

NEEDS ANALYSIS REPORT ON RELEVANT VET COURSES AND INTERNSHIP DEMAND



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D1.3 NEEDS ANALYSIS REPORT ON RELEVANT VET COURSES AND INTERNSHIP DEMAND

WP 1 Identification of similar curricula in the subject area

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Introduction: The purpose of this framework

This report tries addresses the basic needs and challenges in terms of skills and needs of the three country reports (Cambodia, Malaysia and Thailand) in the sector of food innovation. The input received and presented will be used as an input in the design of training programs within the FOODI project framework.

In that context, the structure of the report firstly presents the methodological framework in which the partner countries examined the current situation of the sector in terms of existing training programs and skills needs in the current personnel working in the industry.

The report includes the findings of an extensive desk research that our Team Members have conducted as well as those of a qualitative research.

Our analysis is aligned to the main guidelines stated out in the FOODI application. More specifically, we are reporting the existing professional training courses (where available) of the three regions in terms of required professional skills in food processing and innovation and we are mapping the training needs of existing personnel aiming at the future participants of the FOODI training courses and internship. Our approach includes the study of food innovation related occupational profiles in the three countries, with the intention to understand the differences in the profiles and their relation to skills, i.e. Digital Skills.

Having structured a solid background of knowledge, based on the above analysis we are ready to step further into answering the key question of whether the existing VET Curricula in the three countries are aligned and provide adequate skills and knowledge to cover new sectoral needs.

Our VET Curricula review for the three countries, has been conducted within a systematic approach that has taken into consideration:

- The name, history and classification of each VET Educational system that is providing a specific food innovation curriculum or related curriculum has been identified and enlisted,
- The Learning Outcomes, the total duration of each Curricula and its content

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1 Methodological Framework

The purpose of creating a common harmonized methodological framework was **the identification of existing professional training courses in the area of food innovation in the Asian partner countries**. In particular, this **methodology** functioned as a guide within the **Work Package 1** in order to meet the needs of the three participating countries Malaysia, Cambodia and Thailand. It contained:

- **A qualitative research aiming to food industry businesses**
- **A methodology implementation plan**
- **Guidelines for performing the data collection**
- **Interview templates**

This **common research framework** was used in the study across the **three participating countries** ensuring the best possible **coherence and consistency of findings**. It secured transparency and comparability of findings – especially related to the **qualitative surveys**. It played the role of a **step-by-step handbook** with specific milestones to facilitate and transfer know-how to the partners who may not be specialized in research activities.

1.1 Research phase

The Partnership agreed to **map the current offered VET Curricula in the Food Innovation Sector in Malaysia, Cambodia and Thailand**. The template below used to imprint the important criteria set. In order to identify solid information, the desk research aimed to present the **appropriate details** responding based on **significant criteria**. As there are multiple representatives per country, the research activities were divided among the partners in country teams. Therefore the partnership **documented the data according to the following criteria**:

Country	Provider	Category of Provider	Curriculum	Programme Level NQF	Brief Description of Curriculum	Learning Outcomes	Online / Blended learning / Traditional face to face	Duration	Foundation / Revision Year	Intercultural Skills	Digital Skills	Reference - webpage
Include the country where the Course / Curriculum is offered	Insert the name of the provider that is offering the Course / Curriculum	Choose the Category of the Provider, between the following options: 1. Vocational Training Institutes 2. Other Institutes (please specify)	Provide the name / Title of the Curriculum	Provide the NQF equivalent name of the Curriculum	Please provide a brief description of the Curriculum, not exceeding the length of 1.000 characters	Please identify the Learning Outcomes of the Curriculum in the following format: LO1: Learning Outcome description LO....: Learning Outcome description LOx: Learning Outcome description	Please state the educational strategy selected	Please describe the duration of the curriculum	Please provide the Foundation/ Revision Year of Provider's curriculum	Please answer with "Yes/No". For answer "Yes" please describe briefly these skills	Please answer with "Yes/No". For answer "Yes" please describe briefly these skills	Please insert the official website link of each curriculum

Through this mapping, a coherent analysis in the Food Sector was identified, providing evidence for the skills gap analysis presented below in the county reports' section.

From the mapping of current VET curricula in the Food Innovation sector, more than 20 programs were identified and analysed in the three partner countries.

The need for innovative training programs in the food VET sector aiming at soft and digital skills is the most conspicuous result of the mapping. The programs are analysed and presented in the next section but the completion of the template itself indicated the great need to use a common language in terms of terminology between the European and Asia partners as a difficulty was identified in analysing some terms such as the Work-based Learning.

1.2 Quantitative analysis on Food Industry Businesses

Within the scope of this project, in regards to the **qualitative analysis**, partners used **focus groups** based on the same focus group guidelines to collect information from food industry businesses focusing on the training needs of their personnel aiming them to participate in the professional training component of the FOODI project that is to be developed at a later project stage.

Conduction of focus groups

Focus groups were crucial **tools** in order to conduct a **detailed** and **in-depth qualitative analysis**. These tools provided the **necessary information** and documented the details from persons with an insight into the food innovation sector.

Design and Scope

Target group

The participants were carefully selected and included businesses from the food industry sector such as:

- *Industrial Food Processing;*
- *R&D Companies in the food industry;*
- *Food quality and safety management;*
- *Industrial Process Control;*
- *Food Packaging and labelling;*
- *Other Food industry companies.*

Duration

Interviewers and interviewees had to project **approx. 1,5 -2 hours** to conduct the focus group.

Structure

The order of the questions and their exact wording are, however, largely **up to the interviewer**. The interviewees were motivated to **answer** in as much **detail** as possible; aspects that the interviewee raised him/herself were further explored.

The **focus groups** were carried out by the Asian Universities' members of staff or related experts, who provided a broad view on the topic and represent the state of knowledge. The interviewer selected and **consulted significant persons** in at least **5 targeted companies in the country**. To convince people to take part in the interview partners phoned them directly and explained the purpose and possible benefits.

Place

Focus group discussions took place in **specially designed and comfortable areas**, either at the company's offices or at the Universities' facilities.

2 Guidelines for performing data collection

Focus Groups¹

In a **qualitative interview**, good questions were open-ended (i.e., require more than a yes/no answer), neutral, sensitive and understandable. This method helped the respondents to **build up confidence** and **generated rich data** that subsequently developed the discussion further. The provided guideline contains suggestions for questions that took into account all the **necessary aspects or topics of the FOODI project**.

As far as possible, **all aspects were addressed in the course of each discussion**. The order of the questions and their exact wording were, however, up to the interviewer. **The interviewees were motivated to answer in as much detail as possible**.

3 Focus groups and mapping of training courses templates

3.1 Focus group interview guide

The focus group interview guide provided a set of indicative questions covering the main aspects needed to gain enough information of the existing training needs of the personnel working in the food industry.

FOCUS GROUP INTERVIEW GUIDE

Name of the participant:

Organisation/Company:

Position in the organisation/company:

Years of professional experience in the Food Industry field:

Introductory questions

- Food industry is rapidly changing. What were the **characteristics of the new model** that is being shaped according to your point of view and professional experience?
- How do you think your organisation/company will be **affected by the changes** in the near future?
- What **changes** do you see in the Sector?
- What is the role of your country's educational institutions in equipping young graduates with the required **skills and competences**? What do you think is missing?
- How well prepared do you think you are to **meet the market needs**?

Sector Skills Gaps Exploratory questions

- Recruitment of skilled employees in the growing Food innovation sector is an increasing problem. What do you think should be the **ideal profile of an employee** in the Sector?
- What do you think are the **main skills missing** from the current employees?
- Are you familiar with the term **"soft skills"**? Can you name some of them?
- Are you satisfied by the **soft skills and competences** of your employees?

¹ Richard A. Krueger (2002). "Designing and Conducting Focus Group Interviews", University of Minnesota

- Are you satisfied with the **number of employees** your organisation/company employs?
- What **actions** do you take as an organisation/company **to train your employees**?
- How do you **assess the performance of your employees** in terms of soft skills?
- Would you please let us know, what is **your opinion on the current offered curricula** in the Food innovation sector? What do you think is missing?
- What changes have you brought as an organisation/company to meet **Food industry needs**?
- What is your opinion on **career days**? Do you find them useful?

