangkok	20	80			



Mar. 2019	G_iCAN 2019	Beijing				500	
Mar. 2019	FIET	KMUTT		15	3		
Mar. 2019	RBF	Bangkok	10		2	700	30
Mar. 2019	Woman in Energy Breakfast Workshop	Singapore				120	10
May. 2019	Head foundation, NUS & NTU	Singapore	10	20		160	29
May. 2019	ADB STEM Symposium	Bangkok	10	20		60	
Jun. 2019	ACEF2019	Manila	10	20		1200	22
Jul. 2019	NanoCamp	Russia				500	1
Jul. 2019	Demo day	Bangkok	5	20	6	80	20
Aug. 2019	ADB skill forum	Manila			9	500	10
Total			161	625	199	5670	168



EDITED & DESIGN BY  
Sawaros Thongkaew  
Teeramate Nuanplub



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