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Impact Evaluation of the Belgian University Development Cooperation

Syspons GmbH & Nuffic

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Vietnam VLIR-UOS
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Contents

Abbreviations and acronyms

AUSAID	Australian Aid
ARES	Académie de Recherche et d'Enseignement Supérieur
CDI	Capacity Development Index
CTU	Can Tho University
CPRGS	Comprehensive Poverty Reduction and Growth Strategy
DFID	Department for International Development (UK)
DGD	Directorat-Gneral Development Cooperation
EFA	National Education for All
FWO	Fonds Wetenschappelijk Onderzoek
GDP	Gross Domestic Product
HERA 2020	Higher Education Reform Agenda 2006 – 2020
HUFA	Highly Unsaturated Fatty Acids
ICT	Information and Communication Technology
IUC	Institutional University Cooperation
JICA	Japanese International Cooperation Agency
MHO	Medefinancieringsprogramma voor Hoger Onderwijssamenwerking
MoET	Vietnamese Ministry of Higher Education and Training
OECD-DAC	Organisation for Econimic Co-operation and Development - Deveopment Assistance Committee
OI	Own Initiatives
RCTs	Randomised Control Group Trials
RIP	Research Initiatives Programme
SEDS	Socio-Economic Development Strategy
SEO	Special Evaluation Office
ToC	Theory of Change
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VLIR	Vlaamse Interuniversitaire Raad

VLIR-UOS	VLIR-secretariat for university development cooperation
VUB	Vrije Universiteit Brussels

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1. Introduction

The Special Evaluation Office of the Belgian Development Cooperation (SEO) commissioned Syspons and Nuffic to conduct the "Impact evaluation of the Belgian university development cooperation". The objectives of the evaluation are formative and summative. With regard to the former, the evaluation should examine the evaluability of the impact of Belgian university cooperation. More specifically, the evaluation should analyse "to what extent and on the basis of which methodological approach the impact of the Belgian university cooperation is evaluable (SEO, 2016, p.24)." Concerning the latter, the impact of the Belgian university cooperation should be evaluated on the basis of a sample of selected interventions. Hereby it should be analysed whether, to what extent and under what conditions impacts were achieved.

The scope of the evaluation covers long-term partnerships connected with interventions between January 2000 and December 2014 and scholarships that were granted for the period between January 2008 and December 2016. The interventions to be examined are located in the following countries: Vietnam (VLIR-UOS and ARES), Benin (ARES) and Ethiopia (VLIR-UOS).

In this evaluation Syspons and Nuffic were asked to deliver country reports for each of the four field missions, which took place in Benin, Ethiopia and Vietnam. The country reports should thereby assess the impact of the interventions which were selected in the previous fact-finding missions and are documented in the submitted study report by Syspons and Nuffic. Therefore, this country report analyses the impact of the selected VLIR-UOS' IUC with Can Tho University in Vietnam as well as seleted impacts from the individual scholarship survey for VLIR-UOS scholarships in Vietnam. Furthermore, it describes the lessons learned regarding the methodology used. A detailed description of the applied methodology can be found in the annex.

The country report is structured as follows:

- **Chapter 2** gives a description of the analysed IUC with Can Tho University.
- **Chapter 3** describes the situation at Can Tho University prior to the IUC.
- **Chapter 4** presents the field mission's results with regard to the IUC and the individual scholarships.
- **Chapter 5** draws conclusions on the basis of the presented results.
- **Chapter 6** introduces lessons learned with regard to the methodology used.
- The **annex** includes the bibliography, the list of conducted interviews, the evaluation design, the developed Theory of Change for the IUC, the assessment grid as well as the data collection instruments used.

2. The IUC with Can Tho University at a glance

2.1 Description of the IUC with Can Tho University

Initial contacts and collaboration between Flemish Universities and Can Tho University started in the 1980s and resulted in the implementation of several VLIR-UOS Own Initiatives (OI) projects in the 1990s. The latter were limited to faculties of the University of Gent and Leuven. Based on the OI projects' results an agreement was signed between Can Tho University and VLIR for an IUC programme in March 1998 for a period of five years (1998-2003). On the basis of the results of a conducted mid-term evaluation a second and final phase of the IUC programme was signed for another period of five years (2003-2008). Currently, Can Tho University is part of the VLIR-UOS NETWORK project, in which it is responsible for the thematic fields of aquaculture and biotechnology.

The IUC programme's objective in the first phase (1998-2003) was to strengthen the educational, organisational and research capacity of Can Tho University's staff members with a special emphasis on human resource development and upgrading of laboratory facilities. The second phase (2003-2008) concentrated on further strengthening of staff members and on specific research development. Moreover, this phase strived to contribute to the socio-economic development of the Mekong Delta.

The programme can be divided in two main components, namely education (Coded "A" in phase 1 and coded "E" in phase 2) and research (Coded "B" in phase 1 and coded "R" in phase 2), each with its own projects (see figure 1).

Figure 1: Can Tho University IUC programme phase 1 and 2

IUC Programme Phase 1 (01.04.98 - 31.03.03)	A1 - Distance education by using computer networks
	A2 - Undergraduate curriculum development for environmental engineering and postharvest technology
	B1 - Artisanal pond production of Artemia: Study of soil and nutrient interactions, demonstrating systems to farmers
	B2 - The selection and propagation of valuable fruit tree varieties
	B3 - Studies on tropical plant-microbe interactions and development of molecular techniques for detecting pathogen in valuable trees
	B4 - Microbial management in aquaculture - Mud crab larviculture as first test case
	B5 - Fruit preservation and processing
	B6 - Development of an appropriate enzyme technology for food production
	B7 - Management of physical and chemical soil fertility degradation of alluvial soil types for sustainable paddy rice production in the Mekong delta
IUC Programme Phase 2 (01.04.03 - 31.03.08)	E.1 - Distance education
	E.2.1 - Undergraduate curriculum development for environmental engineering
	E.2.2 - Mechanical and post-harvest food processing engineering
	R.1.1 - Study of aquatic environment in Vinh Chau - Bac Lieu coastlines and sustainable development of aquaculture activities
	R.1.2 - Microbial management of crustacan larviculture
	R.2.1 - Phytotechnology: The selection, propagation and production of valuable fruit tree varieties in the Mekong delta
	R.2.2 - Biotechnology studies on plant-microbe interaction and their biodiversity
	R.2.3 - Technology: Fruit preservation and processing
	R.2.4 - Enzymology: Development of an appropriate enzyme technology for food processing
	R.3 - Soil dynamics in terrestrial/ aquatic environments

Source: Syspons and Nuffic 2017

The activities within the IUC were mainly concentrated towards the College of Technology, the College of Agriculture (today the College of Agriculture and Applied Biology), the Institute of Marine Aquaculture (today the College of Aquaculture and Fisheries) and the Biotechnology Research and Development Institute.

On the programme level the IUC aimed at supporting Can Tho University in the following areas through financed projects under the IUC:

- human resource development through supporting grants for PhD, MSc and short training courses
- upgrading of facilities (information and communication technology (ICT), laboratories, etc.)
- introduction of new techniques (e.g. molecular biology)
- developing courseware and new curricula
- developing distant education

- strengthening of research capacity in defined areas

A detailed overview of the intended synergies between the funded projects is presented in the Theory of Change (ToC) in the annex.

The total budget of the IUC programme amounted to 6.778.863 Euros while 3.718.863 Euros were spent in phase 1 and 3.060.000 Euros were disbursed in phase 2.

2.1.1 Project A1 and E.1: Distance education

In its first phase the project focused on the establishment of an education system through the use of computer networks that should complement the existing classical education system. For this purpose, courseware was produced in two disciplines: informatics and aquaculture. Furthermore, a Master of Business Administration curriculum was developed for professionals in public service as well as in public and private firms to improve the quality of management in these organisations.

In the second phase the project emphasised the integration of improved teaching methods and materials in the MSc programmes of Economics and Aquaculture, thereby relying on the use of a Learning Management System. In this regard, system managers and pedagogic tutors and teachers were trained in Belgium, the Learning Management System was installed and teachers from two faculties improved selected courses by using Dokeos – an E-Learning platform. Afterwards, the established e-learning system was rolled out at university level and distance education was established at Can Tho University as another method of teaching.

2.1.2 Project A2, E.2.1 and E.2.2: Undergraduate curriculum development for environmental engineering, mechanical and postharvest food processing engineering

This project aimed to improve the curriculum of Environmental Engineering, Mechanical and Postharvest Food Processing Engineering in both phases. For this purpose the research capacity of the Centre of Environmental Engineering and Renewable Energy and the Department of Agricultural Machinery and Postharvest Food Processing Engineering was improved. As a result the college library, the environmental engineering laboratory and the food processing engineering laboratory were upgraded. Furthermore, a natural treatment system at Can Tho University was constructed to use as a model to collect data for developing treatment models. Moreover, Can Tho University's staff was trained in the fields of environmental risk assessment, solid waste management and treatment, water resource, water quality management, air pollution and treatment, material engineering, agricultural produce storage as well as preservation equipment. In addition, the staff was supported with Master and PhD scholarships to increase their ratio at staff level.

2.1.3 Project B1 and R.1.1: Study of aquatic environment in Vinh Chau – Bac Lieu coastlines and sustainable development of aquaculture activities

This project strived to research the production cycle of Artemia and transfer its results to farmers in the project region. While the first phase was concerned with the research of the production cycle, the second phase was focused on the application and transfer of the acquired knowledge and technologies to the farmers in the project region. Artemia is a live food which has been widely used in aquaculture, especially for shrimp and fish larvae. The major challenge with the production of this species was that the cyst yields were decreasing year by year in the Mekong Delta due to the lack of knowledge of the culture techniques and bio-processes that had been used in the culture ponds at the local salt fields. The project researched these challenges and transferred the results to farmers to increase their income in the second phase of the IUC.

2.1.4 Project B2 and R.2.1: Phytotechnology: The selection, propagation and production of valuable fruit tree varieties in the Mekong Delta

In both phases of the IUC this project's objective was to improve the educational capacities for Can Tho University staff through staff exchange and PhD scholarships. Furthermore, it tried to maintain the laboratories, greenhouses and nursery houses of the Department of Crop Science. At the same time it strived to research valuable fruit trees in the following areas to improve fruit tree production in the Mekong Delta: asexual reproduction methods, flower induction, identification methods on varieties, tolerance to environmental stress, morphological and physiological characteristics, tissue cultured varieties and post-harvest physiology.

2.1.5 Project B3 and R.2.2: Biotechnology studies on plant-microbe interaction and their biodiversity

The project aimed at researching and developing a fast and reliable technique to detect citrus greening diseases in citrus plant material in both phases as this disease is one of the major factors causing the decline of citrus production in Vietnam – particularly in the Mekong Delta. Moreover, it tried to elucidate genetic diversity and reveal phylogenetic relationships among various citrus species in Vietnam to provide basic information for a breeding programme. In turn, this should help the citrus production in Vietnam and increase the income of the farmers in the project area.

2.1.6 Project B4 and R.1.2: Microbial management of crustacan larviculture

This project aimed at researching the possibility of establishing mud crab production as an aquaculture in the Mekong Delta. The project researched the cause of the unpredictable survival of the larvae in the first phase of the IUC. Based on these research results the project strived to establish commercially applicable crab hatchery technology by

1) investigating the characteristics of the microflora associated with crab rearing systems,

2) improving the water quality and maintaining it during the rearing period through biological methods,

3) studying the epidemiology and control of luminous bacterial diseases in crustacean hatcheries and

4) investigating techniques to modify the bacterial community in the larval rearing systems by using so-called multi-component probionts in the second phase.

Part of the second phase was also a roll-out of this technology to the farmers in the project region.

2.1.7 Project B5 and R.2.3: Technology: Fruit preservation and processing

This project's objective was to strengthen the position of the Department of Food Technology in terms of research, teaching and extension capacities in both phases of the IUC. For this purpose it tried to investigate and develop a scientific and technological basis for the introduction of an appropriate processing technology of selected fruits (mango, citrus fruits, pineapple and banana) produced in the Mekong Delta. In a next step this technology should be transferred to farmers in the project area in order to increase their income.

2.1.8 Project B6 and R.2.4: Enzymology: Development of an appropriate enzyme technology for food processing

In both phases the project aimed at upgrading the teaching and researching capacities of Can Tho University in biochemistry, particularly in enzymology and protein chemistry. Hence, it implemented a research project under which techniques for enzyme purification should be developed. These are needed to produce bromelain and papain which are essential for food processing on a commercial scale. Both – bromelain and papain – can be won from food waste which is produced on a large scale by the cultivation of pineapples and papaya.

2.1.9 Project B7 and R.3: Soil dynamics in terrestrial/aquatic environments

The common crop rotation (mono-culture with three rice crops per year) and inappropriate nutrient management in Mekong rice production are reported to lead to land degradation and a loss of income for the farmers. Against this background, this project tried to establish a monitoring system in its first phase. Through this monitoring system long-term field trials were set up to measure changes in the soil's physical, chemical and microbiological parameters over the years. The monitoring system thereby also differentiated between cropping systems and soil types. In addition, it documented the frequently occurring floods in the Mekong Delta to determine its effect on soil productivity. Based on this data the project tried to develop a sustainable rice-based farming system in the Mekong Delta through the implementation of alternative improved crop rotations in its second phase. This system should then be rolled out to farmers in the project in order to increase their income.

2.2 Theory of Change of the IUC with Can Tho University

To achieve a common understanding of the IUC's objectives, a Theory of Change (ToC) was developed in a participatory process with VLIR-UOS and the Belgian promoters. The Theory of Change was developed and discussed in a workshop at Gent University as well as in the interviews during the field mission. The ToC served as a basis for the evaluation of the IUC and consists of different interconnected and independent components:

- **Inputs / activities**: "the financial, human, and material resources used for the development intervention" (defined according to the OECD-DAC, 2010)[1]
- **Outputs**: "the products, capital goods and services which result from a development intervention" (defined according to the OECD-DAC, 2010)
- **Outcomes**: "the direct benefits on the level of the beneficiaries realised through the intervention objectives" (defined according to the European Commission (Directorate-general Development Cooperation and Humanitarian Aid, 2015, p. 6))
- **Impacts**: "positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended" (defined according to the OECD-DAC, 2010)

In the following, the ToC of the IUC is presented. A graphic presentation of the ToC can be found in the annex.

[1] According to the Strategic Note on Results in Development Cooperation of the DG Ontwikkelingssamenwerking en Humanitaire Hulp, the Directorat-Gneral Development Cooperation (DGD) defines inputs, outputs and impacts in conformity with the OECD-DAC definition, but outcomes pursuant to the definition of the European Commission.

2.2.1 Narrative description of the Theory of Change of the IUC with Can Tho University

Overall the intended **impact** of the IUC with Can Tho University is to improve the living conditions in the Mekong Delta. To achieve this overall impact the IUC tries to improve the four following functions of Can Tho University: research, education, outreach and organisational capacity.

In the *field of research* – on the level of **impact** – the IUC should increase the research capacity at Can Tho University and establish Can Tho University as a centre of research and technology transfer in the Mekong Delta in order to enable a wider adoption of new knowledge, services and technologies in the region. For this purpose the IUC aims at strengthening the research processes and structures as well as human resources at the respective departments and colleges on the **outcome** level. To achieve this it strives for a change in salary regulation with regard to research publications, tries to increase the number of contracts with the industry in the Mekong Delta and to heighten the research output of the College of Technology. Moreover, it aims at the improvement of the undergraduate curriculum of Environmental Engineering, Mechanical, Postharvest and Process Food Engineering as well as to enhance human resources for research and to equip research facilities with the necessary research equipment at the respective colleges and departments. To achieve these outcomes, the IUC implements the following **outputs** in this field: changes in governance structures with regard to research, trainings, research projects, Master and PhD scholarships and upgrading of research equipment.

At the same time in this field, the IUC – through the initiated research projects – tries to increase the income of farmers in the Mekong Delta on **impact** level. For this purpose the research projects research new knowledge and technologies (e.g. for mud crab farming, Artemia farming or rice farming) on **outcome** level, which in turn should be adopted by early adopters and then spread to more farmers in the respective project regions. To this end research staff is hired, scholarships are funded and research is carried out on **output** level.

Simultaneously, on the **outcome** level the described financed research projects under the IUC should also help to produce high quality research publications that can be presented in international networks and conferences. Furthermore, the research projects should generate possibilities for Can Tho University to provide advisory services on policy and to offer consultancy services. Both aspects should strengthen the *outreach function* of Can Tho University and should improve the internationalisation of Can Tho University as well as enable Can Tho University to be a catalyst for the reform of national legislation in the higher education sector on **impact** level.

Moreover, the research projects should also produce better training and information material for external extension services on the **output** level. This in turn should lead to the acquisition of new knowledge and technologies by external extension officers and the general improvement of extension services on the **outcome** level, leading to the establishment of Can Tho University as a centre of research and technology in the Mekong Delta on the **impact** level.

In the field of *educational capacity* the IUC tries to improve the educational quality of Can Tho University on the **impact** level in order to provide better qualified human resources that are actively used in relevant sectors in the Mekong Delta. To achieve this, the IUC tries to strengthen the educational processes and structures in the respective departments and colleges by introducing distance learning, transdisciplinary training courses, undergraduate and Master programmes as well as better network facilities in Can Tho University on the **outcome** level. It tries to do this by using three departments as pilot cases to then roll-out the distance education to all other colleges and departments of Can Tho University. Moreover, it tries to train staff of Can Tho University to actively use newly acquired teaching skills. For this purpose the IUC implements the following **outputs** in this field: setting up of IT hardware and a learning management

system for distance education, development of courseware for distance education, trainings of staff in distance education as well as funding Master and PhD scholarships.