Internship Demand & Curricula design input

- Would you please let us know, what is your opinion on the **current offered curricula** in Food Industry sector?
- Would you please let us know, what is your opinion on the **teaching methods** and educational structures in the food industry sector?
- Do you think current **teaching methods are innovative, promote creative thinking and autonomous learning**?
- Do you think that current learning material equips the learner with **adequate knowledge** to meet labour market needs?
- What type of food professionals do you believe the sector needs and lacks mostly? i.e. engineers, managers etc.
- Would you like to assist the FOODI Partnership in the design of training curricula via offering your input during their design?
- Would you be willing to host an internship for a FOODI learner during the delivery of the learning programme?

Exit questions

- What **solutions** do you propose for the Sector to **meet current needs**?
- If you could summarize in three words the **challenges your Sector is facing**, what would they be?
- If you could summarize in three words the **profile of a successful employee**, what skills would you put first?
- Would you like to be updated through the project implementation period about FOODI's events and activities?

4 Country Report: Cambodia

4.1 The VET Structure in Cambodia: Basic Elements

The Education Law 2007 (p.8)² defines Technical and Vocational Education and Training (TVET) as all public and private institutions, enterprises, communities, and/or families that provide professions and skills training for specific area. However, the basic structure of TVET is:

The National Training Board (NTB) approved the Cambodian National Quality Framework (CQF) in 2014, which composes of eight levels as displayed in the table above.

Table 1: Structure of TVET CQF

CQF Levels	TVET Systems	Higher Education
8	Doctoral Degree of Technology/Business Education	Doctoral Degree
7	Master Degree of Technology/Business Education	Master's Degree
6	Bachelor Degree of Technology/Business Education	Bachelor's Degree
5	High Diploma of Technology/Business Education	Associate Degree
4	Technical and Vocational Certificate 3	Certificate
3	Technical and Vocational Certificate 2	Certificate
2	Technical and Vocational Certificate 1	Certificate
1	Vocational Skills Certificate	Certificate

Under this organizational structure, TVET has been categorized into formal and non-formal education system:

- **Formal TVET system**³: After students completed 6 years of primary school, 3 years of lower secondary school (3 years), they can enroll in the formal TVET programme at three different levels. The students can choose a wide variety of areas, including vehicle repairing, general mechanics, computer technology, agricultural mechanics, electricity, electronics, repairing of cooling mechanics, and civil engineering. In general, the formal TVET system recruits graduates from upper secondary schools, who have completed grade twelve. The duration of the training are varied from 1 to 3 years in order to achieve certificate/high diploma (Diploma for Technician).
- **Non-formal and informal TVET systems** are offered in short-term programs between 1 to 4 months. The trainings basically focuses on emailing immediate knowledge and skills for some priority areas: agriculture, construction, motor repair skills, craft, and basic food processing. These trainings have mostly been funded by private sponsors and NGOs, which focused on non-formal agricultural provision, craft, textiles and garments.

4.2 The current situation in the Food Industry sector

In general, Small and Medium enterprises in the sector have been set as a **key driver** of future growth in order to transform Cambodia into a **middle-income economy** by **2030** and **high-income country** by **2050** (National Strategic Development Plan for 2014–2018)⁴.

² Royal Government of Cambodia: The Education Law 2007

³ National Technical Vocational Education and Training Policy 2017-2025

⁴ Royal Government of Cambodia (2014) Cambodia National Strategic Development Plan 2014-2018

To achieve this long-term vision, the government prepared an **Industrial Development Policy (IDP)** in March 2015 as a guide to develop a competitive industrial sector in Cambodia. Among the key industries to achieve the goals set is the food and beverage processing, which is targeted as key indicator for the Royal Government of Cambodia⁵**National Employment Agency (2018)**.

4.3 Professional Training Courses Provision in Cambodia: A systemic approach

Cambodia has made some progress in providing people with opportunities professional educational training. For instance, there is the **Technical and Vocational Certificate 3**, a program which involves classroom presentation until the competencies of the learning outcomes are achieved. Beginning after level , could require for learners a full time work and study or equivalent. Besides this, the program focuses on specifically in practical technical training, including:

- **Workshops**
- **Laboratories**
- **Applied work**
- **Work experience**

This work would be addressed as equivalent of 30 Credit hours. This could apply to EQF Level 6” Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles” becomes it combines theoretical and practical education and also a critical understanding of factualized theories and principles.



Moreover, there is the **Higher Diploma of Technology/Business Education**, a program which provides students with classroom presentation until the competencies of the modules are achieved. For students entering technical education after general secondary school two years of study and training or equivalent to 30 credit hours beyond level 4. This could apply to EQF Level 5” Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge” becomes it combines theoretical and practical education.

The basic requirement is that such a program leading to this qualification usually involve major studies in which **significant knowledge** is available.

4.4 Focus Group: Organization and Structure

Part 1: Introductory Questions Findings

It was discovered that effective implementation and quality assurance matters are of high importance. In addition, the food technology sector needs **new creative ideas** as well as **practical and communication skills**.

Part 2: Sector Skills Gaps Findings

The basic key findings of the part 2 showed that food analysis and testing methods are of high importance. Furthermore, it was discovered that **product development can be an input in the food processing**.

Part 3: Internship Demand & Curricula design input Findings

⁵ Royal Government of Cambodia (2015) Cambodia Industrial Development Policy 2015 – 2025

The answers in the questions showed that all industries come to an agreement that in order to accept students for an Internship program, a **basic prerequisite is to have completed their university education. The Internship program has to focus on the enhancement of their digital and practical skills.** All Industries



agreed also to join the Scientific and Research Conference in food processing and innovation. They also agreed to offer the guest lecturers and experts related to food processing to the universities join the research project with the students and provide the research competition award annually for the university students.

Curricula design must include the followings:

- **Entrepreneurship and innovation**
- **Food supply chain management**
- **Food legislation and international trade**
- **Consumer preference and behavior**
- **Innovative food products**
- **Innovation in industrial food processing**
- **Food safety and quality management**
- **Advanced food analysis**
- **Unit operation and food engineering**
- **Industrial process control**
- **Research methodology in food science**
- **Entrepreneurship and innovation**
- **Skills for developing “Product development skills”**

As far as the organization of the Focus Groups are concerned, the **purpose of the discussion** was to identify:

- **critical needs**
- **skills gap**
- **curricula content**
- **internship demand on MSc program in food processing and innovation in Cambodia.**

The facilitators of the event were three and the participants attended were 11. The majority of them had an agro-industry background, with their age varies from 18 to 40. The Focus Groups were held in 12-13 June 2019 from 7.30 AM to 17.00 PM.

As far as the agenda of the event is concerned, in the first day there were two group discussions, in which the first was related with Industries and the second one with Students from Agro-industry field, in order to the two groups to be interconnected. The welcoming remarks were made by the Svay Rieng University of Agriculture and from the Deputy Director General of General Department of Higher Education. In that context, Cambodia gave a higher amount of importance in the interconnection of all educational levels with the business sector, in order the FOODI project to gives also practical solutions for food innovation.

On the second day, there were also two group discussions, in which the first one was Managers and the second one was Academics, Lecturers and Researchers.

In the conduct of Qualitative Research, it was discovered that all Internship Programs play a **key role** for students in the field of **food processing and innovation. Problem solving and communication skills** are

important for industry. These skills are needed for helping the industry to improve the process and prevent any obstacles.

4.5 Mapping of training programs in Cambodia

In order to make a successful review of the core learning process of each training program, it is advisable to categorize the providers of each training program. In that way, the grouping and mapping of the training process is easier and also it gives an overview of how educational system related to VET and Innovation works in Cambodia.

