



Co-funded by the
Erasmus+ Programme
of the European Union



Compiled Final Report of WP1

Recommendations from Europe and Asia For SSNS MSc and VET Programs

Funding details:

Education, Audiovisual and Culture Executive Agency

Erasmus+: Higher Education – International Capacity Building

KA2: Cooperation for innovation and the exchange of good practices – Capacity building in the field of Higher Education

Agreement Number: 2018 – 0028 / 001 - 001

Project Number: 585924-EPP-1-2017-1-TH-EPPKA2-CBHE-JP

Support:

Co-funded by the Erasmus+ programme of the European Union

Deliverable details:

Due date of Deliverable: 30-06-2018

Actual submission date: 30-9-2018

Start date of project: 15 - 10 - 2017

Duration: 3 years

Organisation name of lead contractor for this deliverable: NTNU

Dissemination level		
<input checked="" type="checkbox"/> Department / Faculty	<input type="checkbox"/> Local	<input type="checkbox"/> National
<input checked="" type="checkbox"/> Institution	<input type="checkbox"/> Regional	<input type="checkbox"/> International

Disclaimer: The European Commission supports for the production of this publication does not constitute an endorsement of the contents, which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Table of contents

1. Recommendations from Europe	4
1.1. MSc Courses	4
1.2. Best practices	5
1.3. VET Courses from Europe	5
2. Recommendations for Thailand	7
2.1 MSc Courses	7
2.2 Vocational Education Training / short term courses:.....	7
2.3 Best practices in teaching methods or course delivery are:	7
3. Recommended courses for Indonesia.....	8
3.1 From existing courses:.....	8
3.2 Existing course with modification	8
3.3 New courses.....	8
4. Recommended courses for Vietnam:.....	9
4.1 Compulsory courses	9
4.2 Optional courses	9
4.3 The new courses proposed for SSNS could be listed as	9
4.4 VET courses should include:	10

1. Recommendations from Europe

1.1. MSc Courses

European HEIs offer a broad selection of relevant MSc programs that can be used as inspiration to develop the new SSNS MSc curricula in Asia. The most frequently taught subjects among the identified MSc programs were;

1. Aquaculture
2. Management,
3. Ecology,
4. Genetics and Breeding,
5. Sustainability.

Based on the survey from around the world, and review of literature we recommended that it would be relevant to choose subjects that support sustainable growth in aquaculture. Some specific subjects mentioned were;

1. Aquatic animal health control,
2. Food sustainability,
3. Aquatic production systems,
4. Fish farm management,
5. Fish nutrition, feed formulation using local feed resources.

In addition, several topics related to downstream processing is important. The highest ranked subjects for those which are specializing downstream processing were:

1. Seafood Safety,
2. Seafood Processing,
3. Seafood Technology and
4. Food Engineering.

More comprehensive list of potential courses is recommended based on the survey. The subjects are given below in order of highest to lowest preference, which should be considered while selecting the courses for SSNS MSc curricula with their % among the respondents who were the professionals in the field of aquaculture and fisheries and total number was 49:

1. Food safety - 73%
2. Seafood quality - 66%
3. Food Security - 52%
4. Aquatic Animal Health Control - 50%
5. Seafood certification - 50%
6. Food sustainability -50%
7. Aquatic production systems -48%
8. Fish nutrition -45%
9. Food processing- 43%
10. Food technology -39%

11. Farm management -39%
12. Feed formulation and feed resources-36%
13. Food microbiology -34%,
14. Food Chemistry -32%
15. Food Engineering -32%
16. Fisheries -32%,
17. Seminar Courses -30%
18. Internship -30%,
19. Water Re-Circulatory System -30%

1.2. Best practices

Among the best practices active learning methods was found to be the most important as it increases student's employability and the specific learning outcome.

It is however difficult to state, "best practice" regarding the use of digital tools. It is therefore necessary to do more research or search relevant literature to make a trustable conclusion regarding the subject.

To achieve the objective learning several personal skills are important. Based on the present study we concluded that the willingness to learn was stated as the most important point in learning. How to create highest level of willingness to learn in students was not clear from the survey. However, willingness to learn is closely associated with the term "engagement" that is familiar terms such as personal motivation and concentration on the subject matter. Therefore, use of active learning methods enhance student motivation and engagement.

1.3. VET Courses from Europe

The ways that Universities use in order to support students' interest and increase the knowledge and skills of academic staff in this field are:

- Use of social media campaigns, conferences, seminars, workshops, special training courses
- Invite several guest lecturers to present their expertise
- Provision of courses related to this field
- Impel students to do researches and lecturers to conduct them as well
- Creative projects for undergraduate students with the view to solve problems occurring in aquaculture and fish processing
- Facilities that suit to SSNS project
- Bachelor and MSc programs in Aquaculture and Food Technology, VET courses seminar for the demands of labour markets on Fishery.
- Providing students with the chance to visit the processing plants, facilities and be introduced into the technique procedure of the food processing
- Running different developed programmes with IT-based material by sending staff to take part in some training and apply the technology in society group bases

Internships is a significant feature All institutions provide different forms of internship which is an encouraging fact that they already know how to implement internships in the field of aquaculture and fisheries food industry.

The perspectives for near future, as they were expressed by some universities, are:

- The provision of online courses related to the field of aquaculture and fisheries food security, developed in a larger scale.
- Courses can be shorter but more effective.
- Opening of a Center of Excellence.
Collaboration with other institutions so as to promote sustainable seafood and nutrition security.