Finally, in the field of *organisational capacity* the IUC aims at strengthening the organisational capacities of Can Tho University on the **impact** level, which should also heighten the impact in the other three fields. In order to achieve this impact, it tries to improve the governance structures of Can Tho University with regard to IT and English on the **output** level and trains IT and English staff as a service provider. This in turn should increase the capacities for English training on the **outcome** level and should give an impetus for the English and IT departments to adopt new roles within Can Tho University. This should then lead to Bachelor and Master programmes to be offered in English in the fields of aquaculture, food technologies and business at Can Tho University.

The **inputs** that are needed to achieve the outputs, outcomes and impacts in these four fields are financial means by VLIR-UOS, Antwerp, Gent, and Leuven University as well as from Vrije Universiteit Brussels (VUB) and Can Tho University. Furthermore, financial support from the Vietnamese government is required. In addition human resources and expertise of Antwerp, Gent, and Leuven University as well as from VUB and Can Tho University are needed.

2.3 Target groups of the IUC with Can Tho University

The IUC with Can Tho University is implemented by different stakeholders that assume distinct roles and responsibilities within the implementation process. The stakeholders are consequently distinguishable by their functions and are defined as follows for the purpose of this evaluation:

- The **responsible organisations** bear the institutional responsibility for the implementation of the IUC.
- **Indirect beneficiaries** are persons within the responsible organisations that benefit from the IUC's activities, but serve as mediators to achieve the overall objectives and impacts of the IUC; e.g., they receive scholarships or trainings to improve capacities of direct beneficiaries or to achieve the intended impact on the level of the final beneficiaries.
- **Direct beneficiaries** are organisations who should primarily benefit from the IUC.
- **Final beneficiaries** are persons outside the responsible organisations who should benefit from the IUC.

By using these definitions, the following responsible organisations and beneficiaries can be distinguished in the IUC:

- The Belgian universities and Can Tho University are **responsible organisations** which implement the IUC together. They both share the responsibility for the implementation of the IUC and are accountable vis-à-vis VLIR-UOS.
- The **indirect beneficiaries** are the employees of Can Tho University who receive scholarships and trainings under the IUC in order to improve the capacities of Can Tho University or to achieve impacts on the level of the farmers in the Mekong Delta.
- The **direct beneficiary** within the IUC is Can Tho University, as its capacities should be increased through the IUC.
- The **final beneficiaries** are the farmers in the Mekong Delta, as their income should increase through the funded research projects under the IUC. In addition,

the graduates of Can Tho University are final beneficiaries, as they should benefit from the increased capacities of Can Tho University.

3. Situation analysis (baseline)

3.1 Socio-economic situation in Vietnam at the beginning of the IUC

At the beginning of the IUC with Can Tho University in 1998, Vietnam had experienced significant socio-economic development in the year prior due to the "renovation" reforms initiated in 1986. These reforms encompassed among others land reforms, agricultural deregulation and price liberalisation. As a result, GDP per capita more than doubled from 1986 (397.9 US$) to 1998 (724.3 US$) (World Bank, 2018). At the same time Vietnam experienced high annual GDP growth rates in the 1990s ranging from 5.1% to 9.5% (ibid.). Moreover, inflation was reduced to single digit figures and life expectancy at birth increased from 69.2 years in 1986 to 72.7 years in 1998 (ibid.).

Furthermore, the reforms turned Vietnam from a country experiencing extreme food insecurity into one of the world's largest exporters of rice, coffee and other agricultural commodities. As a consequence of the economic growth and Vietnam's strong agricultural performance since the late 1980s with the value of agricultural exports growing at over 13% per year from 1990 to 1998, poverty rates declined from 58% of the population in 1993 to 37.4% in 1998 (Vaes & Van Thang, 2008).

Simultaneously however, Vietnam also experienced large differences in wealth distribution at that time. In this regard the Gini coefficient also rose from 35.7 in 1992 to 39.3 in 1998 (World Bank, 2018). As a result, poverty incidence varied significantly between regions, with the Northern Uplands, Central Highlands and North Central regions having the highest incidence and severity of poverty. In addition, 95% of the poor lived in Vietnam's rural areas at that time, where average per capita income equalled only 50% of that in urban areas (Vaes & Van Thang, 2008).

3.1.1 Socio-economic situation in the Mekong Delta at the beginning of the IUC

Despite the general economic growth and socio-economic development in Vietnam in the 1990s, the Mekong Delta still experienced – especially in the rural provinces – high poverty rates. According to data provided by the General Statistics Office of Vietnam and the World Bank the poverty rate in the three provinces Soc Trang, An Giang and Bac Lieu[2] was 64.4%, 45.7% and 21.2% respectively in 1992 (General Statistics Office of Vietnam, 2017). Hence, with the exception of An Giang the poverty rate in these provinces was higher or more or less equal to the average poverty rate in Vietnam, which amounted to 49.2% in 1992 (World Bank, 2018).

Furthermore, according to a regional poverty assessment in the Mekong Delta funded by the United Nations Development Programme (UNDP) and Australian Aid (AUSAID), poverty incidence was inversely correlated with educational attainment over the time period 1998 to 2004. While poverty rates among those who have not completed primary education is 30% in the Mekong Delta region, poverty is almost non-existent among those with higher education or vocational training. In this regard it is noteworthy that the Mekong Delta region had the highest share of the population who has never completed primary education (in 1998: 52%). Moreover, at that time the province Soc

[2] These provinces are chosen as examples as this evaluation analysed three projects and conducted household surveys in these provinces.

Trang had one of the lowest literacy rates and the largest share of unskilled labour – and thus also the highest poverty incidence (Bales & Huang 2004, p. 36).

As has been traditionally the case, most of the poor households were employed in the primary sector in 1998. Data from this time period shows that over 77% of all poor in the Mekong Delta were employed in agriculture, forestry or fishery activities, whereas just 9% of the poor were employed in the industrial sector and nearly 13% in services. The findings of the regional poverty assessment also confirm that at this time poverty was closely associated with farming, as most poor households lived in rural areas and were engaged solely in paddy cultivation (Ibid., p. 33).

The above described status quo in literacy and primary education at that time is also reflected in the higher education sector. In 1999 the total number of graduates and post graduates per 100,000 people in the Mekong Delta region amounted to 477. This was the lowest score for a region in Vietnam, where for the whole country the total number of graduates and post-graduates per 100,000 people was 1,265 at that time. Moreover, with the exception of the North West region, the Mekong Delta region also scored lowest of all regions with regard to tertiary enrolment (97 and 153 per 100,000 people in respectively 1995 and 1998). The share of the Mekong Delta region in the total number of tertiary level enrolments nationwide remained stable in the 1995 to 1998 period, with respectively 12.3% at the start and 12.4% at the end of that period. Hence, it did not succeed in closing the gap vis-à-vis the rest of the country during this time period (Vaes & Verlé 2002, p. 23).

In this regard the implemented household surveys in the three analysed projects showed that Artemia farmers earned on average 194 Euro per month (N=39) around the year 2000, while rice farmers had an average income of 158 Euro per month (N=67). Mud crab farmers in contrast could achieve an average monthly income of 660 Euro (N=23). As the average household in the survey had and has around 4 members, each person in the assessed households had respectively 582 Euro (Artemia), 474 Euro (rice) or 1940 Euro per person and year available. Hence, all questioned households in the projects were not considered as poor at that time, since the official poverty line of the Vietnamese General Statistic Office was defined as 1,906,950 Dong or 68 Euro per year per person ((Bales & Huang 2004, p. 24).

3.2 Science, technology and higher education policies at the beginning of the IUC

Prior to the 1990s the Vietnamese government was mainly concerned with developing the primary and secondary education sector. Only after having achieved significant improvements in these fields, the Vietnamese government started to develop the science, technology and higher education sector (Vaes & Van Thang, 2008, pp. 28-31). The first impetus for this came with Decree 90 issued in 1993 by the government, in which it committed Vietnam to the unification and restructuring of its higher education system. In this decree, the government declared that all people in Vietnam should have the right to pursue higher education. Furthermore, it identified five universities to become the base of a new higher education system: one national university each in Hanoi and Ho Chi Minh City, and three regional universities in Hue, Da Nang and Thai Nguyen provinces (WorldBank 2008, p. 6).

The decree also approved the establishment of semi-public and non-public higher education institutions and in order to create greater access to higher education and to elicit community participation in its provision. In this regard the assets of the institutions designated as semi-public were to be owned by the state, but their operational activities were to be funded entirely from tuition fee income and the sale of a range of educational services. The non-public higher education institutions in contrast were to include people-founded institutions; those owned and established at the local level by community and professional associations that were not owned by the state (Ibid., p. 6).

While Decree 90 was an important first step in the expansion of the higher education system in Vietnam, the main impetus for the further professional development of the higher education system came from the *Comprehensive Poverty Reduction and Growth Strategy* (CPRGS), which the government adopted in 2002. The strategy aimed to create fundamental and comprehensive changes in the development of education, training, science and technology. For this purpose it strived to improve the quality of human resources in these sectors and gradually develop a knowledge based economy (Office of the Prime Minister 2002, p. 9).

On the basis of the CPRGS the Vietnamese government approved in 2003 a *National Education for All (EFA) Action Plan 2003-2015*. This action plan provided a strategic framework for long-term education development and brought together the overarching national education goals and targets under the Socio-Economic Development Strategy (SEDS) 2001-2010, the CPRGS, the Education Development Strategic Plan for 2001-2010 and the Vietnam Millennium Development Goals. By "setting the objectives and targets to be reached during the plan period 2003-2015 […] identifying the action programmes that must be implemented in order to reach the objectives an targets; and by assessing the resource requirements, by identifying resource gaps and by exploring ways to overcome them", the EFA Action Plan aims at "consolidating the education progress, achieved and guiding education reforms and development programmes for the EFA components of the education sector in order to enable them to strongly and effectively support the attainment" of the national development goals of "maintaining high economic growth through continued transition to a market economy, applying an equitable, socially inclusive and sustainable pattern of growth, putting in place a modern public administration and governance system and strengthening the integration of the country within the world economy and the international community" (Ministry of Training and Education, 2003 ,p. 101).

Following this action plan, the Vietnamese Ministry of Higher Education and Training (MoET) and the Vietnamese government issued several policy initiatives in order to reform the higher education sector. These included the following:

- MoET decision No 38/2004/QD-BGD&DT of 2 December 2004 concerning the adoption of the '*Provisional Higher Education Quality Accreditation Regulation'*. The decision concerned higher education quality issues and includes universities, academies and other types of higher education institutions. It identifies self-assessment and external review as key elements in the quality assurance process.

- Government Resolution 14/2005/NQ-CP of 2 November 2005 on '*Substantial and Comprehensive Renewal of Vietnam's Tertiary Education in the 2006-2020 period*'. Resolution 14 aimed to substantially and comprehensively renew tertiary education and make significant changes in education quality, efficiency and scale, thus satisfying the requirements of national industrialisation and modernisation, international economic integration and people's learning demands. The resolution refers inter alia to the importance of linking higher education with overall socio-economic development, the autonomy of university management and the role of higher education institutions in the renewal of the higher education provision.

- The *Higher Education Reform Agenda 2006-2020* (HERA 2020) approved by the Vietnamese government in July 2005. The agenda, amongst others referred to the importance of networking between institutions of higher education, expansion of higher education and the advancement of scientific and technological research, including contract research.

- MoET Regulation on *Regular (full-time) training programmes of universities and colleges* (promulgated together with decision No 25/2006/QD-BGD-DT of 26 June 2006). The regulation refers to curricula, teaching loads and credit system.

- The *Education Law* of 14 June 2006 replacing the Education Law of 2 December 1998. The Law regulates amongst others the credit system to be used in higher

education, emphasises the importance of QA and distinguishes different types of institutions and various levels of higher education. The law furthermore stipulates that higher education institutions have a responsibility for the design of their own programmes, based on the core programmes set by MoET (Vaes & Van Thang, 2008, pp. 31-32).

3.3 The situation of Can Tho University at the beginning of the IUC

Can Tho University is located in the city of Can Tho, the capital of the Mekong Delta region and of Can Tho province. In 1998 Can Tho University consisted of three campuses and occupied a total land area of 87 ha. At that time Can Tho University had eight educational units, 4 research institutes and centres, plus a variety of support and other specialised departments, boards and centres.

Can Tho University's main mission was and is training, conducting scientific research and transferring technology to serve the regional and national socio-economic development with a particular focus on the Mekong Delta region. Following the appointment of the new rector at CTU in 2002, a new five year programme was adopted which focused on the following priorities (Ibid., pp.35-36):

- Education
    - Development of international programmes
    - Increase in the number of MSc and PhD programmes
    - Application of student centred teaching methods
    - Application of 4 distant education subjects (aquaculture, agriculture, economics and IT)
    - Availability of 60% of lecture notes on CD
- Research and application
    - Increased attention to the research component of CTU activities
    - Development as leading institute in biotechnology, agriculture and aquaculture
    - Increased attention to the development of extension units and social, economical and environmental aspects
- Community service
    - Both to the public and private sectors
    - Further development of distant education
    - Increased attention for outreach and extension dimensions of applied research

Moreover, the following seven priority areas were defined in the five year programme: biotechnology application, social and cultural education, IT application, environment and biodiversity, engineering and technology, economics and marketing as well as post-harvest technology. In addition, aquaculture was identified as a crosscutting priority area cutting across three of the seven priority areas, namely biotechnology application, economics and marketing and post-harvest technology (Ibid., pp. 35-36).

3.3.1 Research capacity

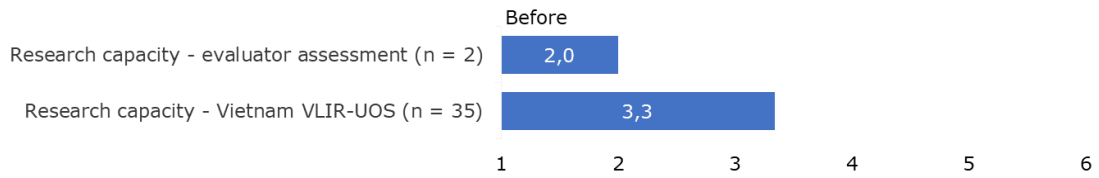
The implementation of research is one of the core activities of universities worldwide. To be competitive, universities in the north and south need the necessary capacities to conduct state-of-the-art research. Thus, one of the main objectives of the IUC with Can Tho University was to strengthen the research capacities of Can Tho University. However, in order to measure the contribution of the IUC to this capacity, one must first measure the baseline situation at the beginning of the IUC in 1998.

For this purpose Syspons and Nuffic devised an index for the research capacity of Can Tho University in order to capture the research capacity of Can Tho University at that time in quantitative terms. The index is composed of answers given in the survey by the interview partners in Vietnam and Belgium as well as the observations by the evaluators in the field mission. Within the survey all respondents were asked to rate the situation regarding the existing research capacity of Can Tho University prior (baseline) to the IUC and after the IUC along a set of various items which were developed on the basis of the Theory of Change of the IUC. A detailed operationalisation of the research capacity index can be found in the data collection instrument and the assessment grid in the annex.

All assessments for each item in the index were made using a scale of 1 (capacity is lacking) to 6 (capacity is high). The index was calculated as the average of the different perspectives of the Belgian and Vietnamese respondents, which all had the same value, prior and after the IUC. The calculated mean of these different perspectives resulted in a value for the situation before and after the IUC. The calculated differential value between the calculated mean for the situation before and after the IUC thus indicates the changes within each capacity, which can be contributed to the analysed IUC by comparing the collected baseline data to the observed results after the implementation of the IUC (see chapter 5.2 and 5.3).

Figure 2 shows the calculated baseline value of the research index for Can Tho University prior to the IUC. It thereby shows that the respondents rate the research capacity of Can Tho University with 3.3; higher than the evaluators, who rate it with 2.0.

Figure 2: Research capacity baseline of Can Tho University in 1998



Source: Syspons and Nuffic 2017

In qualitative terms this index can be explained firstly by the research and teaching staff at Can Tho University. In 1998 248 of 684 (36%) members of Can Tho University's research and teaching staff possessed either an MA or PhD degree. Moreover, the College of Technology in total employed three PhDs and 13 members that had a MA degree. Likewise, the College of Agriculture listed 16 employees with a PhD degree and 55 with a Master degree. There were no full professors occupied in the respective organisational units targeted by the IUC. Furthermore, at that time Can Tho University employed in total eight PhD students in all colleges and institutes targeted by the IUC (see figure 3).[3]

[3] At that time the College of Aquaculture and Fishery did not yet exist. It was organised as an Institute of Marine Aquaculture. As a consequence, secondary data regarding the qualifications of human resources were not available in the data basis of Can Tho University. The same holds true for the Institute of Biotechnology Research and Development Institute.

Figure 3: Qualification level of staff at Can Tho University in 1998

Year	1998
Can Tho University	
Teaching & research staff	684
With MSc or PhD	248
% of staff with MSc or PhD	36%
Female teaching & research staff	229
% of female teaching & research staff	33%
College of Technology and Engeneering	
Teaching & research staff	45
With MSc or PhD	16
% of staff with MSc or PhD	36%
Female teaching & research staff	2
% of female teaching & research staff	4%
College of Agriculture and Applied Science	
Teaching & research staff	137
With MSc or PhD	71
% of staff with MSc or PhD	52%
Female teaching & research staff	45
% of female teaching & research staff	33%
College of Acquaculture and Fisheries	
Teaching & research staff	N/A
With MSc or PhD	N/A
% of staff with MSc or PhD	N/A
Female teaching & research staff	N/A

Source: Can Tho University Database 2017

As a result of the qualification level of the employed staff almost all publications were published in national journals; not only at the respective targeted colleges and institutes of the IUC but also on the level of the whole university. Thus, the number of international publications was on average 2-3 publications per year for each of the targeted colleges and institutes in 1998, according to the interviewees.

Additionally, the existing equipment for research at these colleges and institutes was basic and below state-of-the-art, making it impossible to conduct relevant research according to all interviewed persons. Research was mainly conducted in the specific research fields and cooperation among different kind of research fields was almost non-existent. Also the four research fields of biotechnology, soil science, aquaculture and food technology addressed by the IUC were four research were four research fields among many at Can Tho University.