Governmental and International Agencies

In the first place, the *Food Security and Nutrition Information System in Cambodia* which belongs in the *Council for Agricultural and Rural Development* provides a training program with a curriculum related to the “**Food-Fortification Partnership Dialogue towards Operational Engagement**”. In particular, this curriculum organized by BASF(Leading Chemical Company in Cambodia) in cooperation with the International Relief & Development, which created a platform of dialogue, learning and concrete opportunities to engage in reducing Vitamin and Mineral Deficiencies in Cambodia. Apart from this, this kind of training is a typical workshop which was organized in 28 February of 2011. The objectives of this workshop were:

- To raise awareness of micronutrient deficiencies
- To maximize its impact in Cambodia
- To raise awareness of the global experience and success of fortification
- To share best-practices of public and private sector from both Cambodia and the Region
- To define pathways for industry and international partners to support the current government process to implement a national multi-vehicle food fortification program.
- To initiate discussions on public-private partnerships to support and accelerate the fortification of edible oil, instant noodles.

Another interesting curriculum, was created by the *National Training Board of the Ministry of Labor and Vocational Education and Training* provides people with the “**Piloting the Post-harvesting Technology and Skill Bridging Program for Rural Poor**”. In particular, this is a project which acts as a Pilot in order to:

- **identify** the most effective means of training commune members in postharvest technology and food processing
- **discover** the most effective training mechanism to give out-of-school youth the skills in mathematics and Science.

This Project aims to **reduce poverty** among the rural poor in Cambodia by improving the **post-harvest skills** of agricultural producers and enhancing the knowledge and technical skills of youth to meet the demands of industry. The immediate objectives are:

- **to increase** the value added to agricultural produce through post-harvest (PH) skills development and training
- **to meet** the needs of diversified enterprises through a technical vocational education and training (TVET) skills bridging program for youth.

The Project creates new possibilities and income opportunities for poor agricultural producers in pilot communes both on and off-farm seasons, and provides access to training and employment for out-of-school youth through improvements in their knowledge and skills that respond to the increasing demands of the labor market.

Apart from these, the Project is consisting of two basic components:

- **Component A: PHT and Food Processing**
- **Component B: Skills Bridging**

The Component A aims to:

- **find** the appropriate food storage, processing, and packaging technologies
- **develop** a demand-based curriculum and design training modules in each selected post-harvest technology (PHT)
- **create** and/or upgrade buildings in the target TTCs, and equip them with the required equipment for the basic PHT skills development program
- **offer** training to eight PHT trainers (two from each TTC) to deliver PHT training to 44 PHT commune assistants (one from each participating commune) to further train and provide continuing support to a target group of 3,000 agricultural producers in 44 target communes
- **bring** product samples to TTC-based labs for food safety testing.

The **PHT skills development grant** which will be provided to TTCs (at a maximum of \$180,000/TTC for a 3-year period) for the PHT skills development program. People will receive a mobilization grant of 20% of the contract amount and progress payments based on approved budgets, work program and performance. The grant will be used for training of PHT and community development specialist (CDS) trainers, for training of 3,000 agricultural producers to apply PHT techniques, including advanced food safety and hygiene requirements, and marketing, for promotional activity on local products, including trade fairs and for follow-up support to trained agriculture producers.

As far as the Component B is concerned, it aims to help the **Government of Cambodia** and **MoLVT** to **introduce a TVET training model** to address the issue of out-of-school youth and the unemployed who have never enrolled in secondary education or have at least than grade 7 education, and cannot re-enter school or progress with formal education for economic and/or academic reasons.

This component offers:

- **Entry-level** academic skills developed for TVET certificate course.
- **Curriculum and learning materials in mathematics, science and Khmer** developed or upgraded to move registrants, who may study on a part-time basis, from basic literacy to the entry-level standards for certificate level.
- **Standards assessment instruments** for trainee achievement designed and field tested.
- **Employability skills** curriculum and learning materials developed or upgraded with full input and acceptance by employers.
- **Graduation of around 700 youth** from the TVET skills bridging courses (50% of whom will be recruited by employers, with the remaining 50% enrolled in TVET institutions for further skills training.

The program started successfully in 2011. This program could be applicable to EQF Level 6” Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles” in which the students could demonstrate mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study.

Another interesting curriculum, is the **“Agriculture and Food Security”** which is funded by the **USAID** and belongs in the **US Embassy of Cambodia**. In particular, agriculture is the basic engine for economic growth and food security in Cambodia, but the country must improve its production and post-harvest

infrastructure, streamline the business environment, and also to increase capacity for financial services to reach rural entrepreneurs. This Project **supports the Cambodian government's development strategy** by:

- **increasing the country's agricultural productivity**
- **improving the well-being of the rural poor**
- **promoting sustainable management of the country's rich natural resources.**

Its objective is to **support the achievement of Cambodia's development goals**, including halving the proportion of people who suffer from malnutrition and achieving the sustainable use of environmental resources.

The project started to run from 2017 and aims to end in 2022.

Moreover, the Project "**Training Course on Post-Harvest Technology and Management for Reducing the Losses of Agricultural Commodities for Cambodia, Laos, Myama, and Vietnam**" provides students with courses on:

- **Introduction to postharvest technology;**
- **Structure and composition of fruits, vegetables, and flowers;**
- **Effect of temperature, water loss and humidity;**
- **Harvest system/quality components and standardization;**
- **Physiological and biochemical changes;**
- **Maturation;**
- **Packaging for fresh produce;**
- **System approach to postharvest handling;**
- **Storage system and cooling horticultural crops;**
- **Postharvest pathology and entomology;**
- **Introduction to grain processing.**

The fundamental objective of the course aims to help resolve post-harvest losses and enhance food security of CLMV countries, where the majority of the populations are dependent on agriculture.

The project was tentatively scheduled to commence **in the first half 2018** and is funded by [Thailand International Cooperation Agency \(TICA\)](#) which belongs to *Thai Government*.

What is more, the program "**Formation of Cambodian Association of Food Science and Technology (CAFST)**" which runs from 2012, is provided by the [World of Food Sciences](#). The establishment of a Cambodian Association of Food Science and Technology (CAFST) as a professional association in Cambodia, with a generic constitution in line with the other members of the Federation of Institutes of Food Science and Technology in ASEAN (FIFSTA) offers full insight into food innovation policies.

Higher Education Institutes

In the first place, the [Institute of Technology of Cambodia](#) provides talented students with a "**Bachelor's degree in Chemical Engineering and Food Science; Chemical and Food science, Food Technology, and Food Quality and Food Safety**". This degree seeks to strongly support the development of human resources in the field of Chemical Engineering and Food Science, Agro-Industry and Environment, and to promote the environmental sound management in Cambodia via the academic excellence and the engineering research. Its vision is to sustainably develop the highly trained human resources in the fields of Chemical Engineering, Food Science, and Agro-Industry and Environment. The degree is provided in French and English language and gives insight to:

- **Chemical and Food science**

- **Food Technology**
- **Food Quality and Food Safety**
- **Management**
- **Internship and thesis writing**

The overall program lasts 5 years.

The **University of Battambang** provided students with a two days training in “**Safety, good practice, farm management, and cost-return analysis for live-stock, aquatic animal, and crop**”. The training aims at providing the professional training to students on safety, good practice, farm management, and cost-return analysis for live-stock, aquatic animal, and crop in Cambodia. This program ran in May 2018.

Another Higher Education Institute Program is the “**Bachelor's degree in Food Science, Post-Harvest Technology, and Food Biotechnology**”, which is provided by the **Royal University of Agriculture**. The Faculty of Agro-Industry is one of the ten faculties in Royal University of Agriculture established in 2001 under the policy of the Royal Government of Cambodia to enhance agroindustry sector in Cambodia.

Since 2004, two laboratories were established:

- **The Food Processing**
- **The Food Microbiological Laboratories donated by JICA.**

The laboratories produce different types of juices, quality analysis and other research activities within the faculty. The faculty aims to:

- **manage agricultural products** in reducing the losses and increasing the efficiency of the post production
- **promote technology** in agro -industry and to process the products for local and international market.

In this context, the vision of the faculty is to develop students in the field of food science and technology, food biotechnology, and post-harvest technology.

The faculty has many activities such as:

- Training courses
- Research
- Study Tours
- Local and International Collaborations.

This program lasts for 4 years. This program could possible fit in the Level 5 or 6 of EQF because of the fact that it involves critical understanding and promoting the management and technology in order to enhance food innovation.