2. Recommendations for Thailand

2.1 MSc Courses

In Thailand, recommendations have been made in two categories; a) sustainable catch management and sustainable culture management which are given in below:

SN	Sustainable Catch Management	SN	Sustainable Culture Management
1	Seafood and food security	1	Seafood and SDGs
2	Fisheries governance & policies	2	Entrepreneurship in Seafood business
3	Sustainable fishing technologies	3	Green/Organic aquaculture
4	Fisheries ecology & tourism	4	Precision aquaculture
5	Stock assessment & monitoring	5	Aqua feed business
6	Culture based fisheries	6	Aqua seed business
7	Sea grasses and seaweed conservation	7	Integrated multi-trophic Aquaculture
8	Coral reef conservation and restoration	8	Mariculture (sea bass, grouper, eels..)
9	Plastics & wastes, and water pollution	9	Deep sea/offshore aquaculture
10	Livelihood diversification for fishers	10	Aquaculture and the Environment
11	Gender and fisheries	11	Biosecurity & Fish Diseases
12	Rare species breeding & stocking	12	Aquaculture and the environment
13	Integrated coastal zone management	13	Aquaculture and global warming
14	Post-catch handling and management	14	Value-added seafood products
15	Climate change and Fisheries	15	Seafood safety and certification
16	Seminar	16	Seminar
17	Special case studies	17	Special case studies
18	Internship	18	Internship
19	Thesis research & publication	19	Thesis research & publication

2.2 Vocational Education Training / short term courses:

The followings are the recommended VET Courses for Thailand.

1. Fish/shellfish diseases diagnosis and treatment
2. Seafood business start-ups
3. Hatchery and grow-out of tilapia
4. Hatchery and grow-out of shrimp/prawn
5. Biofloc / Aqua-mimicry
6. Hatchery and grow-out of sea bass
7. Water Recirculation Aquaculture System (RAS)
8. Aquaponics
9. Seafood processing and product marketing
10. Good Aquaculture Management practices
11. Seafood safety and certification

2.3 Best practices in teaching methods or course delivery are:

1. Planned Field Visits (e.g. AIT)
2. Feed factory visit (e.g. AIT)

3. Internship (e.g. AIT)
4. Special case studies (at least one very relevant to respective course)
5. Research with industry partnership
6. Seminar courses (e.g. Kasetsart University)

3. Recommended courses for Indonesia

Based on the assessment of current courses and gap analysis, the following courses have been recommended for SSNS program which project teams think these will make an attractive program with special focus on “Sustainable Seafood and Nutrition Security” (in form of SSNS specialty on existing curriculum or just in form of training courses):

3.1 From existing courses:

The following four courses are already offered by some of the Indonesian universities which can be included in SSNS Curricula:

1. Sustainable Fishing Industry
2. Fish and Seafood Standardization
3. Enzyme System on Fish and Seafood
4. Bio-molecular Techniques for Aquatic Product

3.2 Existing course with modification

At the same time, the project team also recommends the following four courses to be modified in order to suit to the SSNS curricula:

1. Aquatic Bio-resources Characteristics
2. Aquatic Flora and Fauna (Fishes) Nutritional Changes after Harvesting
3. Fish and Environmental Health Management (revision from PIP 5234-UGM)
4. System Handling and Transportation of Fish and Seafood

3.3 New courses

In addition to the above mentioned course, the following course should be developed new and incorporated:

5. Fish Quality and Traceability of Seafoods
6. Seafood Safety
7. Advance Seafood Technology

4. Recommended courses for Vietnam:

For Vietnam, the project team has come up with the list of core or compulsory courses and optional courses as per the university system, which are as follows:

4.1 Compulsory courses

- 1) Scientific research methodology
- 2) Feed and nutrition in aquaculture
- 3) Physiology of aquatic organisms
- 4) Water quality management in aquaculture systems
- 5) Fish health management / Diseases of Aquatic Organism/ Disease outbreak management
- 6) Aquaculture genetics
- 7) Aquaculture production or aquaculture system or advanced aquaculture in both fresh and saline water.
- 8) Field trip / internship on practical aquaculture

4.2 Optional courses

1. Aquatic resources management
2. Aquaculture wetland ecosystem
3. Applied immunology in aquaculture and vaccine
4. Application of GIS in aquaculture
5. Planning for aquaculture development
6. Applied biotechnology in aquaculture
7. Environmental impact assessment on aquaculture
8. Fisheries project management
9. Seaweed aquaculture
10. Technology of fisheries products processing
11. Applied microbiology in aquaculture
12. Live feed production (3/6)

4.3 The new courses proposed for SSNS could be listed as

- 1) Seafood safety and quality control
- 2) Seafood and human nutrition
- 3) Ethical issues in aquaculture production
- 4) Aquaculture and the environment
- 5) Quantifying food risks/analytical methods for food risk elements
- 6) International food safety laws and regulations in international markets (EU)
- 7) Aquaculture certification
- 8) Value chain of aquatic products
- 9) Organic aquaculture

- 10) Ecologically sustainable food systems (module)
- 11) Food and Nutrition Security and Policy (module)
- 12) Biosecurity for Aquaculture and Food Products (module)

4.4 VET courses should include:

The following courses for vocational education training are recommended:

1. Aquatic products and Food safety and hygiene
2. Quantifying food risks/analytical methods for food risk elements
3. Seafood and human nutrition
4. Aquaculture: basic knowledge (trainee: different specialty + worker) + updated techniques
5. Aquatic products processing: updated techniques
6. Disease diagnostic laboratory techniques: updates (for entrepreneur technicians)
7. Disease analysis for fish and shrimp: for entrepreneur personnel
8. Marketing
9. Biosecurity in aquaculture;
10. Aquatic animal disease prevention and control/management;
11. Breeding technology in aquaculture.
12. Aquaculture certification

-*-