3.3.2 Educational capacity

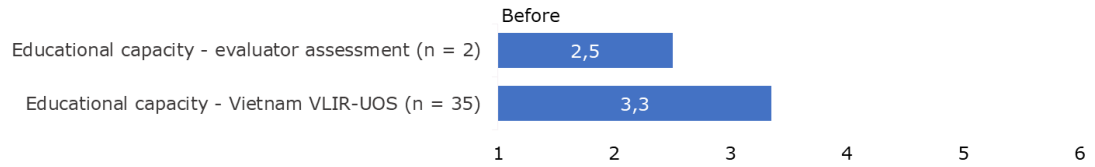
Next to research, another fundamental function of universities is education. In this field universities strive to prepare students for specific job markets that require advanced and extensive formal education. As job markets are however rapidly changing, universities need the capacity to adopt to these changes in order to provide relevant education for society and socio-economic development. Consequently, also in this field IUC tried to increase the capacity of Can Tho University to promote the socio-economic development of the Mekong Delta.

As in the case for research capacity, Syspons and Nuffic also developed a corresponding index for the educational capacity of Can Tho University prior to the IUC. It is based on

the same methodology (see chapter 4.3.1) and its detailed operationalisation can also be found in the annex.

In comparison to the baseline value of the research capacity the educational capacity baseline value of Can Tho University is rated with 3.3, exactly the same by the Belgian and Vietnamese respondents, while the evaluators assessed the educational capacity with 2.5 higher than the research capacity at Can Tho University (see figure 4).

Figure 4: Educational capacity baseline of Can Tho University in 1998



Source: Syspons and Nuffic 2017

The difference in the evaluator's assessment can be explained by the fact that prior to the IUC the Dutch-funded Medefinancieringsprogramma voor Hoger Onderwijssamenwerking (MHO) supported Can Tho University in strengthening its educational capacity. This programme particularly supported the development of curricula and teaching methodology at Can Tho University in the years before the IUC, according to the stakeholders interviewed. Based upon this information and the statements by the interviewees that student centred teaching methodologies and processes for curricula revision were already present at Can Tho University before the IUC, the evaluators assessed the baseline situation better than the research capacity at that time.

Next to a transition from teacher centred to student centred teaching methodologies by the MHO programme, the educational capacity of Can Tho University was characterised by a semester-based system. In this system all interviewed persons explained that students in general could not choose courses from different disciplines but had to adhere to their discipline of study. As a consequence there were almost no transdisciplinary study programmes available.

Furthermore, Can Tho University did not possess any capacities in the field of distance learning or e-learning, according to the relevant interviewed stakeholders. Moreover, study programmes taught in English were not available at Can Tho University in 1998.

In terms of total student numbers per year Can Tho University experienced a gradual increase in students in the years 1998 to 2000. While in 1998/ 1999 12,321 students were registered at Can Tho University, 13,540 were enrolled in the academic year 1999/ 2000. Of these students 71 were Master students in 1999 and 127 in 2000. The rest were either part-time of full time Bachelor students. With regard to the latter, Can Tho University could enrol 3,343 Bachelor students in 2000 while 1,883 graduated in this year. Similar numbers on Master level were not available in the Can Tho University database for these years (see figure 5).

Figure 5: Student numbers at Can Tho University in 1998 to 2000

Total student numbers - Can Tho University		
Year	**1998/1999**	**1999/2000**
Numbers of students	12321	13540
Bachelor students - Can Tho University		
Year	**1999**	**2000**
Enrolment per year	N/A	3343
Graduates per year	N/A	1883
Master students - Can Tho University		
Year	**1999**	**2000**
Total numbers	71	127
Enrolment per year	N/A	N/A
Graduates per year	N/A	N/A

Source: Can Tho University Database 2017

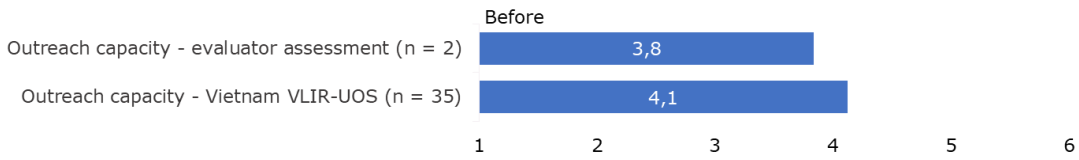
3.3.3 Outreach capacity and internationalisation

To transfer new knowledge or newly developed technologies to society, universities have to possess adequate outreach structures in the form of extension services as well as advisory and consultancy services. At the same time, the internationalisation of universities becomes more and more important as competitive research and education is only possible in an international setting. As a consequence, the IUC – mostly in its second phase – also focused on transferring the newly acquired knowledge and technologies from its research projects to the relevant stakeholders in the Mekong Delta to contribute to the socio-economic development of the region. At the same time the IUC also aimed at improving the internationalisation of Can Tho University.

Also in this regard Syspons and Nuffic developed an index for the outreach capacity of Can Tho University prior to the IUC. It is based on the same methodology (see chapter 4.3.1) and its detailed operationalisation can also be found in the annex.

In this regard the index shows both on the side of the Vietnamese and Belgians as well as on the side of the evaluators a high baseline value of 4,1 and 3,8 respectively (see figure 6).

Figure 6: Outreach capacity baseline of Can Tho University in 1998



Source: Syspons and Nuffic 2017

These values can be explained by the fact that according to the interviews Can Tho University already possessed well established structures and processes in 1998 to convey knowledge to local authorities, farmers or businesses in the Mekong Delta. These processes and structures were already enshrined in the policy frameworks governing Can Tho University as it is its mission to contribute to the overall socio-economic development of the Mekong Delta region. As a result, Can Tho University engaged from the beginning via technology transfer centres, conferences, seminars and workshops with farmers and local authorities to identify research and educational needs in the region. The respondents thereby assessed the existence of these processes and structures as very positive in the conducted interviews despite the following mentioned short-comings.

For example, at that time Can Tho University lacked relevant knowledge or technologies that could actually be transferred through the established structures. All interviewed persons stated that Can Tho University did not possess the necessary research or educational capacities to produce knowledge or technologies with an added value for the region. Therefore, Can Tho University was not able at that time to function as a centre for research and technology transfer and could not answer requests from the local stakeholders.

Thus, in 1998 Can Tho University was not able to acquire any funding from the Vietnamese national research programmes and also could not acquire substantial consultancy or advisory services from either private companies or government bodies. Moreover, all interviewed persons highlighted that trainings held for governmental extension services were minimal. This was particularly true for the targeted organisational unit by the IUC - College of Technology, the College of Agriculture College, the Institute of Marine Aquaculture and the Biotechnology Research and Development Institute.

In the field of internationalisation, Can Tho University did not have many contacts to international universities prior to the IUC according to all interviewed persons. Next to an infrastructure financing programme for university building by the Japanese International Cooperation Agency (JICA), the IUC and the Dutch MHO programme were the first large international content-related projects at Can Tho University. However, multiple donors such as Korea, Japan or Germany were providing individual scholarships to the staff of Can Tho University.

The relatively low degree of internationalisation of Can Tho University at that time is also reflected in the number of international students. In 2000 in total 300 international students were studying at Can Tho University. Furthermore, 55 international delegates (lecturers, researchers or visitors) were visiting Can Tho University in 2000. In addition, Can Tho University concluded 32 signed Memorandums of Understanding with international partners (Can Tho University, 2017c).

3.3.4 Organisational capacity

In addition to the above described capacities, which are particular to universities, each organisation needs organisational capacity to fulfil its functions and tasks. This underlying organisational capacity on the one hand manifests itself in the overarching regulations, processes and structures governing a university and on the other hand informs and supports its core functions – research, education and outreach. To this end the IUC also tried to strengthen underlying service structures such as IT or to change regulations regarding research.

In order to capture these intended changes by the IUC as well as the IUC overall effect on the organisational capacity of Can Tho University, Syspons and Nuffic developed a capacity development index (CDI). This index is composed from the answers given by the respondents in the conducted survey (see chapter 4.3.1) and is based upon the following five capabilities of the 5C model which was introduced in the inception report. A detailed operationalisation of the five capabilities can be found in the annex.

- The **capability to act** was operationalised as the availability of adequate financial and human resources as well as infrastructure in Can Tho University. Furthermore, effective administrative, financial, etc. systems were features of this capability.

- The **capability to generate development results** was operationalised as the resulting impact of the financed research and the improvement of the qualification of students at Can Tho University. Moreover, possible socio-economic changes in the life of the target groups or on the policy level were seen as dimensions of this capability.

- The **capability to relate** to other actors was operationalised as the existence of processes and structures for outreach activities in terms of trainings of extension services, consultancy or advisory services.

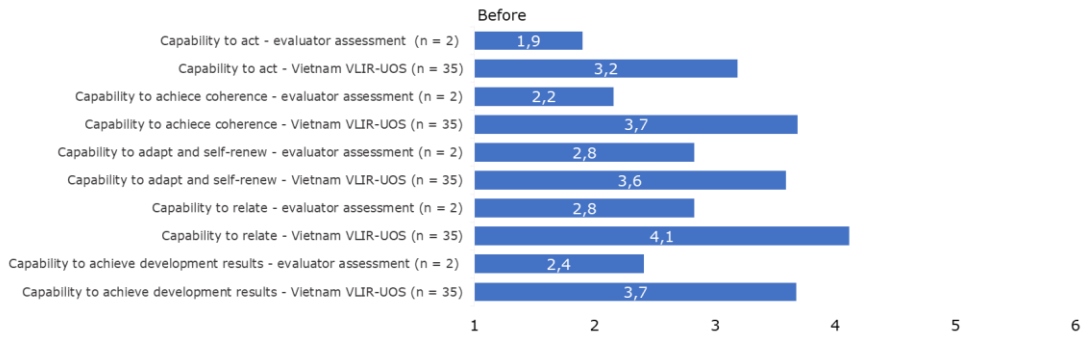
- The **capability to adopt and self-renew** was operationalised as the ability of Can Tho University to understand and adapt to shifting contexts as well as to encourage change processes. In addition, it was analysed whether Can Tho University had processes and structures in place (e.g., knowledge management systems) to cope with changing environments.

- The **capability to achieve coherence** was operationalised as the absence of conflicts within Can Tho University with regard to the vision and strategy of the research and educational orientation of Can Tho University. Additionally, Can Tho University should possess a shared vision and a set of principles governing the organisation.

These five capabilities were thereby operationalised along different items in the survey implemented in the field mission (see annex). Also in this survey the respondents had to rate the situation before and after the IUC. This data was complemented by the views of each evaluator, who assessed the situation before and after the IUC through interviews conducted with relevant stakeholders in the field mission using the same scale. All assessments for each item were made using a scale of 1 (capability is lacking) to 6 (capability is high). The CDI was thereby calculated as the average of the different perspectives of the Belgian and Vietnamese respondents, which all had the same value, for each capability for the situation prior to and after the IUC. The calculated mean of these different perspectives resulted in a value for the situation before and after the IUC. The calculated differential value between the calculated mean for the situation before and after the IUC thus indicates the changes within each capability, which can be contributed to the analysed IUC by comparing the collected baseline data to the observed results after the implementation of the IUC (see chapter 5.2 and 5.3).

When looking at the calculated means for the baseline value for each capability, it becomes obvious that the capability to relate was judged with 4.1 as the highest capability in 1998 by the respondents. This also holds true for the assessment of the evaluators and corresponds to the finding about the outreach capacities of Can Tho University (see chapter 4.3.3). Moreover, the capabilities to generate development results, to adapt and self-renew as well as to achieve coherence exhibit similar baseline values in the view of the respondents. In contrast hereto, the differences in these three capabilities are more pronounced in the evaluators' assessment. The widest difference can be found in the baseline value of the capability to act, which the evaluators assess with 1.9 while the respondents allocate a value of 3.2 (see figure 7).

Figure 7: Organisational capacity baseline of Can Tho University in 1998



Source: Syspons and Nuffic 2017

In this regard an in-depth analysis of the capacity to deliver development results demonstrates that in 1998 Can Tho University faced challenges in conducting state-of-the-art research and education. This can be also seen in the analysis and different values for the research and educational capacity index in chapter 4.3.1 and 4.3.2.

According to the interviews, at that time Can Tho University followed a coherent vision as it aimed to contribute to the socio-economic development of the Mekong Delta region. However, according to the evaluators' assessment existing principles and regulations at that time were not completely adequate to reach this mission, as they were mainly geared towards teaching and not research. For example, financial incentives were set for teaching hours while research was not similarly rewarded; thus explaining the difference in the baseline value assessment.

A similar explanation can be found for the capability to adapt and self-renew, in which the evaluators assessed the baseline situation of Can Tho University more critically. Here it became obvious in the interviews that in 1998 research was not systematically incorporated into the curricula as the interviewees unanimously stated that they did not have the necessary research equipment for teaching research. However, research was still incorporated –where possible – on an individual basis by the respective lecturers in their lecture notes. The latter was possibly rated higher by the respondents than the evaluators.

The largest difference in the baseline values finally can be found in the capability to act. Here the respondents assessed the existing research equipment and the IT infrastructure more positively than the evaluators. In 1998 Can Tho University possessed – referring to the conducted interviews – no wireless internet on its campuses as well as no internal network. Only one of the university's colleges was connected to the internet. However, at this time the Dutch MHO Programme invested heavily in IT infrastructure at Can Tho University.

The IT department understood its role in 1998 as an education and research department and not as an internal service provider for the university, according to the interviewed stakeholders. Likewise the English department did not see itself as a service provider for the university.

With regard to the existing structural arrangements at that time, the main organisational units targeted by the IUC were the College of Technology, the College of Agriculture College, the Institute of Marine Aquaculture and the Biotechnology Research and Development Institute.

3.4 Assessment of the situation at the beginning of the IUC

Based on the analysis of the situation at the beginning of the IUC, the evaluators come to the conclusion that Can Tho University exhibited a relatively weak research capacity as it was missing the necessary human resources and research equipment. At the same time the existing educational capacity has to be judged slightly higher in comparison, as the Dutch MHO programme had already strengthened needed capacities with regard to teaching methodologies, curricula revision processes and curricula content. Nevertheless, research did not form an integral part of teaching in 1998 and Can Tho University did not possess any forms of distance education.

Moreover, in the view of the evaluators Can Tho University already possessed well established processes and structures to implement outreach activities. At that time it was already common to transfer knowledge and technologies via established formats such as technology transfer centres, conferences, seminars or workshops. However, it should also be noted that Can Tho University lacked the necessary relevant knowledge and technology, to transfer via these structures at that time. This led to the fact that Can Tho University had a relatively low success rate in acquiring external funds.

Furthermore, in the field of internationalisation the evaluators conclude that Can Tho University was not very well connected to other universities and also did not possess a very diverse student, lecturer or researcher body. International experience took mainly

place on an individual level through scholarships provided to members of Can Tho University staff by international donors.

As a result, the evaluators assess the organisational capacity of Can Tho University as relatively low as it could not deliver its intended development results according to its stated mission; namely contributing to the socio-economic development of the Mekong Delta region. This mainly manifests itself in the above described research capacity but also in its capability to act. In the latter it was missing crucial infrastructural means, such as research equipment or IT infrastructure. Similarly, Can Tho University also experienced a relatively low capability to adapt-and self-renew as there was room for improvement to make the core processes of research and education more adaptable to the identified needs of the stakeholders in the Mekong Delta.

In contrast hereto Can Tho University already possessed a relatively high capability to relate, which is also expressed in its outreach capacity. Furthermore, it had a coherent vision in terms of its objectives for research and education – the development of the Mekong Delta region – that was shared by the whole staff. Improvements could be made in this regard concerning the existing regulations for research, which were not always in tune with the overall vision of the university.

4. Results of the field mission

This evaluation was based upon a regulatory and generative / mechanisms approach to causal inference, in which for selected impact hypothesis also a counterfactual approach to causal inference was implemented. More precisely, the evaluation team implemented a before and after design in combination with a contribution analysis and a modified most-significant change approach to assess the impact of the IUC with Can Tho University. Furthermore, to measure impact on the level of the final beneficiaries – the farmers of the Mekong Delta region – a quasi-experimental design was implemented for selected research projects under the IUC to measure changes in the income of the farmers (see chapter 3).

For this purpose Syspons and Nuffic conducted a field mission in which they implemented 43 interviews or focus groups with 67 individuals. In addition a pen-and-paper survey was conducted among 35 Vietnamese and Belgian individuals to gather quantitative data regarding the capacity development of Can Tho University. Furthermore, 151 household surveys among farmers in treatment as well as comparison groups were implemented to measure changes in the livelihood of the farmers. Moreover, secondary data was collected from the database of Can Tho University and an extensive desk research was carried out.

On the basis of this data, the design of this evaluation and the encountered methodological challenges (see chapter 7), it was possible to build a credible performance story about the IUC's impact and to draw valid conclusions about the effectiveness and impact of the IUC.

4.1 Relevance of the IUC with Can Tho University

The criteria relevance refers to the raison-d'être of any given programme. Its analysis renders insights into whether a programme will be or is doing the right thing. Therefore, the question of whether a programme is relevant is also relevant for the measurement of impact of this particular programme. It is assumed that relevant programmes have a higher chance of delivering impact as they address identified needs and thus generate ownership among the target group. Hence, when analysing the relevance of the IUC with Can Tho University, it is necessary to study whether the IUC was aligned to national policies and strategies, addressed the needs of Can Tho University as well as the needs of its indirect and final beneficiaries.

4.1.1 The relevance of the IUC with regard to national strategies and policies

The development of the higher education sector plays a crucial role in the economic development of a country as it provides the necessary skilled human resources for the economy. As a result, the Vietnamese government issued a decree in 1993 that started the expansion of the higher education system in Vietnam by unifying and restructuring the higher education institutions. One of the main objectives of this expansion was hereby to increase access to higher education for all Vietnamese people (World Bank, 2008, p.6).