Vocational Training and Professional Institutes

In the first place, the **Training Center for Tourism** provides students with knowledge into “**Food Quality Management System: HACCP Implementation**”. The training period lasted from 16 to 18 March in 2015 as an essential tool for the food handlers/processors and all those involved in the food industry. It provides the **basic principles** of food safety, hygiene and sanitation for implementing the food quality management system which is Hazard Analysis Critical Control Point (HACCP). Besides the short lecture, this training included a lot of group discussions and role plays to encourage the participants to immediately put into real practices what they are learning and to enable the trainer to provide feedback.

The requirements of attendance were:

- **To have** knowledge on the basic principles of food safety, hygiene, sanitation and microbial, physical and chemical risks and control measures.
- **To understand** the requirements of HACCP system and the task works for implementing HACCP system.
- **To follow** a guideline of Codex Alimentarius (CAC/RCP 1-1969, Rev. 4-2003).
- **To prepare** documents such as: Quality policy, Quality manual, Procedures, Records and Review records for correction and corrective action.
- **To gain** an overview of the food laws and regulations of Cambodia and prospect export countries/customers.

The structure of Course Content was:

- **To have a basic knowledge** on food safety
- **To know the applicable regulations** for food industries
- **To learn the principles of food technology**
- **To gain knowledge** on the Risks and control measures
- **To review the code of Practice** on food safety (CAC/RCP 1-1969, Rev. 4-2003)
- **To study the HACCP System** and implementation method
- **To take course in the practical testing methods** for evaluating raw material entry, personal hygiene and swab test.

The benefits of following such kind of training were:

- **To select the content of the training relevant** for in a concise form
- **To update your employees' and managers'** know-how and react quickly to changes with legal peace of mind
- **To provide your employees with new impulses** for their own work
- **To recognize problems from a different point of view** – we can offer participants an ideal platform for exchanging experience, in the group as well as with skilled teachers
- **To give your participating employees** or institute a chance at further development
- **To take advantage of our extensive experience** in further training and from our pool of experienced educators, trainers, and experts and our modern equipment.

Furthermore, the course “**Safe Food Courses**” which ran from July 29 to August 2 to 2019 by the [Mekong Institute](#), aims to strengthen participants’ awareness and understanding of key food safety concepts, related global and local issues, and existing best practices in the region. In particular, the Project focuses on countries, such as Cambodia, Laos, Myanmar, and Vietnam to **raise journalists’ interest** in covering food safety issues so that they can raise awareness back home.

It features presentations from food safety experts in Thailand and field visits to agricultural farms that follow good agricultural practices (GAP) and markets, as well as interviews with various stakeholders in Khon Kaen province. In Cambodia, four ministries are generally involved in the promotion of quality and safe food – Agriculture, Industry and Handicrafts, Commerce, and Health.

In that context, this program could be possible applicable to Level 4” Factual and theoretical knowledge in broad contexts within a field of work or study”, because it aims to strengthen the participants’ awareness, without actually broaden their knowledge in food innovation. Its objective is more related with gaining factual knowledge.

In addition, the [Institut Pasteur du Cambodge](#) offers the course “**Personal Hygiene and Food Safety**” which aims at providing the basic knowledge for the **Laboratory of Environment and Food Safety** of the Institute

and it focuses on **personal hygiene and food safety**. The training, was held in August and September 2018, was mainly for Plant and Food Research team. The Personal Hygiene and Food Safety training ensure that all staff:

- **Know** what foodborne diseases is
- **Understand** how food can become contaminated by virus, bacteria, parasites, or chemicals
- **Learn** the important of personal hygiene
- **Gain insight into** the hygiene measures to prevent foodborne diseases
- **Maintain** good hygienic practices in food production

This program could be related with EQF Level 3” Knowledge of facts, principles, processes and general concepts, in a field of work or study”, because it involves the general engagement with food principles.

Business Associations

EuroCham Cambodia organized the “**Food Safety Management Systems Standard**” which was held in December of 2018. This course helps participants to gain knowledge of new standard and requirements.

5 Country Report: Malaysia

5.1 The VET Structure in Malaysia: Basic Elements

The *Government of Malaysia* established the *Critical Skills Monitoring Committee (CSC)* as a fundamental part of the **Eleventh Malaysian Plan (11MP)** with the mandate to monitor skills imbalances. A Critical Occupations List (COL) coded as **MASCO (Malaysian Standard Classification of Occupations)** was developed to serve as a platform for the coordination of **human capital development policies**. In the report released by the Ministry of Human Resource, the 2018/2019 critical occupation list included Quality Assurance Manager and Production Executive in Halal Food Manufacturing; Food and Drinks Technologist. The call-for evidence survey conducted indicated that⁶:

- The majority of companies have reported that vacancies within this occupation group are for **entry-level and junior executives**;
- The companies employ **minimum of diploma or bachelor’s degree employees** with particular certifications such certificates in the area of food technology and food science;
- The majority of companies have resorted to **raising wages**, increasing worker training, and expanding local recruitment efforts as their strategies to address the talent shortage.
- The companies are looking for the applicant that have **good understanding on the products** with food presentation skills instead of basic baking skills only
- The Food and Beverage Environmental Scan have stated that for the need of bakers, pastry, and confectionery makers is crucial in overall food and beverage Halal industry.

5.2 The current situation in the Food Industry sector in Malaysia

Malaysia has gradually made improves in food processing industry to become a **net exporter** of processed food. The food-processing sector accounts for about **10%** of Malaysia’s manufacturing output contributing to about RM21.1 billion, which was exported to more than 200 countries in 2017. In comparison, import value

⁶ Ministry of Human Resource, Malaysia. “Critical Occupations List 2018/2019”. Occupation Report

of processed food amounted RM20.7 billion. Malaysia has a strong domestic market for halal food. Recognized as a modern Muslim nation, Malaysia is well positioned to be an international halal food hub in the branding, processing and marketing of halal foods to world Muslim populations. The concept of halal is associated with food products which are of high quality in terms of cleanliness, sanitation and compliance with religious requirements with certification issued by the Department of Islamic Development Malaysia (JAKIM).

The Halal certification includes:

- MS 1500:2009 - on the Halal Food : Production, Preparation, Handling and Storage which has incorporated the GMP and hygienic sanitary requirements;
- MS 2565:2014 - Halal Packaging-General Guideline describing the general guidelines in the manufacturing and handling of halal packaging.

The food processing SMEs account a **large part** of mainstream businesses in Malaysia. **Lack of skilled human capital** is one important innovation barriers faced by the Malaysian SMEs due to the **lack of professional and competent employees in the SMEs is preventing them from innovating**.

5.3 Professional Training Courses Provision in Malaysia: A systemic approach

A new framework for technical and vocational training is in the **pipelines**. The **main objective** is the organization of a **well- structured streamlined, effective, and industry-relevant Technical and Vocational Education Training (TVET) system**. Proposed by the National TVET Movement to the Economic Planning Unit last month, the framework aims to address the country's ailing TVET system. Currently as of to date, all TVET programmes have been halted to give time for the Malaysian Qualifications Agency and Department of Skills Development to evaluate its curriculum to ensure TVET meets the quality benchmark set by the government and industrial needs.

The ministry aims to ensure certification and industry standards are met and used as reference in terms of marketability, improving skills, and in making curriculum improvements. The National Occupational Skill Standard is developed for various occupational areas. Candidates for certification must be assessed and trained at certain levels to substantiate competencies. The guideline of each NOSS Level as defined by the Department of Skills Development, Ministry of Human Resources, Malaysia.

5.4 Food Industry Sector Related Occupational Profiles for Malaysia

The following food industry jobs are related with the Food Industry Sector and the Food Innovation and Technology.

Food Technologist

The food technologist must hold knowlege on the new supplier corporate, facility and product approval; nutrition and allergy data management, specification management and food legislation.

The main skills and competences/learning outcomes:

They are expected to conduct nutritional analysis, develop or modify new products (food and beverage), assist in product definition and design. Other job description includes work on process improvements to achieve better efficiency and cost; formulate product specifications and product plans/schedules; perform initial trial and assist daily operations of R&D Section. The required job scope also being responsible to formulate, develop new product and improve product. They are expected to assist QA Manager to manage QA functions in the laboratory, implementing and maintaining quality/food safety management systems.