In this light the interviewed external stakeholders stated that the IUC's first phase adhered to the Vietnamese government's strategies and policies as it strived to capacitate Can Tho University in the fields of human resources and infrastructure to

enable better access to higher education for the Vietnamese people. The interview partners furthermore pointed out that with the adoption of the CPRGS in 2002, the IUC was even more in line with government's strategies and policies, as this strategy aimed to create fundamental and comprehensive changes in the development of education, training, science and technology. To achieve these changes the government strived to improve the quality of human resources in these sectors and gradually develop a knowledge-based economy. Hereby the interviewees highlighted that a particular focus was also put on the socio-economic development of relatively poor regions such as the Mekong Delta and that universities like Can Tho University were explicitly assigned to actively contribute to such a development.

Referring to the conducted interviews this strategic outlook was then brought together in the *National Education for All (EFA) Action Plan 2003-2015*, which was approved in 2003 by the Vietnamese government. The action plan thereby provided a strategic framework for long-term education development and brought together the overarching national education goals and targets under the Socio-Economic Development Strategy (SEDS) 2001-2010, the CPRGS, the Education Development Strategic Plan for 2001-2010 and the Vietnam Millennium Development Goals.

On the level of the implemented research projects under the IUC, these research projects were developed against a regional policy background in which the regional government aimed at diversifying the agricultural sector in the Mekong Delta region to reduce poverty rates in the region. At that time the interviewed persons stated that agriculture in the Mekong Delta was mainly dominated by rice, as more than 50% of Vietnamese rice was produced in the Mekong Delta. However, due to an increase in population the rice production had to be increased from one to two harvests to three harvests in order to guarantee food security, in the view of the government. Simultaneously, the regional government also wanted to diversify agricultural production by developing the aquaculture sector in order to upgrade agricultural production in the Mekong Delta. Another objective was to diversify agriculture by promoting fruit tree agriculture as well as to reduce post-harvest losses.

In order to meet these challenges the funded research projects under the IUC tried to:

- research the production of Artemia in aquaculture to provide a sustainable supply of live food to the aquaculture sector in the Mekong Delta region and thereby improve the income of farmers in selected provinces (project B1/ R.1.1).

- research valuable fruit trees to improve fruit tree production in the Mekong Delta; particularly through asexual reproduction methods, flower induction, identification methods on varieties, tolerance to environmental stress, morphological and physiological characteristics, tissue cultured varieties and post-harvest physiology (project B2/ R.2.1).

- research a fast and reliable technique to detect citrus greening diseases in citrus plant material to improve citrus production and the income of farmers in the Mekong Delta (project B3/ R.2.2).

- research the possibility of establishing mud crab production as an aquaculture in the Mekong Delta (project B4/ R.1.2).

- develop a scientific and technological basis for the introduction of an appropriate processing technology of selected fruits (mango, citrus fruits, pineapple and banana) produced in the Mekong Delta (project B5/ R.2.3).

- research and develop techniques for enzyme purification. These are needed to produce bromelain and papain which are essential for food processing on a commercial scale (B6/ R.2.4).

- research how more harvests of rice without soil degradation would be possible (B7/ R.3).

Furthermore, all research projects took place in the Mekong Delta region, which experienced at that time on average high poverty rates and a low level of education particularly, but not exclusively, in the field of tertiary education (see chapter 4.1). In addition the three research projects (Artemia, mud crab and rice) that were analysed in-depth in this evaluation focused on relatively poor regions in the Mekong Delta. These regions either experienced the same poverty rate as the national level or a higher poverty rate; the only exception being the province of the mud crab project, which had with 21.2% a significantly lower poverty rate than the average national poverty rate of 49.2%.

4.1.2 The relevance of the IUC with regard to Can Tho University

To address the needs of Can Tho University, it is essential that the IUC related to specific priorities and strategies of Can Tho University. In this regard Can Tho University's main mission was to conduct training and scientific research and to transfer technology to serve the regional and national socio-economic development with a particular focus on the Mekong Delta region in 1998. Moreover, a new five year programme adopted in 2002 by the rector of Can Tho University stated that the focus in the field of education would be on the increase of MSc and PhD programmes, the development of international programmes, distant education and student centred teaching methods. Furthermore, the programme highlighted an increase in research, particularly in the institutes of biotechnology, agriculture and aquaculture as well as an increased attention to the development of extension and outreach units. Additionally, the programme defined biotechnology application, social and cultural education, IT application, environment and biodiversity, engineering and technology, economics and marketing as well as post-harvest technology as priority areas (Vaes & Van Thang, 2008, pp.35-36).

When looking at the objectives in the developed ToC of the IUC on the outcome and impact levels, it becomes obvious that most of the objectives are relevant to the mission and strategy of Can Tho University. This was also confirmed in the interviews conducted with all relevant stakeholders. First of all, the IUC five year programme's main focus are the thematic fields of economics, aquaculture, agriculture – and here more specifically also food processing – as well as biotechnology. Furthermore, the IUC focused in its education component on the establishment of international programmes (e.g. BA and MA programmes offered in English) and on the introduction of distance education within Can Tho University, which are also addressed by the five year programme. In addition, the IUC's research component put an emphasis on research in the field in food processing, aquaculture, biotechnology and agriculture; and thus was also in line with the five year programme. Moreover, the component also focused on the strengthening of human resources through MA and PhD scholarships. Finally, the IUC's organisational component addressed the IT infrastructure, which was also an integral part of Can Tho University's five year programme.

Overall the IUC – similar to the Can Tho University's mission – also focused on the socio-economic development of the Mekong Delta region by increasing the income of farmers situated in the Mekong Delta through its research projects or by better qualifying human resources for relevant sectors in the Mekong Delta through the strengthening of the educational capacities of Can Tho University.

4.1.3 The relevance of the IUC with regard to its indirect and final beneficiaries

As the programme documents of the IUC demonstrate, the main target group of indirect beneficiaries was the staff of Can Tho University. They received MA or PhD scholarships that were integrated into the different projects funded under the IUC with the aim to strengthen the capacities of Can Tho University as well as to accomplish the individual objectives under each project. Therefore, these integrated scholarships were a crucial means to achieve the overall objectives of the IUC.

In this regard all the interviewed persons, who benefitted from these integrated scholarships, deemed these scholarships as relevant for the achievement of the IUC's objectives as well as for their personal development. They explained that without these scholarships they would not have been able to conduct the needed research as they would not have possessed the necessary thematic and methodological competences and skills. Hereby, they stressed that particularly peer-to-peer learning between the Belgian promoter and them was essential to acquire necessary skills in research and teaching (see chapter 5.2). Moreover, all of them stated that these scholarships were critical to fostering their career. This was also exemplified by the fact that all these persons had acquired leading positions within Can Tho University as department heads, directors or deans (see also chapter 5.2).

On the level of the final beneficiaries – the farmers or enterprises situated in the Mekong Delta region – the respective research projects implemented the following different strategies to identify research needs and to engage farmers or enterprises during the inception and implementation of the research project, according to interviews:

- The **Artemia** (project B1/ R.1.1), **mud crab** (project B4/ R1.2) and the **rice** project (B7/ R.3) identified their respective research needs together with the relevant local authorities and farmers. Once the specific research needs were identified, farmers and local authorities were involved in the piloting and research of the new technology. Once the new technology was developed and refined, annual learning workshops were conducted at the pilot sites to persuade other farmers to use the new technology. The first production cycle for the newly won farmers was closely monitored by a technician of Can Tho University. Afterwards, all farmers could call a telephone hotline, for which they had to pay the telephone charges, to request help from Can Tho University if they experienced problems. Furthermore, Can Tho University also trained the extension officers of the local departments of the Ministry of Agriculture free of charge, where the farmers could also get information and help if needed.

- In the **food production and processing** projects the interviewed partners explained that the research projects (projects B2/ R.2.1; B3/ R.2.2; B5/ R.2.3) were identified by the researchers from the general existing needs in the Mekong Delta region (see chapter 5.1.1) and the engagement of enterprises in workshops at the beginning of the research projects. On this basis the research projects were formulated and new knowledge and technologies were developed. Enterprises that want to use this technology can contact the Technology Transfer Centre of Can Tho University or the College of Agriculture and Applied Biology directly. However, Can Tho University does not undertake any active marketing as most contacts are established via alumni of Can Tho University. Once an enterprise contacts Can Tho University, Can Tho University concludes a contract with the respective enterprise and conducts technology transfer workshops.

- In the **enzymology** project (B6/ R.2.4) farmers, local authorities or other stakeholders were not involved in the inception or implementation of the project. In their view this project was a fundamental research project which was not based on an explicit demand from outside of the university. It was based and developed on the basis of the researchers' interest and their opinion that there might be a future applicability for the developed technology.

Furthermore, the conducted household survey in all three in-depth analysed projects demonstrated that the final beneficaries earned on average 582 Euro (Artemia, N=39), 474 Euro (rice, N=67) and 1940 Euro (mud crab, N=23) per person and year around 2000. Their income was thus higher than the official poverty line of the Vietnamese General Statistic Office, which was defined as 68 Euro per year per person (Bales & Huang, 2004, p. 24).

4.1.4 Assessment of the relevance of the IUC with Can Tho University

Based upon these findings the evaluation team comes to the conclusions that the IUC was a relevant programme at its inception and during its implementation. The IUC was in line with major policy developments and strategies on the national as well as regional level. In this regard it can even be concluded that it was – at least at its start – ahead of its time as many of its objectives already strived for the strengthening of research and educational capacities before similar objectives were adopted by the Vietnamese government in its *National Education for All (EFA) Action Plan* in 2002.

Furthermore, the funded research projects under the IUC were in line with the provincial government's development policies for the Mekong Delta and addressed particular poor provinces in the Mekong Delta region. The only exception to this has been the province of the mud crab project, in which the poverty rate was significantly lower than the average national poverty rate. In this regard it must be concluded that the three in-depth analysed research projects did address poor farmers but not the poorest of the poor in Vietnam at that time.

In almost all cases the funded research projects addressed developmental research needs that could potentially contribute to the socio-economic development of the Mekong Delta region. They thereby successfully used different strategies to involve local authorities and farmers to identify developmental relevant research needs and also involved relevant stakeholders throughout the implementation of the research projects. However, while some projects (Artemia, rice and mud crab) actively pursued dissemination strategies, other projects (food technology and processing) did not do this. Moreover, the research project on enzymology, which did not involve stakeholders in its inception and implementation, was solely based upon the interest of the involved researchers and not on the articulated needs of the beneficiaries –making it thereby less relevant in a developmental context.

In addition, the evaluation team assesses the IUC's relevance for Can Tho University positively. Also in this field the IUC was in line with the relevant strategies and policies of Can Tho University at that time and addressed the needs of the Can Tho University's staff through its objectives and integrated scholarships. The latter were particularly relevant for the implementation of the research projects under the IUC as well as the career development of the scholarship holders (see also chapter 5.2).

4.2 Effectiveness and impact of the IUC with Can Tho University

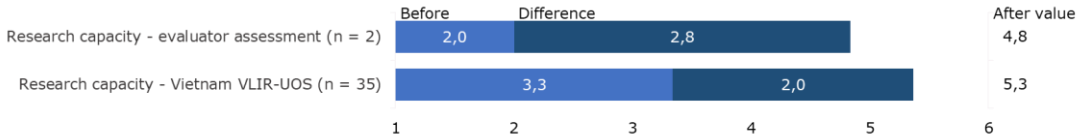
Insights on the effectiveness and impact of the IUC with Can Tho University are of central importance to VLIR-UOS and SEO. While the criterion effectiveness captures to what extent the IUC's objectives on outcome level have been achieved and what mechanisms facilitate or impede the achievement of objectives, the criterion impact investigates to what extent mid-term to long-term effects resulted out of these achieved objectives. As mentioned in chapter 2.2.1, the IUC – broadly speaking – tries to strengthen the research, educational, outreach and organisational capacity of Can Tho University on the outcome level to improve the living conditions in the Mekong-Delta in the long-run.

4.2.1 Effects on Can Tho University's research capacity

In the first field – research capacity – the IUC aims at improving the research quality at Can Tho University and establishing Can Tho University as a centre of research and technology transfer in the Mekong Delta (*impact*). For this purpose it wants to enhance human resources, upgrade research equipment and libraries as well as increase the research output in the targeted organisational units (*outcome*).

According to the conducted pen-and-paper survey the research capacity of Can Tho University increased due to the conducted activities in the IUC. While the Belgian and Vietnamese respondents see an increase of 2.0 in Can Tho University's research capacity, the evaluators could observe an increase of 2.8. However, both assessments also started from a different baseline value (see figure 8 and chapter 4.3.1).

Figure 8: Changes in the research capacity of Can Tho University



Source: Syspons and Nuffic 2017

The increase in the research capacity of Can Tho University can be firstly explained – according to all interviewed persons – by the qualification of teaching and research staff through the IUC. During its implementation the IUC funded 32 Master and 22 PhD scholarships, while other programmes from the Netherlands or Korea also financed scholarships. However, the interviewed stakeholders unanimously agreed that the IUC was the most significant programme developing human resources at that time.

This can also be seen in the development of the absolute numbers regarding the qualification level of Can Tho University staff. Here, the IUC scholarships accounted for an increase of 100% of Master and 62.9% PhD holders in the targeted organisational units by the IUC in the time period 1998 to 2008. Moreover, the IUC was responsible for an increase in the qualification level of staff in the whole university of 21.5% for Master and PhD level in the time period 1998 to 2007. In this time period the percentage of female teaching staff could also be increased from 33.5% to 37.9% (see figure 9).

Figure 9: Changes in the qualification level of staff at Can Tho University

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Can Tho University											
Teaching & research staff	684	713	795	824	835	751	814	828	890	912	N/A
With MSc or PhD	248	316	373	394	413	384	494	523	540	546	N/A
% of staff with MSc or PhD	36%	44%	47%	48%	49%	51%	61%	63%	61%	60%	N/A
Female teaching & research staff	229	235	276	296	297	261	214	298	337	346	N/A
% of female teaching & research staff	33%	33%	35%	36%	36%	35%	26%	36%	38%	38%	N/A
College of Technology and Engeneering											
Teaching & research staff	45	53	59	65	70	88	99	114	124	129	160
With MSc or PhD	16	22	24	26	30	31	40	45	46	49	53
% of staff with MSc or PhD	36%	42%	41%	40%	43%	35%	40%	39%	37%	38%	33%
Female teaching & research staff	2	2	4	6	6	9	12	16	21	22	23
% of female teaching & research staff	4%	4%	7%	9%	9%	10%	12%	14%	17%	17%	14%
College of Agriculture and Applied Science											
Teaching & research staff	137	135	138	136	111	111	108	108	107	115	113
With MSc or PhD	71	92	107	109	92	90	93	96	99	106	101
% of staff with MSc or PhD	52%	68%	78%	80%	83%	81%	86%	89%	93%	92%	89%
Female teaching & research staff	45	46	48	47	42	43	40	39	38	40	42
% of female teaching & research staff	33%	34%	35%	35%	38%	39%	37%	36%	36%	35%	37%
College of Acquaculture and Fisheries											
Teaching & research staff	N/A	N/A	N/A	N/A	26	27	36	35	38	41	41
With MSc or PhD	N/A	N/A	N/A	N/A	21	22	32	32	33	35	37
% of staff with MSc or PhD	N/A	N/A	N/A	N/A	81%	81%	89%	91%	87%	85%	90%
Female teaching & research staff	N/A	N/A	N/A	N/A	8	9	14	14	16	18	19
% of female teaching & research staff	N/A	N/A	N/A	N/A	31%	33%	39%	40%	42%	44%	46%

Source: Can Tho University Database 2017

In addition it was confirmed by the interviewed stakeholders that three of the persons who received a scholarship within the IUC are full professors today due to their education level and the publications they could publish through their research under the IUC (see below). Furthermore, Can Tho University increased its employed number of PhD from eight to 75 in 2013 (Can Tho University, 2017d). The increase in the number of PhDs after the end of the IUC was thereby mainly ascribed by the interviewed persons to the increased qualification level of its staff through the IUC, as this makes the supervision of PhD candidates possible.

Next to the scholarships the IUC also implemented 25 short-term trainings courses, seminars and exchange visits to train CTU staff in specific research methods (Vaes & Van Thang, 2008, pp. 90-93). According to all interviewed indirect stakeholders these trainings increased the research capacities of Can Tho University by teaching them how to use research equipment, how to conduct modern research (e.g., how to write a lab

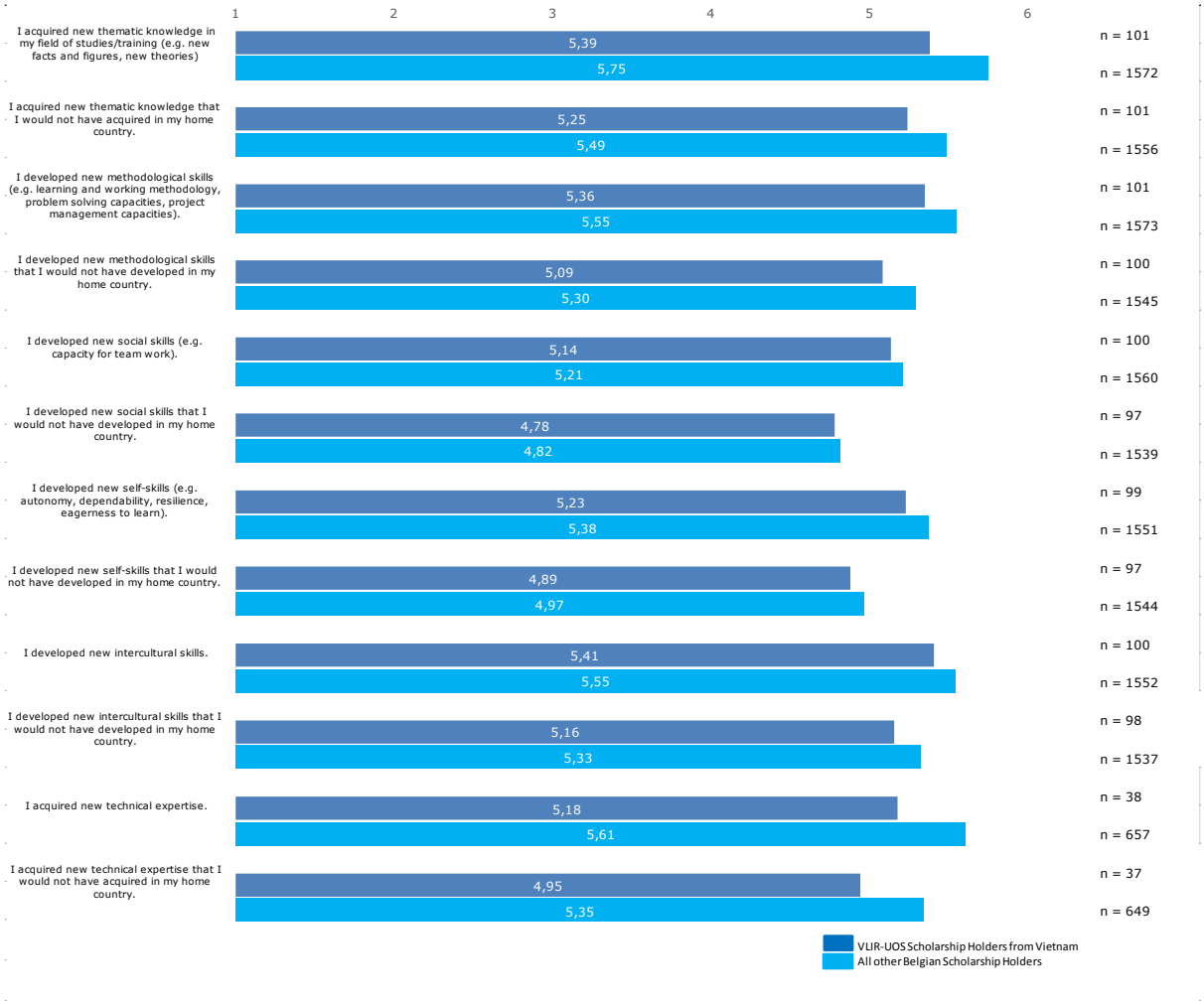
journal, how to do sampling, how to work with milestones or how to analyse data) as well as how to plan and manage research processes in general. Hereby, the interview partners, who benefitted from scholarships under the IUC, also explained that peer-to-peer learning from their Belgian supervisors was crucial to learning new research techniques and methods. Moreover, the set-up of the IUC in form of the programme coordination unit was also identified as a crucial learning mechanism on how to organise and manage research projects. In this regard, the involved staff of Can Tho University copied processes and structures used for the project management of the IUC to manage their research projects.

The skill increase through the scholarships and training in Can Tho University staff furthermore led to an increase in research output in the form of publications, according to the interviewed stakeholders. Before the IUC the targeted organisational units by the IUC mostly produced national publications and rarely international publications. For example, the College of Technology published on average two to three international publications per year at the start of the IUC. In 2010 the number of international publications in the College of Technology amounted to 40. Similarly the College of Agriculture could increase its average international publications to 32 and the Biotechnology Research and Development Institute to 37 in 2010 (Can Tho Database, 2017e). The increase was explained by the interviewed stakeholders through, on the one hand, the research conducted under the IUC (see below) and on the other hand, through the aforementioned enhanced research skills. Regarding the former it can be stated that during the IUC involved Vietnamese and Belgian staff published three national books, 79 articles in peer reviewed national journals and 54 articles in international peer reviewed journals (Vaes & Van Thang, 2008, pp. 51-53).

Furthermore, the interviewees stated that the skill increase and the increase in publications also fostered the career development of the persons who received scholarships under the IUC. The majority of these former scholarship holders are at the time of this evaluation either directors, (vice) deans or head of departments in their respective units and thus hold responsible positions. Moreover, the targeted organisational units by the IUC have developed to flagship units in the field of research and teaching in the view of all interviewed stakeholders (see chapter 5.2.3 and 5.2.4).

In comparison, individual scholarship holders from Vietnam answered in the implemented online survey that they also experienced thematic, social and methodological skill increases. The increases are thereby slightly lower than the expireinced increases of other Belgian scholarship holders (see figure 10).

Figure 10: Increases in competencies for individual scholarship holders



Source: Syspons and Nuffic 2017

However, when looking at the time it took individual scholarship holders to find their first job after graduation it took them with 8.3 months (N=104), 6.2 months longer than the other Belgian scholarship holders (N=1713) according to the online survey. Integrated scholarship holders in comparison immediately had a job as they returned to their job within the projects financed under the IUC.

At the same time the individual scholarship holders from Vietnam experienced only a relatively small increase in their decision-making power[4]. Those who changed their jobs after their graduation exhibited an increase of 1.9 (N=51) while the others, who returned to their old job, had an increase of 1.0 (N=37). In comparison other non-Vietnamese Belgian scholarship holders experienced a decision-making power increase of 3.2 (N=934) when having changed their employment and of 2.9 (N=692) if they stayed in their former occupation. In this regard it seems plausible to assume that the individual scholarship holders in Vietnam did not experience the same enhanced career development as the integrated scholarship holders. This might also be explained by the fact that career development opportunities depend in Vietnam more than in other countries on other factors (e.g., political affiliations) than international academic background, according to the conducted qualitative interviews with scholarship holders.

To underscore the above described organisational developments the IUC also financed the upgrading of classrooms, laboratories and stations with state-of-the-art research

[4] Based on the collected data in the online survey Syspons and Nuffic calculated a decision making power index on the basis of the respondents answers regarding their financial, personnel, operational or strategic responsibilities as well as the size of their employer's organisation.

equipment. For this purpose the IUC restored and equipped 13 laboratories, three field stations and five classrooms with state-of-the-art equipment in its two implementation phases (Vaes & Van Thang, 2008, pp. 102-106). The interviewees thereby highlighted that the upgrading of these laboratories was essential to actually conduct state-of-the-art research and to include research in teaching (see chapter 5.2.2). Additionally, they highlighted that it was critical that the laboratories were set up as shared and not "college owned" laboratories in which different disciplines could do research. This fostered transdisciplinary research and was new for Can Tho University at that time.

In this regard the transdisciplinary set-up of the research projects under the IUC was also important, according to the interviewed stakeholders. Before the IUC, research was mainly conducted in the specific research fields and cooperation between different research fields was rare. According to the interviewed stakeholders the outright transdisciplinary set up of the research projects under the IUC broke down barriers between the different academic disciplines at Can Tho University and fostered cooperation between them as well as stakeholders outside of the university. For example, the research project on Artemia included scientists from the disciplines of soil science, aquaculture and water as well as farmers and local government authorities.

Overall the interviewed persons at Can Tho University stated that the combination of human resource development, upgrading of equipment and funded transdisciplinary research projects increased the research quality at Can Tho University and contributed to establishing Can Tho University as a centre of research and technology transfer in the Mekong Delta (*impact*). Likewise they highlighted that the four research fields the IUC focused on – biotechnology, soil science, aquaculture and food technology – are the flagship disciplines in research and teaching at Can Tho University at the time of this evaluation. This self-assessment was confirmed by the interviewed local authorities, who agreed that Can Tho University has developed into an important centre of technology transfer and research in the fields of agriculture, food technology and aquaculture. However, it has to be noted that these fields have received further funding of VLIR-UOS after the IUC had ended in form of four Research Initiatives Programme (RIP) and a network programme. In addition, other donors such as the Worldbank have funded research projects in these fields in the meantime, as well as individual scholarships.

4.2.1.1 Effects of the IUC funded research projects on final beneficiaries

Moreover, the aforementioned research projects were not only used to enhance the research capacity and quality of Can Tho University, but also to create new knowledge and to develop new technologies in the field of agriculture, biotechnology, and aquaculture as well as food technology and processing (*outcome*). These in turn should be adopted by early adopters in order to improve farming (*outcome*) and the income of farmers in the Mekong Delta (*impact*).

According to the interviews and a reviewed sample of published articles all research projects were successful in either developing new knowledge or new technologies.

- The Artemia project (B1/ R.1.1) was successful in researching optimal conditions and feed for the production of Artemia. As a result reseachers were able to improve the production rate from 30 to 150 to 200 kilogram per hectare. Moreover, in comparison to Artemia caught in natural conditions, the quality of the Artemia was increased in terms of their protein and HUFA content.

- In the valuable fruit tree varieties project (B2/ R.2.1) they were able to develop a new cutting method, which reduced the time to grow fruit trees and thus minimises the investment costs of farmers. In addition the project also developed new varieties for fruit tree production.

- Furthermore, the citrus greening diseases project (B3/ R.2.2) developed a technique to detect citrus greening diseases in plant material and hence reduced losses in citrus production for farmers.

- The mud crab project (B4/ R.1.2) successfully researched the optimal feed and conditions to grow and hatch mud crab larvae in terms of salinity, water temperature and microbiological conditions. As a consequence, the project was able to increase the survival rate of the mud crab larvae from 2% to 12% to 14%. Moreover, they could reduce losses in production after the larvae state from 60% to 70% to 10% to 20% due to researched optimal conditions for mud crabs in aquacultural setting.

- The project on appropriate processing technology of selected fruits (B5/ R.2.3) successfully developed new locally adapted processing technologies to process raw materials into higher valued products such as juice, jam, dried fruit or fermented juice.

- Additionally, the enzymology project (B6/ R.2.4) successfully developed two enzymes out of food waste produced during the processing of pineapples. One enzyme can be used to make meat tender, while the other can prevent diseases in fish aquaculture production.

- Finally, the rice project (B7/ R.3) developed two different farming models to increase the productivity of rice production without soil degradation. In the first model the farmer plants two rice crops a year and one other crop (either vegetables or cereal). In the second model the farmer plant three rice crops a year with a break of one to three week in between each harvest while simultaneously using organic fertilizer. Both models produced higher yields than the traditional model.

All newly researched knowledge and technologies were tested within the research projects' implementation by involving early adopters – farmers or enterprises (see also chapter 5.1.3). Furthermore, all interviewed stakeholders within and outside of Can Tho University stated that the new knowledge was shared with the extension services of the local departments of the Ministry of Agriculture. Conference seminars as well as workshops were used to distribute the knowledge and technologies among interested stakeholders to improve farming or processing methods among farmers and enterprises in the Mekong Delta region (see also chapter 5.2.3). The only exception to this, was – according to the interviewed stakeholders – the enzymology project, which did not disseminate its knowledge among stakeholders as there was no demand from stakeholders outside the university.

With regard to the effects of this newly developed knowledge and technology on the income and living conditions of the farmers in the Mekong Delta region (*impact*), this evaluation focused on three research projects – Artemia, mud crab and rice (see chapter 3).

Effects of the Artemia project (B1/ R.1.1) on the income of farmers

According to the interviews, the main form of income in the project region before Artemia farming was salt farming. In addition, the interviewed local government authority stated that Artemia farming was not known in the region before the involvement of Can Tho University. Referring to the implemented interviews Can Tho University's involvement started in 1984, when the university initiated research on Artemia farming together with the Philippines University Institute by trying to breed Artemia in artificial conditions. Only after having found out the right conditions in terms of water salinity, water temperature and microbiological conditions were they able to hatch the first Artemia in 1986.

In the following years, in 1987 and 1988, Can Tho University together with the University of Gent initiated another research project on Artemia with the objective to make the production of Artemia stable. The interviewees explained that the project succeeded in stabilising the production rate of Artemia, but was still too low to be commercially viable. After the conclusion of this research project, the project manager of Can Tho University left to do his Master and PhD on the topic of Artemia at the

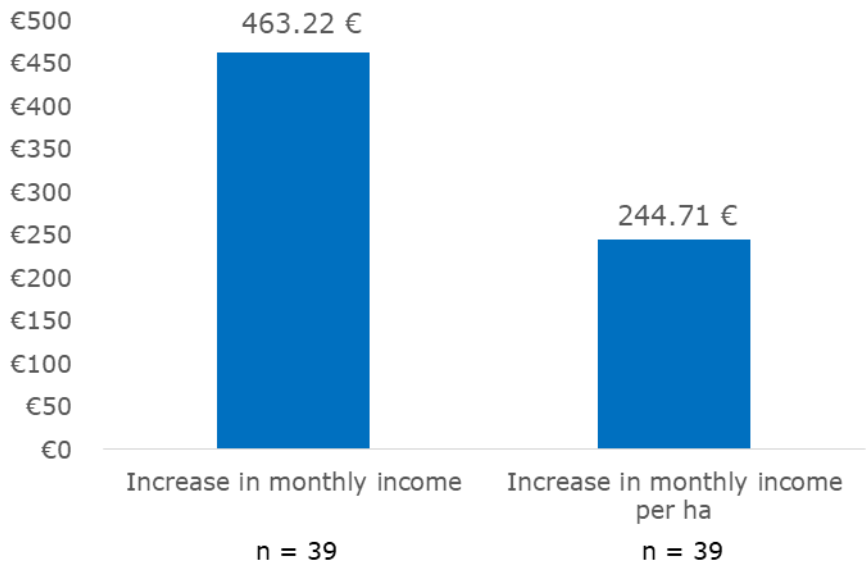
University of Gent. As a consequence, no further research and roll-out to farmers was conducted in the meantime in Vietnam on this topic.

Further research in Artemia production began then with the start of the research project under IUC in 1998. At that time 350 households in the region did Artemia farming, while the rest were still engaged in salt farming with an income of less than $1 a day. Hence, in 1992 the average poverty rate in the province was 64.4% (General Statistics Office of Vietnam, 2017).

By using the above described newly researched knowledge and technologies, the project could increase the production rate from 30 to 150 to 200 kilogram per hectare and the number of farmers doing Artemia farming from 350 to 600 in 2008 and 700 in 2017. They transferred the newly acquired knowledge and technologies thereby through workshops to farmers, the local extension service of the Ministry of Agriculture as well as through word of mouth. Furthermore, new farmers were always accompanied by technicians during the first production cycle and received a step-by-step manual for the implementation of the new farming method. Afterwards farmers could still call Can Tho University if they experience challenges and either receive advice via phone or through a seconded technician.

As a result of the introduction of the newly developed farming methods for Artemia farming, all farmers except one in the province turned from salt to Artemia farming, according to the interviewed farmers and local government authority. In addition, according to the conducted household surveys the income of the farmers could be increased on average by an additional 463.22 Euro per month due to the newly developed farming methods under the IUC research project ($p<0.001$). In this regard the average income per hectare also increased by 244.71 Euros (see figure 11).

Figure 11: Income changes of farmers due to the Artemia project comparison between 2000 and 2017



Source: Syspons and Nuffic 2017

At the same time the poverty in the province decreased to 26.9% in 2008 and 12.5% in 2015 (General Statistics Office of Vietnam, 2017). This decline was mainly attributed to the increase of Artemia farming by the interviewed farmers and local government authority.

Furthermore, the interviewed stakeholders identified the stable worldwide demand for Artemia as a critical success factor for the project. Currently, there is an annual market demand of about 500,000 tons of Artemia of which 90% is met by naturally produced Artemia. However, as Artemia produced in aquaculture has comparatively higher quality

in terms of protein and HUFA content, high prices are paid for Artemia products from this region – thus having a beneficial and stable effect on the income of the farmers.

According to the implemented household surveys, the farmers in the region benefitting from the new technology use their additional income mainly for their children's schooling (N=32) (e.g. in terms of material or paying for transport to the school) and the building of houses or land purchases (N=9). On a personal level most farmers see the largest benefit of the additional income as gained life security and stability (N=38).

Effects of the mud crab project (B4/ R.1.2) on the income of farmers

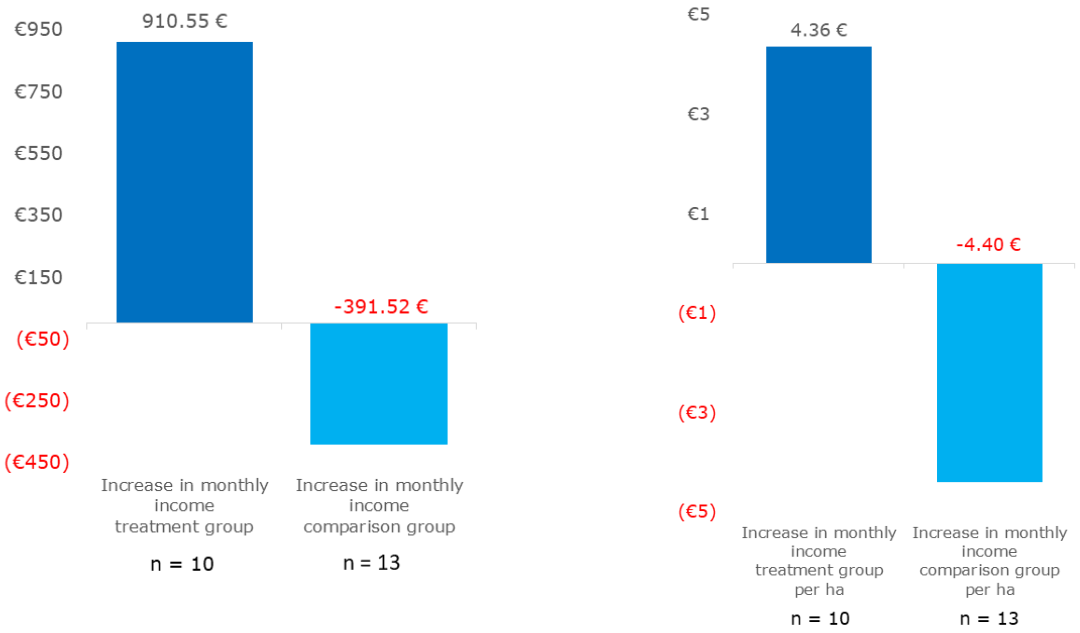
Mud crab farming has had a long tradition in the respective project region according to the conducted interviews. As a consequence mud cab farming took already place before Can Tho University got engaged in the province in 2002/ 2003. However, the main form of mud crab farming at that time entailed capturing the mud crab larvae in nature and then raising mud crabs in artificial conditions. Hence, the interviewees highlighted that there was low productivity and low quality in the production as many larvae died and the quality of the larvae could not be controlled. This resulted in small scale mud crab farming and relatively high prices for mud crabs in the region (around 1000 Vietnamese Dong per kilogram). The average poverty rate in this province was 21.2% in 1992.