Certification:

The candidate must possess at least Diploma/Advanced/Higher/Graduate Diploma, Bachelor's Degree/Post Graduate Diploma/Professional certificates.

Quality Assurance Executives

The Quality Assurance Executives are to ensure conformity with quality standards and specifications.

The main skills and competences/learning outcomes:

To research complaints from productions and QC Lab regarding quality and coordinate. To coordinate QC Efforts with all stakeholders. Monitor all test parameter to ensure conformity. Handle ISO Documentation and QA Function, HACCP maintenance, line supervision with knowledge of HACCP and supervisory skills.

Certification:

The candidate has to be a graduate in Food Science or Food Technology; or at least Bachelor's Degree/Post Graduate Diploma/Professional Degree in Biology, Biotechnology, Chemistry or equivalent.

Laboratory Technicians

The candidate has to conduct lab test and production sample verification to ensure final product and process are specification compliance.

Certification:

Diploma/Advanced/Higher/Graduate Diploma

Production Supervisor

The main skills and competences/learning outcomes:

The production supervisor is to assist production foreman in daily production activities and ensure process comply with standard order of operation and work instruction. He/she is responsible in production planning to ensure product produce with quality products within timeline, monitoring closely on production progress. The fundamental skills of the perfect candidate must have:

- **Skills – learning**
- **Teamwork**
- **Self-Reliance**
- **Communication Skills**

Certification:

Diploma/Bachelor's Degree in Food Technology/Science or equivalent.

5.5 Focus Group: Organization and Structure

Part 1: Introductory Questions Findings

The basic Key findings addressed the issue of the fundamental needs and challenges faced by food processing industries. In particular, in introductory questions addressed issues such as the process of recent graduates in order to find a decent job and the needs of current food courses. Moreover, it was discovered that the materials which are used by local suppliers for food technology are of high importance.

Part 2: Sector Skills Gaps Findings

The basic key findings of the part 2 of focus groups, showed that students and in general people who are related with the food sector, in order to pursuit a career in that field, need solving orientation and teamwork skills for a better and efficient cooperation. Apart from these, the research findings showed that human resource management and food technology sustainability not only are in correlation with each other, but also are issues of high importance.

Part 3: Internship Demand & Curricula design input Findings

The basic key findings showed that the majority of participants believe that an internship program benefits them, not only for a future career in food sector but also for the massive improvement of their skills. They also agreed that a potential sponsorship such as sponsoring students and guest lecturers.

Curricula design must include the followings:

- **Halal Certification**
- **Regulatory Requirements**
- **Specific module for major food sectors in the country such as rice processing, poultry management and so on.**
- **Food Safety**
- **Licensing dietician**
- **Integrity particularly relating to Halal food where Halal is not just about logo or endorsement but rather about “Value”**
- **Financial aspects of business**
- **Innovation and Food technology**
- **Food Product development**
- **Food Chemistry**
- **Food Engineering**
- **Food Marketing**
- **Food waste management/reengineering**
- **Skills for developing “Wholesome Nutritious Food”**
- **Negotiation Skills**

5.6 Professional Training Courses Provision in Malaysia. A systemic approach

- **Level 1 VET Training Schemes**

Malaysia Skills Certificate Level 1: Competent in performing a range of varied work activities, most of which are routine and predictable.

- **Level 2 VET Training Schemes**

Malaysia Skills Certificate Level 2: Competent in performing a significant range of varied work activities, performed in a variety of contexts. Some of the activities are non-routine and required individual responsibility and autonomy.

- **Level 3 VET Training Schemes**



Malaysia Skills Certificate Level 3: Competent in performing a broad range of varied work activities, performed in a variety of contexts, most of which are complex and no routine. There is considerable responsibility and autonomy and control or guidance of others is often required.

- **Level 4 VET Training Schemes**

Malaysia Skills Diploma Level 4: Competent in performing a broad range of complex technical or professional work activities performed in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and allocation of resources is often present.

- **Level 5 VET Training Schemes**

Malaysia Skills Advanced Diploma Competent in applying a significant range of Level 5: fundamental principles and complex techniques across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and for the allocation of substantial resources features strongly, as do personal accountabilities for analysis, diagnosis, planning, execution and evaluation.

5.1 Mapping of training programs in Malaysia

Vocational Educational Institutes

The *Institut High tech* provides students with “**Food Processing**” which combines theory and practice and lasts for 2 years. In particular, this course is related to food processing from vegetables, fruits, meat and confectionaries. The preparation from raw materials and all equipment used to quality products with Good Manufacturing Practices in level 1. In the level 2, Production with Good Manufacturing Practices and Standard Operating Procedure is related with packaging. In the level 3, the curriculum involves Economic of scale manufacturing with OSHA. In this course there is no internship program.

The *British Standards Institute in Malaysia* provides students with Transition Training Course which in the 1st day introduces students to the new ISO high level structure (HLS) for management system standards and explores the changes between ISO 22000:2005 and ISO 22000:2018. By attending, participants are able to identify the gaps in your current Food Safety Management System (FSMS) and start planning your transition to the revised standard. The duration of this course lasts for one day. The objective was to gain a solid understanding of the global standard ISO 22000:2005 with the participants Introduction to Food Safety Management Systems training course. Understand how to use ISO 22000 Food Safety Management System to reduce organizational risk and enhance client confidence.

The *Malaysian Institute of Food Technology (MIFT)* gave a certificate in “**Food Safety, Hygiene & Microbe Training**”. In particular this course, is related to **Practical Food Microbiology for Common Foodstuff** - an overview of Food Microbiology (FM) for those who might not have the chance to learn it before, or as a review. The all process and duration lasted 3 days. This module covers the practical aspects that are needed to successfully perform microbe related tasks. The objective was to learn practical aspects of FM and how it helps together microbe related tasks. Understand food safety risk better, especially top pathogens. Use good FM knowledge to enhance the cost savings and even generate income.

Moreover, it included **method validation and verification for microbe Test**, which are an important part of lab management. The basic role of this was to learn the proper way to choose and assess the performance of

the methods so that one may choose a suitable test method for you. Learn method verifications as per ISO 17025 needs, accepted by auditors.

Apart from this, the course offered knowledge in **Microbe Testing in Common Foodstuff** which gave the participants the opportunity to gain insight into learning the practical aspect of MT, understanding how to design test protocols and conducting test properly so that the results can stand challenges, and generate good corporate image and income. In this training, also students receive detailed training notes and templates (MT worksheet and checklist) and post -training support.

In addition, the *Universiti Sains Malaysia* provided a course in “**ISO 22000 - 2005: An integrated food safety management**”. The course is targeted at manufacturers, food technologists and quality control managers in the food industry and provides “hands-on” practical training to such personnel in analyzing accurate nutritional value in food samples using international standard methods. It will cover nutritional labelling regulations within the ambit of the Malaysian Food Act 1983 and Food Regulations 1985. Proper nutrition labelling and claims can bring benefits to the food industry’s’ trade activities and increasing their competitiveness in the market. At the end of the course, participants should be able to use the various methods presented in the analysis of the nutritional content in their food products for labelling purposes as well as to be able to set up a quality control laboratory in their company. At the end of this training course, participants should have acquired:

- **A comprehensive understanding** of the ISO 22000 requirements;
- **The necessary skills** in establishing the Food Safety Management System.

6 Country Report: Thailand

6.1 The VET Structure in Thailand. Basic Elements

The **Office of the Vocational Education Commission (Ovec)** is the leader in Vocational Education and Training for driving the development of economics and society, increasing competitiveness capacity of the country and region. Ovec plans to invite **500 experts who work in 10 industries** targeted under the Thailand 4.0 policy to become special instructors at 900 vocational colleges nationwide. This plan aims to connect students and teachers to professionals and industry experts to integrate real-world experience into classroom lessons. Engaging students with business and industry while they're in the classroom is one of Ovec's strategies to increase the skills of vocational students and produce job-ready graduates to cater to the demands of Thai Industry 4.0. Food innovation and agriculture and biotechnology are among the ten targeted industries for the training.