The interviewed farmers stated that Can Tho University under the IUC as well as other donors active in the field of university cooperation and agricultural development developed different technologies to increase the production rate of mud crab farming. In all these projects different farmers piloted each of the different developed technologies. Moreover, the newly created knowledge and technologies were transferred to the extension services of the local government authority. According to the interview with the local government authority, every year it has conducted ten to 15 training courses or workshops with around 30 farmers in which it transfers the newly created technology of Can Tho University but also of other donors to the farmers. In addition Can Tho University stated that currently 20 mud crab farmers in the region are using their technology. Hence, only a minority of farmers in these trainings adopt the technology developed by Can Tho University while other farmers either adopt no new technology or the technology of another donor. This leads to the conclusion that this format is not the most effective format for disseminating research findings.

By using the newly created knowledge and technologies developed by Can Tho University under the research project of the IUC, the survival rate of the mud crab larvae could be increased from 2% in 1999 to a range of 12% to 14% in 2008. Moreover, losses in production after the larvae state could be decreased from 60% - 70% to 10% - 20% due to research about optimal conditions for mud crabs in aquacultural setting.

As a result of the newly introduced mud crab farming methods by Can Tho University, the mud crab farmers could on average increase their monthly income by additional an 910.55 Euro according to the implemented household surveys. In this regard also the average income per cubic metre increased by 4.36 Euros. In contrast the comparison group, which is statistically comparable in relevant parameters such as gender, use of fertilizer or frequency of crop failure, actually experienced a decrease in their monthly income by on average -391.52 Euro or -4.40 Euro per cubic metre (see figure 12). At the same time the poverty in the province decreased to 13.9% in 2008 and 8.4% in 2015 (General Statistics Office of Vietnam, 2017).

Figure 12: Income changes of farmers due to the mud crab project comparison between 2000 and 2017



Source: Syspons and Nuffic 2017

According to the household surveys, the mud crab farmers in the region benefitting from the new technology use their additional income mainly for their children's schooling (N=13) (e.g. in terms of material or paying for transport to the school) and monthly expenditures (N=14). On a personal level most farmers see the largest benefit of the additional income as gained life security and stability (N=18).

However, these observed changes in income are not statistically significant ($p>0.05$). Moreover, the size of the sample, which has given complete answers to the questions asked, is statistically not large enough to deduct reliable answers and exhibits too much variance (see figure 16).

Also from the qualitative data it is questionable what kind of effect the introduction of the new technology by Can Tho University had on the income of the farmers. On the one hand there have been multiple donors that have introduced different kind of methods and technologies of mud crab farming in the region, making it difficult to identify which technique(s) the individual farmers are using. On the other hand, the increase of the production rate in mud crab farming has resulted in a decline of prices from 1000 Vietnamese Dong in 2005 to 650 Vietnamese Dong in 2008 to 220 Vietnamese Dong in 2012; thus having a direct adverse effect on the income of the farmers. Nevertheless, as can be seen from the data, an effect on the income of the farmers can be observed, but it cannot be concluded to what extent this effect can be attributed to the funded research project under the IUC.

Effects of the rice project (B7/ R.3) on the income of farmers

Rice farming is one of the most important sources of income for farmers and is the most dominant crop in the Mekong Delta region. More than 50% of Vietnamese rice was produced in the Mekong Delta around 2000. However, due to an increase in population rice production had to be increased from one harvest per year to two to three harvests per year in order to guarantee food security, in the government's view. The farmers who adhered to this change in policies shortly afterwards experienced decreasing yields due to soil degradation, according to the interviewed farmers and local government authorities.

As a consequence, the concerned local government authorities approached Can Tho University in 2003 to find a solution to this challenge. Then, Can Tho University together with its Belgian counterpart set up a research project under the IUC according to the conducted interviews to research farming methods that would allow three harvests without soil degradation.

All involved interviewed stakeholders thereby highlighted that the project from the beginning was set up in close cooperation with five piloting farmers and the respective local government authorities. With the help of the farmers and the local government authorities Can Tho University set up an experiment and a monitoring system with a small number of famers in which they tested different farming methods.

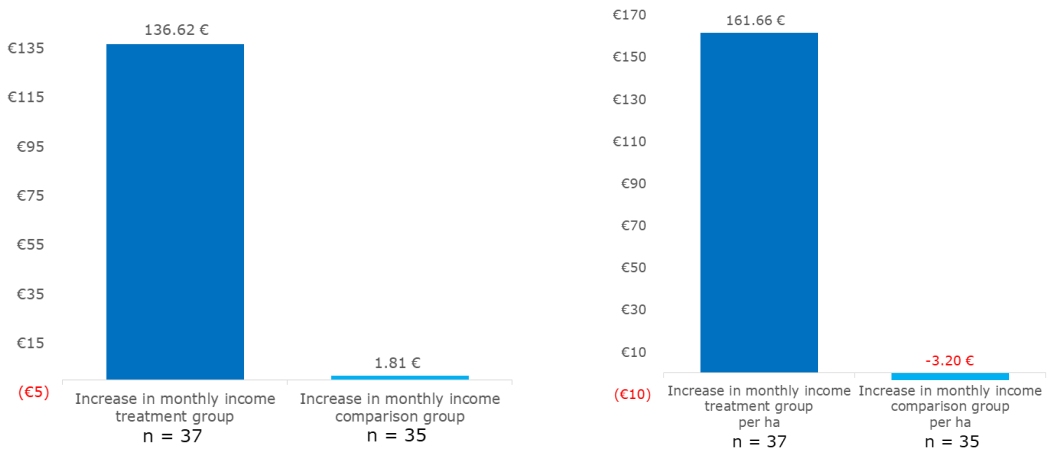
Through this research they developed two different models that each allowed three harvests without soil degradation and increased the productivity of the farmers. In the first model the farmers have to plant two rice crops and one other crop, preferably vegetables or cereal, per year. In the second model they could plant three rice crops per year, but have to use organic fertilizer and have to have a break between each harvest of one to three weeks. The organic fertilizer was provided by the project as it was too expensive for the farmers to purchase by themselves. Both models resulted in a higher productivity per year than the traditional farming methods used by the farmers before.

Afterwards, all interviewed stakeholders stated that the new knowledge and methods were transferred through workshops to other farmers as well as the extension service of the local departments of the Ministry of Agriculture. As a consequence, the newly acquired knowledge was multiplied through the extension service, but also through word of mouth by the farmers. As a result the exact number of farmers using the new models is unknown.

At the time of the evaluation the interviewed local government authorities explained that the farmers mainly use the first model, as the second is more cost intensive due to purchase of organic fertilizer. The application of the newly developed models led to yield increases per year of on average between 10% to 20% for the farmers, according to the interviewed farmers and local government authorities.

In terms of income the farmers using the newly developed methods could increase their income by 136.62 Euro per month and 161.66 Euro per hectare. In contrast the comparison group, which is statistically comparable in relevant parameters such as gender, use of fertilizer or frequency of crop failure, experienced an increase in their monthly income by on average 1.81 Euro, but a decrease of -3.20 Euro per hectare. Moreover, the difference between the two groups can be statistically attributed to the intervention ($p<0.05$) (see figure 13). At the same time, poverty in the province decreased from 45.7% in 1992 to 8.5% in 2008 and 3.9% in 2015 (General Statistics Office of Vietnam, 2017).

Figure 13: Income changes of farmers due to the rice project comparison between 2000 and 2017



Source: Syspons and Nuffic 2017

Furthermore, according to the implemented household surveys the rice farmers in the region benefitting from the new model use their additional income mainly for their children's schooling (N=21) (e.g. in terms of material or paying for transport to the school) and monthly expenditures (N=31). On a personal level most farmers see the largest benefit of the additional income as gained life security and stability (N=30).

Moreover, the change in in the farming methods also had an impact on the environment and health of the farmers according to the interviewed local government authorities. On the one hand there are less diseases in the rice and less chemical fertilizer is used. On the other hand this has also improved the health of the farmers as they use less chemical fertiliser.

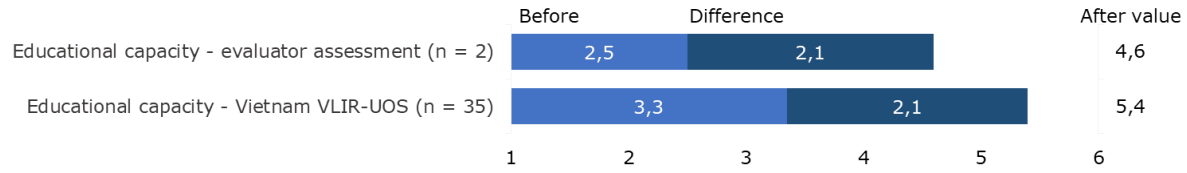
However, the interviewed local government authorities also highlighted that there are still many farmers in the region who use traditional methods of rice farming. This is due to the fact that it is not easy for the farmers to sell the third crop, as there is not a large market for it. The reason for this is that firstly there is scepticism on the side of the consumers to change their diets to incorporate a crop other than rice and secondly that the market for other crops is already saturated due to the first movers planting a third crop.

4.2.2 Effects on Can Tho University's educational capacity

In the field of educational capacity the IUC's objective is to improve the educational quality at Can Tho University in order to enable the university to better qualify human resources for relevant sectors in the Mekong Delta (*impact*). To achieve this it strives to introduce distance education to Can Tho University and to reform curricula with a particular focus on the integration of research in teaching as well as introduce curricula taught in English (*outcome*).

The conducted pen-and-paper survey thereby shows that the educational capacity of Can Tho University increased by 2.1 due to the implemented activities in the IUC. Both the Vietnamese and Belgian stakeholders as well as the evaluators come to the same assessment (see figure 14).

Figure 14: Changes in the educational capacity of Can Tho University



Source: Syspons and Nuffic 2017

The increase in the educational capacity of Can Tho University can be explained by different factors. Firstly, prior to the IUC, the Dutch funded MHO programme supported Can Tho University in the development of curricula and student-centred teaching methodologies. According to the interviewed stakeholders this was the main impetus for the university to change from teacher-centred to student-centred methodologies as well as making the curricula more practice-oriented. Nevertheless, the IUC also revised or newly developed 15 curricula in its focus areas to make them more practice-oriented. Moreover, in total 50 courses and trainings were developed in these fields (Vaes & Van Thang, 2008, pp. 61-63).

Furthermore, the stakeholders interviewed explained that this revision in combination with upgraded equipment, the integrated scholarships and the initiated research projects (see chapter 5.2.1), enabled Can Tho University to integrate research into the curricula. However, they also stated that this integration mainly occurred in the form of lecturer

notes and not through a systematic process. The persons who had received an integrated scholarship also highlighted that their personal experience in these scholarships helped them via peer-to-peer learning with their Belgian counterpart to integrate research into their teaching as well as to use student-centred teaching methodologies.

In the interviews with the rectors of Can Tho University it became furthermore apparent that the IUC played an important role in switching the semester-based to a credit-based system in 2008. According to them and the interview with MoET, MoET was pushing universities to switch to credit-based systems during the time of the IUC. As a result Can Tho University decided to utilise the curricula revisions and developments in the IUC as a pilot for a credit-based system. Once these curricula were successfully piloted, they decided to apply the credit-based system to the whole university in 2008. As a result of this switch, curricula and courses and Can Tho University became more transdisciplinary as students could chose electives that could and still can make up to 30% of their curriculum.

With regard to distance education the interviewed stakeholders highlighted that the IUC was the first programme which introduced them to this kind of education. In this regard a prerequisite for the introduction of distance learning at Can Tho University was the setting up of the necessary multi-media equipment and the upgrading of the IT infrastructure (see chapter 5.2.4). Once this was set-up the IUC introduced a web-based platform and provided training to over 350 teachers regarding the usage of this system. 35 distance education courses were developed and over 100 courses were transferred onto the web-based platform during the implementation of the IUC. At the end, the system was rolled out to the whole university and reached around 20,000 students at Can Tho University (Vaes & Van Thang, 2008, pp. 61-63).

At the same time however, the interviewed stakeholders stated that the usage of the established distance education system is very different from teacher to teacher. While some use it to solely upload assignments, others use it to provide lectures or to do multiple-choice tests. In addition, colleges like the College of Agriculture, whose curricula encompass a lot of applied research, use the system to a lesser extent than for example the College of Information and Communication Technology or the College of Economics, which has a more theoretical curricula.

The interviewed stakeholders however did not confirm that the IUC introduced Bachelor or Master programmes in English. According to them these are currently introduced for the first time under the VLIR-UOS funded Network programme.

In terms of total student numbers per year Can Tho University continuously increased its intake during and after the implementation of the IUC. While in 1998/ 1999 12,321 students were registered, 22,141 were enrolled in the academic year 2008/ 2009. In this line Can Tho University could also increase its intake of MA students from 71 in 1999 to 800 in 2008. Regarding Bachelor students, Can Tho University also increased its enrolment and graduation rate from 3,343 enrolled and 1,883 graduated Bachelor students in 2000 to 6,809 enrolled and 4,323 graduated Bachelor students in 2008 (see figure 15).

Figure 15: Student numbers at Can Tho University from 1998 to 2008

Total student numbers - Can Tho University											
Year	**1998/1999**	**1999/2000**	**2000/2001**	**2001/2002**	**2002/2003**	**2003/2004**	**2004/2005**	**2005/2006**	**2006/2007**	**2007/2008**	**2008/2009**
Numbers of students	12321	13540	14684	16073	17512	17108	16871	15727	17156	20342	22141
Bachelor students - Can Tho University											
Year	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	
Enrolment per year	N/A	3343	3207	3830	3313	4012	4928	5254	6668	6809	
Graduates per year	N/A	1883	1984	2161	2243	3119	3116	3448	3311	4323	
Master students - Can Tho University											
Year	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	
Total numbers	71	127	111	106	129	275	395	398	739	800	
Enrolment per year	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	800	
Graduates per year	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	745	

Source: Can Tho University Database 2017

Similarly, Can Tho University could also increase the employability rate of its Bachelor graduates from 53.9% six months after their graduation in 2012 to 88.1% in 2015.[5] In this regard it has to be noticed that over the same time period the employability rate of the Bachelor graduates from the colleges and institutes targeted by the IUC increased from 53.4% in 2012 to 92.3% in 2015 (Can Tho University, 2017g).

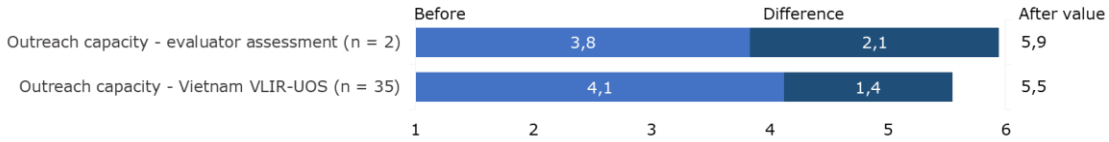
[5] Can Tho University only started to conduct regular employability surveys among their bachelor graduates in 2012. Hence, earlier data regarding the employability of their graduates is not available in Can Tho University's database.

4.2.3 Effects on Can Tho University's outreach capacity and internationalisation

To achieve the objective of establishing Can Tho University as a centre of research and technology transfer (*impact*), the IUC also aims at improving the advisory, consultancy and extension services of Can Tho University (*outcome*). At the same time the strengthened advisory services should establish Can Tho University as a catalyst for the reform of national legislation in the higher education sector (*impact*). Furthermore, in the field of internationalisation the improved quality of the research publications and the improved outreach services (*outcome*) should lead to an improved internationalisation of Can Tho University (*impact*).

Hereby, the implemented pen-and-paper survey demonstrates that the outreach capacity of Can Tho University increased in the opinion of the Belgian and Vietnamese respondents by 1.4, while the evaluators assessed the increase with 2.1 (see figure 16).

Figure 16: Changes in the outreach capacity of Can Tho University



Source: Syspons and Nuffic 2017

The relatively low increase in comparison with the research and educational capacity of Can Tho University due to the IUC activities (see chapters 5.2.1 and 5.2.2) can be explained by the fact that – according to the conducted interviews – Can Tho University already possessed well established structures and processes in 1998 to convey knowledge to local authorities, farmers or businesses in the Mekong Delta (see chapter 4.3.3).

However, the interviewees also stated that at the beginning of the IUC, Can Tho University lacked relevant research that it actually could transfer via the established outreach processes and structures. As a result, they unanimously agreed that one of the biggest contributions of the IUC was to provide Can Tho University with relevant research through the research projects initiated under the IUC for its outreach structures. This enabled the colleges and institutes targeted by the IUC to implement trainings for governmental extension services, farmers and enterprises in the Mekong Delta region. Furthermore, it also made it possible in the opinion of the interviewed stakeholders to establish Can Tho University as a centre of research and technology transfer in the Mekong Delta region (*impact*).

As a result of the initiated research projects and the increased research capacity (see chapter 5.2.1), Can Tho University was also able to acquire more external research funding, in the view of the interviewed stakeholders. During the time of the IUC the involved colleges and institutes acquired 26 consultancy and eleven research contracts as direct spin-offs of the funded research projects (Vaes & Van Thang, 2008, pp. 71-76). Moreover, based upon the research initiated under the IUC Can Tho University obtained 1.85 million Euro in the years 2004 to 2008 and another 5.51 million in the years 2009 to 2013. Of the latter, 38% were acquired by the College of Agriculture and the Institute of Marine Aquaculture (see figure 17).

Figure 17: Acquired external funding by Can Tho University on the basis of IUC research

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Can Tho University	151.660 €	185.814 €	335.093 €	643.246 €	506.321 €	578.964 €	995.010 €	1.310.556 €	1.538.176 €	1.094.162 €
College of Agriculture and Applied Science	N/A	N/A	N/A	N/A	N/A	269.651 €	212.896 €	369.927 €	225.921 €	249.171 €
% of total acquired funds	N/A	N/A	N/A	N/A	N/A	47%	21%	28%	15%	23%
College of Aquaculture and Fisheries	N/A	N/A	N/A	N/A	N/A	82.260 €	243.933 €	112.052 €	192.264 €	137.319 €
% of total acquired funds	N/A	N/A	N/A	N/A	N/A	14%	25%	9%	12%	13%

Source: Syspons and Nuffic 2017

Additionally, the interviewed stakeholders also explained that before the IUC, Can Tho University was not able to acquire any research funding from national research programmes. In 2009 to 2013 Can Tho University was then successful in acquiring funds from six out of 26 existing national research programmes. Moreover, individual researchers were also successful in obtaining grants from international research funding agencies such as the Fonds Wetenschappelijk Onderzoek (FWO) in Belgium.

The interviewed stakeholders also explained that Can Tho University was able to establish new partnerships with industry based upon the conducted research in the IUC. For example, the College of Technology could obtain new partnerships with Mitsubishi and Siemens. As a result it acquires 50% of its funding from industry or international research projects at the time of this evaluation, while no such funding was acquired before the IUC.

The increased research activities and outputs also led to more international exposure of Can Tho University, according to the interviewed stakeholders. For example, the research in the Artemia project got transferred to Africa (e.g., Uganda, Kenya or Mozambique) and other parts of Asia (e.g., China, Laos, India or Sri Lanka) via international students and researchers who came to Can Tho University to study their Artemia farming techniques. These students now implement the same techniques in their home countries. This however, did not have any effect on the market price so far, according to the interviewed farmers and local authorities. Furthermore, lead researchers from Can Tho University have been invited to international conferences – e.g., in Bangladesh – to present the findings and newly developed technologies at these conferences. Another example is the mud crab project, in which a Malaysian company concluded a contract including financial clauses with Can Tho University to acquire the newly developed technologies. This company is now using this technology in its hatcheries in Malaysia and has also expanded its business with this technology to Myanmar.

Simultaneously, this international exposure also led to more international donors being interested in doing capacity development or research projects with Can Tho University according to the interviewed stakeholders. In the time period of the IUC, the IUC was the most important external funding. At the time of the evaluation however Can Tho University received funding from the Worldbank, United States Agency for International Development (USAID), AUSAID and JICA. Moreover, other donors such as Korea, Germany or the Netherlands were providing numerous individual scholarships to the staff of Can Tho University.

At the same time the number of signed Memorandums of Understanding increased from 32 before the IUC to 98 in 2008 and 140 in 2017. A similar trend could be observed in the number of international students, which increased from 300 in 2000 to 859 in 2008 and 1709 in 2016. Furthermore, the number of international delegates (lecturers, researchers or visitors) increased from 55 in 2000 to 176 in 2009 to 493 in 2016 (Can Tho University, 2017c).

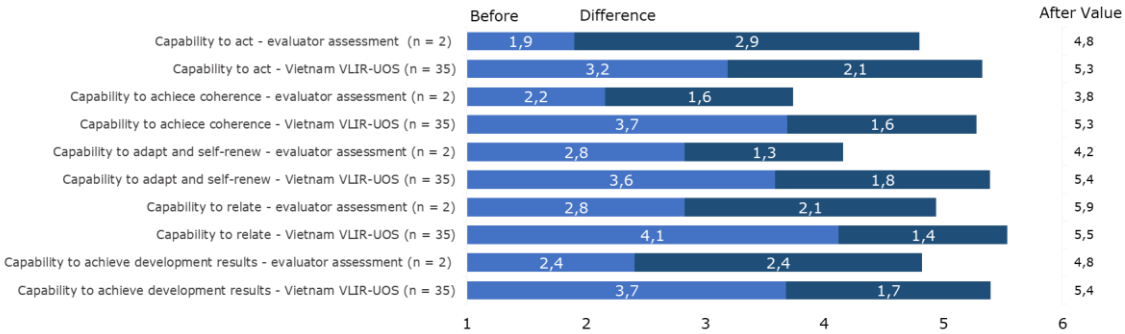
Due to these developments, Can Tho University is considered at the time of the evaluation as an example for internationalisation by the interviewed stakeholders, which is further strengthened by the currently running Network programme funded by VLIR-UOS. In this programme Can Tho University is developing together with its Belgian counterparts English Master programmes for international students as well as network platforms between the participating Vietnamese and Belgian partner universities.

4.2.4 Effects on Can Tho University's organisational capacity

To improve the overall organisational capacity and thus also the research, educational and outreach capacity of Can Tho University (*impact*), the IUC aimed at strengthening the IT infrastructure and the capacity of the IT and English departments as well as changing regulations regarding research (*outcome*).

In this regard the implemented pen-and-paper survey shows an improvement in all five capabilities in the view of the respondents as well as the evaluators due to the implemented activities under the IUC (see figure 18).

Figure 18: Changes in the organisational capacity of Can Tho University



Source: Syspons and Nuffic 2017

However, an in-depth analysis of the different capabilities highlights that the capability to act, with 2.1 and 2.9 in both assessments, experienced the highest gains. This can be explained on the one hand by the IUC's activities in upgrading infrastructure, the investment in the qualification of human resources and the development of curricula and courses (see chapters 5.2.1 and 5.2.2). On the other hand a major component in strengthening this capability was the setting up of the IT infrastructure according to the interviews. The IUC could thereby build upon the progress made under the Dutch MHO programme. While the MHO programme established the fundamental infrastructure, the IUC could build upon this by introducing a common internal network and E-Mail system. It also strengthened the IT infrastructure through the installation of servers. As a result the IT system and internet became faster, more reliable, and more stable. This made it also possible to host websites for the different colleges and departments.

Simultaneously to the strengthening of the IT infrastructure, the interviewed stakeholders also mentioned that the IUC started to change the self-perception of the IT department. Before the IUC the IT department of Can Tho University understood itself as a classical department for teaching and research. With the change and the investment in the IT infrastructure however, a service oriented department was needed to offer the needed internal services to the other departments in the university. Through workshops the IUC initiated a change process that ended with the IT department adopting a service provider role for the entire university, according to all stakeholders interviewed. Changes in the role of the English department however could not be observed by the evaluation or the interviewed stakeholders.

Another relatively large change in the capabilities with 1.7 and 2.4 respectively can be found in the capability to deliver development results (see figure 23). This is in line with the observed results in the research and educational capacities, which demonstrate

relevant improvements in terms of quality, structures and processes (see chapters 5.2.1 and 5.2.2).

Furthermore, the evaluators' assessment highlights with 2.1 also a relatively large change in the capability to relate, while the respondents assess the change in this capability with 1.4. The difference in this assessment can be attributed to the fact that the evaluators judged the change of actually using the existing structures and processes for outreach due to the provided research by the IUC higher than the respondents. This is apparently also true for the increase in external funding in terms of advisory, consultancy and extension services (see chapter 5.2.3).

A similar difference emerges in the capability to adapt and self-renew, in which the evaluators assess the change through the IUC with 1.3 and the respondents with 1.8. Here the interviewed stakeholders assessed the incorporation of research into teaching stronger than the evaluators. While for the stakeholders the possibility of introducing research into their teaching due to the upgraded equipment, change in mind sets through the scholarships and the actual conducted research under the IUC was experienced as a major change in their work, the evaluators recognised this change, but evaluated it as lower as it was not embedded into organisational processes at Can Tho University. At the time of this evaluation the incorporation of research results took place on an individual basis and was mainly restricted to changes in individual lecture notes, according to all interviewed stakeholders. The IUC thus did not establish a process for the incorporation of research into teaching, e.g., the curricula revision process.

In contrast hereto the change in the capability to achieve coherence is assessed by both parties with 1.6. The major change that occurred in this capability was the change in regulations providing incentives to do research, according to the conducted interviews. Before the IUC there were only financial incentives to do teaching as the salary was linked to the teaching hours. During the IUC's implementation discussions were conducted between the Belgian promoters and the rector of Can Tho University to also incorporate a link between salary and research. This was then introduced by linking salaries not only to teaching hours but also to publications in national and international journals. As a result – according to the interviewed stakeholders – Can Tho University could better fulfil its mission to provide research and teaching for the socio-economic development of the Mekong Delta region.

Next to the changes in the capabilities, it should be highlighted that in 2002 and 2008, during and after the IUC had ended, a re-structuring of Can Tho University occurred. In this re-structuring the Institute of Marine Aquaculture was elevated to the College of Aquaculture and Fisheries in 2002. The interviewed stakeholders stated that this happened due to the research and progress made in these fields under the IUC. Moreover, the College of Agriculture was re-structured and renamed the College of Agriculture and Applied Biology in 2008. The interviewed stakeholders explained that this was done on the basis of the model of a Belgian university that many considered exemplary. Furthermore, the newly merged College of Technology and Engineering established two new departments and research fields in chemical and mechanical engineering in 2008 due to the research conducted and the equipment provided during the IUC.

4.2.5 Assessment of the effectiveness and impact of the IUC with Can Tho University

Based upon these findings the evaluation team is highly confident that the IUC has improved the **research capacity** of Can Tho University. Particularly, the improvement in the qualification of the human resources through the integrated scholarships (*causal mechanism*) makes it reasonably certain that the IUC has contributed to increased research capacities at Can Tho University, as these constituted the majority of scholarships at that time (*outcome hypothesis 1*) (see figure 19 and 27). Furthermore, the evaluation team is highly confident that the improved qualification of human resources also led to an increase in the quality and quantity of the research output by

Can Tho University, which could be significantly increased since the start of the IUC (*outcome hypothesis 2*). The most effective *causal mechanism* hereby was the funding of research projects under the IUC, which led to more and better publications.

Moreover, the evaluation team is also highly and cautiously confident that the upgrading of research equipment and the transdiciplinarity of the funded research led to higher quality in the research publications of Can Tho University (*outcome hypothesis 4 and 5*). Only by financing this equipment was it actually possible to conduct state-of-the art research at Can Tho University. At the same time the evaluation team is highly confident that the increased research output and the integrated scholarships also enhanced the career development of the indirect beneficiaries, as they were in key positions at Can Tho University at the time of this evaluation (*outcome hypothesis 3*).

Furthermore, the evaluators are more confident than not confident that the better qualification of human resources, the upgraded research equipment and increased research output led to better research processes and structures (*outcome hypothesis 6*). In this regard it could be proven in the opinion of the evaluators that the trainings in research methodologies and planning (*causal mechanism*), the indirect influence of the IUC programme coordination unit (*causal mechanism*) as well as the peer-to-peer learning between the Belgian promoters and the Vietnamese scholarship holders (*causal mechanism*) led to the improvement in research processes. However, it remains questionable if the increased research output actually had an influence on the improvement of research processes and structures at Can Tho University.

As a result the evaluation team is also cautiously confident that the improved research processes and structures as well as human resources led to an improved research quality at Can Tho University (*impact hypothesis 9*) and that Can Tho University could establish itself as a centre for research and technology transfer in the Mekong Delta region (*impact hypothesis 8*) as its expertise is highly sought after by the local government authorities, farmers and enterprises in the region. An important role here was played by the publications of high quality research publications (*impact hypothesis 10*), which resulted out of the funded research projects under the IUC (*causal mechanism*). It is thereby reasonably certain that the funded research under the IUC developed relevant knowledge and technologies that were used by early adopters in the Mekong Delta (*outcome hypothesis 7*). This in turn led the evaluators to conclude that they are cautiously confident that the application of these technologies and knowledge led to income increases for the surveyed farmers (*impact hypothesis 11*). A crucial success factor hereby was that the relevant stakeholders were involved in the research process throughout the whole process – from the identification of research needs until the end of the implementation of the research projects.

Figure 19: Overview of assessed impact hypothesis – research capacity[6]

		Hypothesis	Qualitative assessment	Quantitative scale
Research capacity				
Outcome	1	If human resources are strengthened by the IUC, then the research capacities of Can Tho University are increased.	Reasonably certain that () is true	0.95 – 0.99
	2	If human resources are strengthened by the IUC, then the quality and quantity of the research output by Can Tho University can be increased.	Highly confident that () is true	0.85 – 0.95
	3	If human resources are strengthened and the individual research output is increased through the IUC, then the career development of indirect beneficiaries is enhanced.	Highly confident that () is true	0.85 – 0.95
	4	If research equipment is newly introduced or upgraded by the IUC, then more high quality research publications are published.	Highly confident that () is true	0.85 – 0.95
	5	If transdisciplinary research projects are funded by the IUC, then the quality of the research output of Can Tho University is increased.	Cautiously confident that () is true	0.70 – 0.85
	6	If human resources are strengthened, research equipment is upgraded and research output is increased by the IUC, then research processes and structures are improved.	More confident than not confident that () is true	0.50 – 0.70
	7	If the funded research under the IUC develops relevant knowledge or technologies for the development of the Mekong Delta, then this knowledge or technologies are adopted by early adopters.	Reasonably certain that () is true	0.95 – 0.99
Impact	8	If research structures and processes as well as human resources are improved by the IUC, then Can Tho University can establish itself as a centre of research and technology transfer in the Mekong Delta.	Cautiously confident that () is true	0.70 – 0.85
	9	If research structures and processes as well as human resources are improved by the IUC, then the research quality at Can Tho University is improved.	Cautiously confident that () is true	0.70 – 0.85
	10	If high quality research publications are published under the research of the IUC, then Can Tho University can establish itself as a centre of research and technology transfer in the Mekong Delta.	Highly confident that () is true	0.85 – 0.95
	11	If the knowledge or technologies are adopted by early adopters, then new farming methods are adopted in the Mekong Delta, which increase the income of the respective farmers.	Cautiously confident that () is true	0.70 – 0.85

Source: Syspons and Nuffic 2017

With regard to the **educational capacity** the evaluation team is more confident than not confident that the IUC led to an improvement. In this regard the evaluators are highly confident that a major improvement was the upgrading of research equipment, which enabled the introduction of research into the teaching at Can Tho University as there was no suitable equipment before (*outcome hypothesis 13*) (see figure 20 and 27). At the same time, however the evaluators are neither confident nor not confident that the courses and programmes at Can Tho University became more transdisciplinary due to the funded research under the IUC (*outcome hypothesis 12*). This is due to the fact that one major factor that influenced the transdiciplinarity of the programmes and courses at Can Tho University was the switch from a semester-based to a credit-based system, which was initiated through regulations by the Vietnamese MoET. This impetus was, in the opinion of the evaluation team, the main force that led to the credit based system and its inherent transdiciplinarity. Nevertheless, it can be stated that the course and curricula revision under the IUC were used as pilot for the credit based system and thus played an important role in introducing the whole university to transdiciplinarity and the credit-based system. In this regard the evaluators are more confident than not confident that this is true (*outcome hypothesis 14*).

This assessment also holds true for the improvement of educational processes and structures through the introduction of distance education at Can Tho University (*outcome hypothesis 15*). Here, distance education did improve educational processes in those colleges that do not focus on applied research, as in those colleges it is used frequently. However in colleges focused on applied research it is not used very often. As a consequence, distance education has partially improved educational processes but not for the whole university, in the view of the evaluators. Furthermore, the evaluators are more confident than not that the staff of Can Tho University has not acquired new teaching skills under the IUC (*outcome hypothesis 16*). These skills were already transferred under the Dutch MHO programme as well as student-centred teaching techniques. Nevertheless, the integrated scholarships of the IUC and the indirect beneficiaries' experiences abroad (*causal mechanism*) showed them student-centred teaching techniques in practice. In addition, it is reasonably certain that there were no

[6] The impact hypotheses written in blue were not part of the Theory of Change. They were identified during the field mission as relevant additional impact hypotheses.

programmes and courses in English introduced at the time of the IUC as these are now introduced under the VLIR-UOS funded Network programme (*outcome hypothesis 17*).

Thus, the evaluation team is neither confident nor not confident that the improved educational processes and structures led to a better educational quality at Can Tho University or to better qualified human resources for the Mekong Delta region (*impact hypothesis 18 and 19*). As many other factors such as the Dutch MHO programme and the decision of the Vietnamese MoET played important roles in the improvement of the educational processes and structures at Can Tho University, it is difficult to discern the concrete contribution of the IUC. Moreover, available data for the employability of the students is only available for recent years. Hence, it cannot be interpreted to what extent the IUC had an impact on the students' employability or for example the running VLIR-UOS Network programme.