In Thailand, **Education Development Center (EDC)** has teamed up with vocational institutes to provide an innovative skills training and work-based learning opportunities. EDC is a US-based global nonprofit that advances lasting solutions to improve education, promote health, and expand economic opportunity. The EDC’s accelerating work achievement and readiness for employment 2 (AWARE2) program has been developed and supported local technical education and vocation training (TVET) graduates to handle the digital economy. In Thailand, the EDC has provided this programme in two provinces - Chiang Mai and Lamphun - for seven schools 1,200 targeted students.

6.2 Food Industry Sector Related Occupational Profiles for Thailand

Most common profiles encountered in food industry sector related occupation profiles for Thailand are mentioned below:

Production manager

Job Description:

The Production Manager is responsible for the management of production during shift operation by maximizing existing resources both man powers and machines capacity to achieve efficiency target with standard quality and a safe work environment. The responsibilities include leading continuous improvement in front line as well as developing effective team with high engagement and individual's direct reports career.

Main skills:

- Bachelor's degree in related in related field, preferably in engineering or sciences
- At least 7 years of experience in production environment
- Working knowledge of good manufacturing practices
- Ability to convey communications clearly and concisely
- Demonstrated experience working in people development / building effective teams.
- Understanding of Lean and GMP principles
- Ability to work any shift pattern as needed
- Be able to communicate in English both writing and speaking

Food Auditor(QA/QC in Food Business)

Job Description:

- Participate auditor qualifying program to all relevant standards
- Carry out all necessary audit planning and preparation and report the result of audit
- Develop the skills necessary to conduct the audit and plan, prepare and carry out assigned audit tasks
- Conduct all the necessary follow-up with clients to ensure clients clearly understand all of the requirements of the auditing process and the status of their contract
- Respond to client technical and marketing enquires
- Report any customer complaints, problems and or system deficiencies to the Managerial Levels
- Conduct as a trainer for both management systems and technical training courses.

Qualification:

- Bachelor's degree or higher in Food Science and Technology
- At least 5 years working experience in technical areas (QC/QA, Production, R&D) in food factory
- Working experience in varieties of food categories is preferable.
- Experience in being as internal auditor for management systems is preferable
- Working experience in companies that implemented and certified food safety and quality management systems and getting involved with this system is preferable
- Achieve ISO 22000/FSSC 22000 and ISO 9001 Registered Lead Auditor course is preferable
- Good command in English

6.3 Professional Training Courses Provision in Thailand: A systemic approach

A short term training course **“Safety and Quality in Innovative Food Production Systems”** was conducted by Asian Institute of Technology, Thailand. This training aimed to provide the knowledge on the need for greater quality assurance, and standardization in the food production systems. This course emphasized food quality control as the mechanism for the prevention of food-borne illness and food spoilage at the “farm-to-fork” level.

Institute of Nutrition, Mahidol University provides formal and non-formal training on relevant food and nutrition issues for professionals working in Thailand and other countries. These sessions take the form of short-course training programs as well as attachment programs. The Short-course training area cover a range of food and nutritional issues for the period of 1 week to six-week training with the aims to meet the needs of professionals who want specialized training in specific areas.

Over **20 training courses** on food processing and product development are provided by Kasetsart University (KU) each year to meet the requirement of domestic and Asian region. KU organized annual international training course 14 May -11 June, 2019 on Food Security – Postharvest, Processing and Quality Assurance of Selected Agro-Industrial Products. This training course aims at sharing Thailand’s knowledge and experiences regarding postharvest technology.

Chulalongkorn University organized training course on **“Toward a One Health Approach to Antimicrobial Resistance”** (3-27 June 2019) with aim to share Thailand’s experiences in the application of One Health approach to combat foodborne pathogens and Antimicrobial Resistance. Khon Kaen University conducted training on Sustainable Animal Production and resource Management for Sustainable Agriculture and Food Safety (10 June-6 July) with an aim of sharing Thailand’s knowledge and experiences in sustainable fish farming and livestock production. Mae Fah Luang University is organizing training on R&D in Postharvest and Processing Technology for Food Security (7-27 November, 2019).

This training course aims to provide basic knowledge in postharvest and processing technology.

6.1 Mapping of training programs in Thailand

Government Agencies



The **National Food Institute, Ministry of Industry** provided participants with a training **“Train the Trainer: Food Safety Management (for CLMV)”**. This training took place in 21 May-15 June of 2018.

The objectives of the training were:

- **Gaining knowledge** on food safety management practices
- **Being able** to apply food safety

management.

- **Understanding government’s role** in supporting and promoting food safety management.

The course outline focuses on how to apply different food safety management practices with topics such as:

- Good manufacturing practice

- Hazard analysis and critical control points
- Risk assessment in food industries
- British retail consortium
- ISO 22000:2005
- ISO 17025: 2005 General requirements for the competence of testing laboratories.
- Thai Industrial Standard Guidance on sufficiency economy for industries.

Higher Education Institutes

In the first place the *Asian Institute of Technology (AIT)* provided students with a short term training course (STTC- 2018) on **“Safety and Quality in Innovative Food Production System”**. The duration of this training course lasted on 20-26 May 2018. The objective of this course was to provide the knowledge on the need for greater quality assurance, and standardization in the food production systems. The STTC course emphasizes food quality control as the mechanism for the prevention of food-borne illness and food spoilage at the “farm-to-fork” level.

The Learning Outcomes of this short course were:

- **To identify** hazards as well as standard regulations and procedures in agriculture, aquaculture, livestock and food processing practices.
- **To analyze** hazards and risks associated with food and beverage production.
- **To apply** the basis of safety issues in food supply chain systems.
- **To understand** and apply standard laboratory protocols to maintain the food quality.

In order to be a part of this process, students must have a prior understanding of the food safety systems. This program could possibly fit into EQF Level 5” Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge”, in which students gain an insight of cognitive skills.

Furthermore, the *Mahidol University* offers participants the opportunity to be engaged with the short- course training in the areas of **applied food science, food safety and toxicology, and applied biostatistics**. The course begins and ends each year and aims to **meet the needs of professionals who want specialized training in specific areas**. In particular, the Institute's international short-course training programs have evolved from INMU’s experience over the past few decades in organizing many needs-based training programs. Areas of training cover a range of food and nutritional issues **such as the following:**

- **A one-week policy seminar** for high level policy-makers and planners is offered to multi-disciplinary teams involved in formulating food and nutrition policies, plans and programs in their respective countries.
- **A two- to six-week training course in community nutrition program planning, management, implementation and evaluation** is also organized by combining theoretical considerations and discussions with Thai authorities from both policy-making and implementation units.
- **Direct field experiences** are organized through short field trips to projects that are relevant to improving food and nutrition policy-making, planning and programming, as well as hands-on experience in data collection and the formulation of action plans.
- **A two-week training course on developing** applied food and nutrition projects is organized for participants from fellow countries of the South East Asia Nutrition Research-cum-Action Network. The course aims at assisting professionals in member countries to design protocols, implementation and evaluation plans, and to develop a project proposal on specific question(s) identified by participants.

- **A three- to four-week course is arranged upon request which includes classroom lectures, discussions, and field trip.** Specific nutritional assessment methodologies including field techniques (e.g., anthropometry, dietary assessment) and laboratory-based techniques (e.g., biochemical parameters of various nutritional deficiencies) are dealt with in this short-course training program. Examples include surveys of nutritional deficiencies within communities, as well as biochemical techniques of iron and vitamin A assessment.
- **Short-course training programs** are also offered upon request in the areas of applied food science, food safety and toxicology, and applied biostatistics.

As far as the **Kasetsart University** it offers participants the chance to be involved in 20 training courses on **food processing and product development on the regular basis**. The program starts and ends each year and its objective is to meet the requirement of domestic and Asian region. Also, the same provider gives the opportunity to young learners to be involved in **“Food Security – Postharvest, Processing and Quality Assurance of Selected Agro-Industrial Products”**. This course lasted in the period 14 May – 11 June 2019 and aimed at:

- **Sharing** Thailand’s knowledge and experiences regarding postharvest technology.
- **Understanding** how important postharvest technology is in maintaining quality, protecting food safety, and reducing losses between harvest and consumption.
- **Gaining** knowledge on principles and concepts of postharvest, food preservation processing, packaging, product development and quality measurement.
- **Promoting** food security in participant’s respective country.

This **training course** focuses on the principle of postharvest technology, food preservation and food safety. It will discuss approaches to implement appropriate technologies to selected commodities. Topics of the training are such as:

- Food security – availability, accessibility, utilization and stability.
- Production and postharvest technology for selected plants and animals.
- Production and preservation of nutritious food from agricultural raw materials to promote food security for needed population.
- Review of food safety with an emphasis on prevention of toxin contamination.
- Packaging of raw materials and food products.
- Review of quality measurement of raw materials and food products including chemical, physical, and microbiological and consumer preference.

The participant criteria to be met are:

- “Guideline for Thailand’s Annual International Training Course Programme” No. 2 “Qualifications” as well as following qualification;
- Currently working with at least two-five years’ experience in relevant field.
- Graduated with degree in food science, food engineering, agro-industry, agricultural science, home economic, biotechnology, agricultural processing, agricultural product development
- Be less than 50 years of age.

The **Chulalongkorn University** provided students with the curriculum **“Toward a One Health Approach to Antimicrobial Resistance”**. This course was short and lasted in the period of 3-27 June in 2019. This training course aims at sharing Thailand’s experiences in the application of One Health approach to combat foodborne pathogens and Antimicrobial Resistance. Apart from this, its objectives are:

- **To gain knowledge** and basic skill in the application of One Health Approach in controlling and preventing foodborne pathogens and AMR.
- **To be able** to apply knowledge and skill to the case of their respective countries.

The **basic topics** of the training were:

- **Principle and epidemiology** of AMU and AMR;
- **Approaches to AMR** monitoring and surveillance;
- **Technology and implementation** for controlling and preventing AMR;
- **Laboratory practice** in "Standard antimicrobial susceptibility test for standardized and harmonized AMR surveillance";
- **Computer laboratory practice** in "Statistics for AMR monitoring and surveillance".

In order for students to be selected there were important requirements, such as:

- **Currently working** with at least two-year professional experience as veterinarians, public health officers, medical doctors and research scientists in the area of antimicrobial resistance, food microbiology, food safety and veterinary public health.
- **University graduated** in relevant fields with basic knowledge in microbiology.

The ***Khon Kaen University*** offered the course "**Sustainable Animal Production and resource Management for Sustainable Agriculture and Food Safety**" which lasted from 10th of June to 6th July of 2019. The objectives of this course were:

- To provide **understanding on concepts** of animal production and food safety
- To provide the **academic knowledge and practicum** on sustainable livestock production leader
- To provide the **academic knowledge** on how to incorporate environmental friendly and due with marketing sizes to **achieve agricultural development** in the entire food system.
- To stimulate participants to **share experience** and lessons learned on Good Agricultural Practices

The course consisted of 4 Modules:

- **Module1:** Animal genetics and reproductive improvement from Indigenous Animal to Domestic Animal for moving farm to market.
- **Module2:** Local Feeds and Forages Management for sustainable animal production
- **Module3:** Research plan and methodology designs for Good Agriculture Practices (GAP)
- **Module4:** Sustainable Inland aquaculture management and food processing.

This course could possibly fit into the EQF Level 6 "Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles", because it offers the chance to demonstrate mastery and innovation in a specific field.

The ***Mae Fah Luang University*** offered a course on "**R&D in Postharvest and Processing Technology for Food Security**" which lasted from 7th of November to 27th of November of 2019. The course aims at:

- **Provide** the basic knowledge in postharvest and processing technology of agricultural produces with the skill to develop food security and added value of agricultural products.
- **Learn** how to manage agricultural production to reduce losses during storage and transportation.
- **Enhance** knowledge and understanding of how to select appropriate technology to maintain food security.
- **Promote** collaboration and communication.
- **Foster** a professional network among participants.

The training course focuses on how to apply postharvest and processing technology to promote food security.

Topics of the training were:

- **Postharvest losses**
- **Postharvest management of fruit and vegetables**
- **Application of packaging technology for agricultural produces.**
- **Quality measurement of raw materials and food products including chemical, physical and microbiological preference.**
- **Assuring food safety and quality.**
- **Agricultural waste utilization such as peel, seed and skin.**
- **Logistics and supply chain for agricultural production.**

7 Summarising the key points to be addressed

Having presented and identified the main challenges of the food industry in the partner countries of Malaysia, Cambodia and Thailand, we are summarizing below the main findings per country.

Cambodia

In the *Country report of Cambodia* it was discovered that for sustainable growth, Cambodia as an agricultural country **focuses more on agro-business** in terms of food safety and security and technology. **Universities should revise and develop the existing curricula to produce human resources to response the country's needs.** Food industries and factories should be established to process the overwhelming agricultural productions produced by the Cambodian farmers. Furthermore, the Cambodian Higher Education Institutions are challenged with risks such as:

- **Lack of qualified lecturers** and experts to run the programs
- **Lack of laboratories** to support the programs
- **Limited number of students** who will enroll in the programs
- **Lack of financial support** to run the courses due to the low tuition fees

Some proposals in order to address these matters, are:

- ✓ **The design of an integrated curriculum** on Food Technology, Entrepreneurship, and Agro-Business.
- ✓ **The structure of a new Cambodian government's Rectangular Strategy 2018-2023**, Policy on Higher Education Version 2030, and Cambodian Industrial Development Policy 2015-2025 which will focus more on sustainable growth.
- ✓ **The institutional capacity building of the Universities and training centers in the country** to increase their ability and performance in managing food innovation programs.

Further to the above points, another set of key issues to be taken into are:

- **Product quality** needs improvement from process engineering.
- **Fable Process control monitoring.**
- Problematic **quality management system** and implementation (food safety standards or other standards).
- Challenging **General Management System (GMS) and Quality Management System (QMS).**
- Lack of **practical and communication skills**, and **foreign languages skills** as well as **soft and hard skills** of the personnel.

- It is difficult for the **Cambodian food sector to overcome the problem of competition** with other food companies and imported products. Consumer demand will need also to be studied and offer what the consumers need and be able to buy at an affordable price.

Furthermore, the food analysis and testing methods in Cambodia are moderately different and for that reason there is a need for some study program/equipment in order for these 2 fields to be distinguished.

Other challenges involve:

- **Gaps in processing skills**
- **Gaps in Food quality**, especially in food safety and quality management (FSQM)
- **Gaps in Packaging** and labelling which Cambodian Government needs to strengthen to make the food products more attractive.
- **Gaps in Food innovation**
- **Need for more training in Soft skills** in the field of production between engineers, personnel and workers.
- **Gaps in Food value chain** in the research and innovation for food production and marketing.
- **Need for Product development** to be added as an input in the food processing.

In the Part 3: Internship Demand & Curricula design input Findings it was also discovered that:

- **The Internship program needs to be scheduled** with practical skills and offer the additional guidance and mentoring to support and improve the associate (employee) skill as much as possible by internal and external experts.
- **There are problems during the operation** which have employees or interns coming from various institutions. Skills such as communication and feedback are desirable for team works.

Despite the existing legal framework in Cambodia, there are a number of critical issues challenging food safety implementation, especially the lack of effective cooperation among the line ministries.

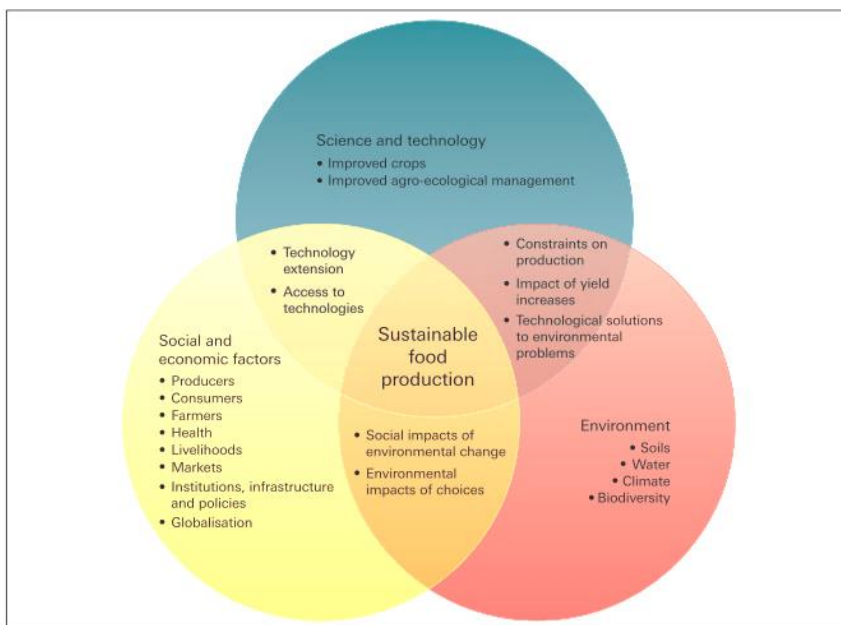
Malaysia

In the **Country Report of Malaysia**, a lack of short courses at professional certificate levels to be provided for in-service training for the food industry was identified. Food process improvements are needed to achieve better efficiency and cost that will also formulate product specifications.

The emergence and growth of Halal food market with the broad acceptance among non-Muslim consumers who consider Halal food as safe, hygienic, quality and wholesome product has created huge gap in halal food training facilities and human resources.

In the *Focus Groups in Malaysia* needs and challenges faced by food processing industries are identified as such:

- **Difficulty to get the right graduates** to fill in talent gaps for the food industries.
- **Difficulty for most graduates to pursuit** an ideal career.



- **Lack of present graduates in right attitude** and soft skills such as communication, critical thinking and hands on skills.
- **Current food courses do not tailored to specific needs** of local food industries particularly relating to appropriate packaging and rice processing course.
- **Collaboration between Universities-Industries** lacks while it would be an advantage if this area being addressed as universities would have access to the food processing equipment and facilities of the industry,
- **Food industry is facing rising cost** of materials and ingredients, while the increase of cost could not be simply transferred to consumers to ensure acceptable menu pricing.
- **Limited storage areas to maintain good quality** of raw items, translating to more frequent delivery of goods and this impacted the cost.

In the Part 2: Sector Skills Gaps Findings it was also discovered that:

- **The majority of graduates** have a background in food programs but are not specialized in food innovation.
- **The majority of current talents** particularly from public universities are excellent in certain skills but lack in soft skills, particularly in communication, teamwork and punctuality
- **There is a lack of confidence** amongst public university graduates.
- **The majority of courses** may require the technical knowledge of a specific area such as supply chain or product management.
- **The majority of students** fail in understanding the importance of life- long learning
- **The Gaps in human resource management**, engaging with peers and stakeholders and leadership skills.

The main strengths of the discussions are the participants of the focus groups who are really committed to answer all the facilitators questions and sharing their perspectives of the industry. All of them have strong experience of an average of more than 22 years and they have built their career in food related industries since they graduated.

In terms of needs and challenges, participants are in view that the main needs are for right graduates to fill in talent gaps for the food industry. Other challenges include sustainable source of raw materials from local suppliers, stringent requirement for Halal and Safety of food and rapid change of technology to cope with. This is not surprising as Malaysia is a developing country which requires skillfull talent in its journey to be an advanced nation. As the country intends to be the major Halal Hub for the region, more talents with halal knowledge and expertise are needed. The rapid innovations and technology advancement is another challenge that must be addressed for the industry to remain competitive and spell the needs for proactive talent with agility to cope with changes.

In terms of skills gap, the major gaps identified amongst the talents in food industries are the **lack of soft skills such as communication, teamwork and entrepreneurial drives which includes motivation, attitude and innovativeness**. Talents must keep abreast with latest technology in food development and be able to overcome gaps in skills for human resource management, leadership quality and engagement skills with peers and stakeholders. Soft skills such as maintaining integrity, punctuality, team player and going beyond are very valuable to the industry.

All participants are open to ideas and will be ready to support the intended MSc in Food Processing program whenever possible. Curricula design must include; Halal Certification, Regulatory Requirements, and specific

module for major food sectors in the country such as rice processing, poultry management and so on. Food safety and food related business management are also required.

As far as the “FOODI Analysis Survey- Descriptive Analysis”, conducted by Malaysia in order to identify which Technical Modules should form the major part of postgraduate programs for the Food Industry, the vast majority of participants addressed the need that technical model should form the major part of postgraduate programs for the food industry.

Thailand

In the *Country report in Thailand*, it was discovered that:

- There is demand for **training courses** in the areas related to food innovation.
- Training courses have to focus on the **development of academic, technical and soft skills**.
- The gap between **industrial equipment and university education** needs to be considered.
- The enhancement of specific skills such as **laboratory analysis, management, communication and software skills**.

As far as the *Focus Groups in Thailand*, are concerned, it was shown that:

- Many participants lack in **laboratory skills** and quality analysis management.
- Industries have to focus on the **sustainability of food production** and manufacturing process.
- Industries have to do **research and production development**.
- Skills such as **entrepreneurship and engineering** are not considered of high importance as core modules.

According to the three country reports, we can see that it is difficult to distinguish how NQF Programs are related to EQF Modules. This is an issue that should be addressed, as students could:

- Gain a broader insight into how food innovation processes throughout the world.
- Adapt in a globalized educational context.
- Find new possible issues that could be fixed.

In terms of personnel skills gaps, the most characteristic that the three countries lack are summarized as such:

- Innovation
- Digital
- Research
- Entrepreneurship

Moreover, soft skills that are considered of high demand and the three countries doesn't excel are:

- Communication
- Flexibility
- Leadership
- Management

To this end, all participants in the focus groups declared that they are more than willing to host the FOODI Internships once the program is further developed.

Without support and up skilling, the food industries struggle to produce products that meet specific (and rising) standards, and may rely on inputs that are harmful to human health.

On the other hand, new technology such as block chain technology, which can monitor and track food in the supply chain, can help in driving food supply transparency as well as increasing responsiveness to food safety issues. It would allow specific products to be traced at any time, allowing contaminated products to be traced easily and quickly.

The three countries need to invest in capacity-building and strengthening regulatory frameworks to deliver evidence-based policymaking. Governments need to develop their own capacities to ensure that evidence-based policymaking occurs in all areas of scientific research. New technologies such as CRISPR, and even policies regarding import regulations and standards, require significant investment by governments to develop both understanding and regulation.

8 ANNEXES

8.1 ANNEX 1. Participants list template

MSc Course in Food Processing and Innovation (FOODI)

Focus group Interview Nr. xxx

[Location], [date]

A/A	Name	Organization	Field of Expertise	Telephone number	E-mail	Signature

8.2 ANNEX 2. Common template on FOODI Qualitative research

Introductory Information

Description:

Introductory paragraph: Please state in no more than 10-15 lines the main aim of this certain discussion and provide a brief on its synthesis and rationale behind selecting the participants

Name of Interviewee(s)	
Purpose of the Focus Group	Please state in brief the main goals of the focus group
Date and time	
Place	
Number of participants	
Facilitator/s	Name: Contact details:
Signature of Facilitator	
Interviewee(s)	Name: Contact details:
Signature of Interviewee(s)	
Duration	

Main points findings

Part 1: Introductory Questions Findings	
Key findings (20-30 lines)	•
Part 2: Sector Skills Gaps Findings	
Key findings (20-30 lines)	•
Part 3: Internship Demand & Curricula design input Findings	
Key findings (20-30 lines)	•

Profile of participants

Participant Nr. 1	Name: Age group: Years of expertise: Educational background: Short bio: (no more than 5 lines)
Participant Nr. 2	Name: Age group: Years of expertise: Educational background: Short bio: (no more than 5 lines)
Participant Nr. 3	Name: Age group: Years of expertise: Educational background: Short bio: (no more than 5 lines)
Participant Nr. 4	Name: Age group: Years of expertise: Educational background: Short bio: (no more than 5 lines)
Participant Nr. 5	Name: Age group: Years of expertise: Educational background: Short bio: (no more than 5 lines)

Conclusions and recommendations

- **Description:**

Please identify the main strengths and limitations of the discussions and provide a short summary of no more than 20-25 lines with regards to conclusions and policy recommendations

8.3 Annex 3: Professional Training Programs