Figure 20: Overview of assessed impact hypothesis – educational capacity[7]

		Hypothesis	Qualitative assessment	Quantitative scale
Educational capacity				
Outcome	12	If new curricula and courses, which are based upon new research insights, are introduced by the IUC, the programmes and courses become more transdisciplinary.	Neither confident nor not confident that () is true (or false) – no idea	0.5
	13	If research equipment is newly introduced or upgraded, then research becomes integrated into programmes and courses.	Highly confident that () is true	0.85 – 0.95
	14	If the reforms under the IUC are used as a pilot for educational reform at Can Tho University, then these changes can be applied university wide.	More confident than not confident that () is true	0.50 – 0.70
	15	If distance education and relevant network facilities are introduced by the IUC in Can Tho University, then the educational processes and structures in the targeted fields by the IUC at Can Tho University are improved.	Neither confident nor not confident that () is true (or false) – no idea	0.5
	16	If staff of Can Tho University acquire new teaching skills under the IUC, then the educational processes and structures in the targeted fields by the IUC at Can Tho University are improved.	More confident than not confident that () is false	0.30 – 0.50
	17	If programmes are offered in English, then the educational processes and structures in the targeted fields by the IUC at Can Tho University are improved.	Reasonably certain that () is false	0.01 – 0.05
Impact	18	If the educational processes and structures in the targeted fields by the IUC at Can Tho University are improved, the educational quality at Can Tho University is improved.	Neither confident nor not confident that () is true (or false) – no idea	0.5
	19	If the educational quality at Can Tho University is improved by the IUC, then there are better qualified human recourses available in relevant sectors in the Mekong Delta.	Neither confident nor not confident that () is true (or false) – no idea	0.5

Source: Syspons and Nuffic 2017

In contrast hereto the evaluation team is cautiously confident that the **outreach capacity** and the **internationalisation** efforts of Can Tho University have been strengthened (*impact hypothesis 24*) through the funded research projects under the IUC (*causal mechanism*) (see figure 21 and 27). Hereby, it is reasonably certain that the funded research projects under the IUC improved the outreach services of Can Tho University (*outcome hypothesis 20*). Before the IUC, Can Tho University did not have any relevant research that could be transferred via the well-established outreach processes and structures. Only with the research under the IUC was it possible for Can Tho University – from the perspective of the evaluators – to contribute to the socio-economic development in the Mekong Delta region. The evaluation team is thereby cautiously confident that the research projects also contributed to the acquisition of external funding, as these could be significantly increased over the implementation period of the IUC (*outcome hypothesis 21*). At the same time this also led to more international exposure in terms of conference and transfer of technologies to other continents as well as new partnerships with industry (*outcome hypothesis 22 and 23*).

However, the evaluators are highly confident that through the improved outreach services, Can Tho University did not become a catalyst for reform of national legislation in the higher education sector (*impact hypothesis 25*). Most of the reforms at that time were initiated by the Vietnamese MoET and then reached Can Tho University and not vice versa. In addition the evaluation team is also cautiously confident that the improved internationalisation under the IUC did not led to a coordination role of Can Tho University among Vietnamese universities regarding internationalisation (*impact hypothesis 26*). In

[7] The impact hypotheses written in blue were not part of the Theory of Change. They were identified during the field mission as relevant additional impact hypotheses.

this regard the IUC did contribute to the internationalisation of Can Tho University but the coordination role was only taken up once VLIR-UOS founded the Network programme. This programme actually gave Can Tho University the platform to take up this role. During the IUC Can Tho University was "only" viewed as an example for successful internationalisation in the opinion of the evaluators.

Figure 21: Overview of assessed impact hypothesis – outreach capacity and internationalisation[8]

		Hypothesis	Qualitative assessment	Quantitative scale
Outreach capacity and internationalisation				
Outcome	20	If the IUC funds research projects, which produce relevant academic output, then these research projects lead to better outreach services of Can Tho University.	Reasonably certain that () is true	0.95 – 0.99
	21	If the IUC funds research projects, which produce relevant academic output, then Can Tho University acquires more external funding.	Cautiously confident that () is true	0.70 – 0.85
	22	If the IUC funds research projects, which produce relevant academic output, then Can Tho University can establish new partnerships with industry.	Cautiously confident that () is true	0.70 – 0.85
	23	If the IUC funds research projects, which produce relevant academic output, then Can Tho University gets more international exposure.	Cautiously confident that () is true	0.70 – 0.85
Impact	24	If the funded research projects under the IUC lead to better outreach services and more international exposure of Can Tho University, then the internationalisation of Can Tho University is improved.	Cautiously confident that () is true	0.70 – 0.85
	25	If the funded research projects under the IUC lead to better outreach services of Can Tho University, then Can Tho University is a catalyst for the reform of national legislation in the higher education sector.	Highly confident that () is false	0.05 – 0.15
	26	If the internationalisation of Can Tho University is improved, then Can Tho University takes over a coordination role regarding internationalisation efforts of universities in Vietnam.	Cautiously confident that () is false	0.15 – 0.30

Source: Syspons and Nuffic 2017

Finally within the field of **organisational capacity**, the evaluators are cautiously confident that the IUC improved the organisational capacity of Can Tho University. It is thereby reasonably certain that the major impetus for this strengthening came from the improvement of the IT infrastructure at Can Tho University under the IUC (*outcome hypothesis 27*) (see figure 22 and 27). The IUC hereby built upon the preliminary work of the Dutch MHO programme and made the internet connection within Can Tho University more reliable, stable and faster. At the same time it introduced an internal E-Mail system and network. Moreover, it developed the IT department into a service provider for the whole university. These changes made distance education, higher quality research and also communication for internationalisation efforts more feasible in the view of the evaluators.

In addition the evaluators are also more confident than not that the IUC changed regulations regarding the financial compensation of research at Can Tho University (*outcome hypothesis 29*). This in turn contributed to the research capacity and in particular to an increase in research output and funding (*causal mechanism*). However, the evaluators are neither confident nor not confident that the IUC contributed to an increase in the capacities of the English department as no major improvements have been made and these could also be attributed to a natural development (*outcome hypothesis 28*).

Nevertheless, based on these findings the evaluation team is highly confident that the strengthened organisational capacity led to improved research and education capacities, although more activities in this area could have resulted in even more effects (*impact hypothesis 30*). In this regard, it should be mentioned that due to the IUC several colleges were modelled along the Belgian model and new departments were founded on the basis of the research initiated under the IUC.

[8] The impact hypotheses written in blue were not part of the Theory of Change. They were identified during the field mission as relevant additional impact hypotheses.

Figure 22: Overview of assessed impact hypothesis – organisational capacity

		Hypothesis	Qualitative assessment	Quantitative scale
Organisational capacity				
Outcome	27	If the IUC improves the information technology (IT) of Can Tho University, the organisational capacities of Can Tho University are strengthened.	Reasonably certain that () is true	0.95 – 0.99
	28	If the IUC increases the English capacities of Can Tho University, the organisational capacities of Can Tho University are strengthened.	Neither confident nor not confident that () is true (or false) – no idea	0.5
	29	If regulations regarding research are improved, then the organisational and research capacities of Can Tho University are improved.	More confident than not confident that () is true	0.50 – 0.70
Impact	30	If the organisational capacity of Can Tho University is strengthened, then the research and educational capacities are improved.	Highly confident that () is true	0.85 – 0.95

Source: Syspons and Nuffic 2017

4.3 Sustainability of the IUC with Can Tho University

Sustainability is central for the IUC, since the programme aims to foster durable changes in Can Tho University. Hence, it is important to analyse to what extent the IUC has promoted institutional, technical and academic sustainability. Moreover, it must be analysed whether the IUC has initiated sustainable partnerships between the participating universities. For the purpose of this evaluation the different dimensions of sustainability were defined as follows:

- *Institutional sustainability* was defined as the degree to which human resources, processes and procedures of the IUC have been incorporated into the structures of Can Tho University.
- *Technological sustainability* was defined as the degree to which newly upgraded or introduced equipment can still be used by Can Tho University without external assistance and maintenance support.
- *Academic sustainability* was defined as the degree to which Can Tho University will be better able to fulfil its core functions in the future.

With regard to the *institutional sustainability* the field mission and the interviews demonstrated that the four research fields – agriculture, aquaculture, biotechnology as well as food technology and processing – on which the IUC focused, are still included in the priority areas of Can Tho University's strategy. This is also exemplified by the funded VLIR-UOS Network programme, which also focuses on these areas. Moreover, Can Tho University has sufficient academic staff available in these areas to continue research and teaching. At the same time the qualification level of the staff improved through the IUC and is still improving through other external funding in terms of e.g., scholarships. In addition indirect beneficiaries of the IUC are located at key positions within Can Tho University (e.g., directors or deans) to continue and keep the initiated changes in the future. Furthermore, the stakeholders interviewed expressed a high ownership of the initiated changes (e.g., distance learning system, transdiciplinarity in research or the incorporation of research into teaching).

Also the *technological sustainability* of the upgraded and newly introduced equipment has been guaranteed at Can Tho University. A success factor for the sustainability and maintenance of the equipment could be identified during the interviews conducted by the fact that most of the equipment purchased or upgraded under the IUC was done by using local materials. As a result the staff at Can Tho University was taught in workshops under the IUC to assemble the equipment themselves. Thus, they are capable of repairing the equipment by themselves, unlike other equipment financed by other donors. Additionally, the equipment was still frequently used in teaching at the time of this evaluation as the staff was taught how to use it during trainings under the IUC. This was also not the case with equipment provided by other donors, which is currently not used by Can Tho University. Nevertheless, the maintenance of the equipment is a

challenge for Can Tho University, as the university does not possess sufficient financial resources to maintain all equipment or to keep it up to date, according to the interviewed stakeholders.

Furthermore, the *academic sustainability* was assessed positively by the interviewed stakeholders. On the one hand, Can Tho University is experiencing an upward enrolment trend in students and an increasing employability of its students (see chapter 5.2.2). On the other hand, Can Tho University is experiencing a turn-over rate of less than 5% in its staff, although they do not pay as much as other universities in the region. The latter can be explained by the following factors, according to the implemented interviews:

- Firstly, Can Tho University possesses a very good work environment in which a lot of opportunities and freedom are provided to each individual. In this regard the interviewees also highlighted that Can Tho University, in comparison to other Vietnamese universities, does not foster a competitive working environment, but rather collegiality between its staff, which was viewed as an advantage.
- Secondly, Can Tho University offers its staff the opportunity to do research and teaching while other universities in the region are mainly focused on teaching.
- Thirdly, in the view of the interviewed stakeholders Can Tho University possesses better research facilities than most universities in Vietnam due to the IUC.
- Fourthly, the interviewees stated that they feel very valued by Can Tho University. They feel that their work makes a different and contributes to the development of the Mekong Delta region as Can Tho University possesses such well-established processes and structures for outreach.
- Fifthly, Can Tho University keeps close personal contact with its personnel when it is selected for scholarships abroad. Moreover, they offer young researchers their own research fund three years after their graduation, when they stay at Can Tho University.

Likewise the IUC also established *sustainable partnerships* on an individual and institutional level between the involved Belgian universities and Can Tho University, according to the interviews conducted with the relevant stakeholders. On the individual level researchers and lecturers still have frequent contact with their respective Belgian counterparts to publish articles and to apply for external funds. The acquired fund of the Belgian FWO is one example of such a collaboration. Furthermore, Belgian and Vietnamese colleagues are substituting for each other at international conferences if one of them does not have the time to participate. For example, a Belgian professor was invited to speak at a conference in Bangladesh on a subject matter that was researched under the IUC. As he did not have the time to participate in this conference, he nominated his Vietnamese colleague to participate in his place.

On the institutional level Can Tho University has a long tradition of partnerships with Belgian universities going back to the 1980s (see chapter 2.1). At the time of this evaluation this partnership still continued, as Can Tho University together with some of the Belgian universities of the IUC was engaged in a VLIR-UOS funded Network project, in which they were applying for a second phase. Moreover, Can Tho University also had signed Memorandums of Understanding with all Belgian universities that were involved in the IUC.

4.3.1 Assessment of the sustainability of the IUC with Can Tho University

Based on these findings the evaluation team comes to the conclusion that the IUC has initiated sustainable changes at and partnerships with Can Tho University. The observed changes initiated by the IUC were and are still incorporated into Can Tho University's strategies and the research fields of the IUC are still recognised as priority areas of Can

Tho University. Moreover, they are considered flagship fields or colleges within Can Tho University.

At the same time the evaluation team comes to the assessment that Can Tho University will possess sufficient academic staff and students to pursue research and teaching in these fields in the future. In this regard it is helpful that persons qualified under the IUC today occupy strategic positions within Can Tho University and that the university possesses a very high retention rate of its staff due to the working environment they have created. Furthermore, the ongoing maintenance and usage of the equipment installed and upgraded under the IUC also guarantees a continuous involvement in these fields in the opinion of the evaluation team.

Additionally, it has to be concluded that Can Tho University maintains sustainable partnerships with Belgian universities on an individual an institutional level. With regard to the former, staff at Can Tho University still have frequent contact with their Belgian counterparts and are successfully working together within them in terms of publications, participation in conferences or in the acquisition of external funding. Concerning the latter, Can Tho University and some of the Belgian universities of the IUC are still working together in a VLIR-UOS funded Network programme and are thereby continuing the tradition of Belgian partnerships since the 1980s.

5. Conclusions

The IUC's **strength** is that it was a relevant programme which addressed the needs of Can Tho University as well as of the farmers and local government authorities in the Mekong Delta region. In this light it was also in line with the respective policies and strategies on the national and regional level as well as with Can Tho University's strategies. In particular research projects under the IUC reached impacts if they involved the addressed stakeholders in the identification of the research need and during the implementation of the research project. This was in six out of seven projects the case.

It can also be concluded that the IUC was particularly successful in strengthening the research capacity of Can Tho University and establishing the university as a centre of research and technology transfer in the region. Through the improvement in the qualification of human resources, the upgrading of research equipment, changes in research regulations as well as the transdisciplinary research projects, the IUC was able to improve the research quality and output of Can Tho University. Furthermore, the funded integrated scholarships of the IUC enhanced the career development of the beneficiaries and placed them in key positions in the university. Simultaneously, these integrated scholarships as well as the trainings conducted under the IUC strengthened the research processes and structures at Can Tho University as state-of-the-art research methodologies and planning was taught to key personnel. Another crucial factor hereby were the funded research projects under the IUC, which researched relevant knowledge and technologies and led to income increases among the targeted and "spill-over" farmers in the Mekong Delta region.

The latter also led to a strengthening of the outreach capacities of Can Tho University as the research projects provided for the first time relevant knowledge and technologies that could be transferred via the existing outreach processes and structures of Can Tho University. As a consequence, external research funding could also be significantly increased and Can Tho University received more international exposure.

Furthermore, the IUC was also successful in introducing research into the teaching at Can Tho University by providing the necessary equipment and training. The introduction of distance education also improved the educational processes and structures, particularly in colleges that do not focus on applied science. A prerequisite for this was the establishment of a stable, reliable and fast IT infrastructure with an IT department in the role of a service provider, which was established under the IUC. In this regard it is also noteworthy that the curricula development under the IUC was used as a pilot to change the semester-based system to a credit-based system at Can Tho University. In this regard, it should also be mentioned that due to the IUC several colleges were re-structured along the Belgian model and new departments were founded on the basis of the research initiated under the IUC.

Moreover, it can be concluded that the observed changes have been sustainably integrated at Can Tho University, as they are incorporated in relevant strategies and policies. Hereby, it was crucial that the integrated scholarships enhanced the careers of its beneficiaries in such a way that they occupy crucial positions in Can Tho University at the time of this evaluation. At the same time, the portfolio approach of VLIR-UOS starting with the first projects in the 1980s via the IUC and other funded projects and cumulating in the currently running Network programme ensured the sustainability of the changes initiated under the IUC. As a result of this continuous involvement and the contacts established under the IUC, professional contacts and partnerships between

individual researchers as well as on the institutional level of Can Tho University with Belgian counterparts still exist.

However, the IUC also exhibited some **weaknesses**. The IUC did not address the poorest farmers as at the start of the projects the farmers targeted by the research projects had an income that was higher than the official Vietnamese poverty line. In addition, the projects were not always located in the poorest regions in the Mekong Delta. Moreover, the IUC was not able to reform the English department or to establish Can Tho University as a catalyst for reform of national legislation in the higher education sector. The observed reforms were initiated by the Vietnamese MoET and then reached Can Tho University and not vice versa. Additionally, the IUC also did not – as promised – establish Can Tho University in a leading coordination role among Vietnamese universities regarding internationalisation. This was only achieved under the VLIR-UOS funded Network programme. However, the IUC lay the groundwork for this development through its improvements in the internationalisation of Can Tho University.

Also in the field of educational capacity did the IUC not achieve all envisioned impacts. Here the main factor for making curricula more transdisciplinary was the regulations initiated by the Vietnamese MoET, which was also the main impetus for the implemented switch from a semester-based to a credit-based system at Can Tho University. Moreover, the change from teacher to student-centred teaching methods has to be mainly attributed to the Dutch funded MHO programme and not the IUC. As a consequence it is difficult to discern the concrete contribution of the IUC to the improvement of the educational quality at Can Tho University.

Despite these weaknesses, it can however be concluded that the IUC made a valuable contribution to the capacity development of Can Tho University as well as to the improvement of the living conditions in the Mekong Delta region – particularly through the implemented research projects and the resulting income increases by the farmers.

6. Lessons learned regarding the evaluation design and used methodology

Having implemented the proposed evaluation design for the field mission in Vietnam regarding the VLIR-UOS IUC intervention, there are – as in every evaluation – lessons learned. On a general level the following lessons learned could be identified:

- The proposed country selection in the Terms of Reference caused a selection bias in the choice of countries, as countries were selected in which there was a higher chance of identifying impacts. This reduces the external validity of the applied evaluation design regarding the assessment of IUCs in general. Therefore, it can be concluded that the evaluation results in this report cannot be generalised to VLIR-UOS IUC interventions. They solely can highlight tendencies regarding why and if some IUCs or projects work or do not work.

- Furthermore, this IUC was selected on the basis of an evaluability assessment. On the one hand, this ensured that the IUC was evaluable. On the other hand, this also reduced the external validity of the results, as an intervention was chosen that was probably better planned and implemented than others. However, this does not mean that interventions that score high in an evaluability assessment are necessarily better than others. Nevertheless, a selection bias cannot be ruled out completely when applying this selection procedure. This selection bias as well as the country selection bias was however accepted by the stakeholders involved in the inception phase due to the formative nature of this impact evaluation.

Furthermore, the following specific lessons learned could be identified:

- Before the implementation of this IUC no baseline study had been implemented. Consequently, a baseline had to be re-constructed in order to make a before-and-after comparison. This however, entailed the risk that interview partners or secondary data do not describe a correct baseline situation due to changed perceptions over time (interview partners) or possible political motivation (interview partner and secondary data). As a result, the before-and-after comparison might be flawed due to a better or worse described baseline situation than actually existed in the past. This could however be mitigated in this impact evaluation by data and methods triangulation in the opinion of the evaluators.

- The collected secondary data proved very valuable for the assessment of this IUC. At the same time it was however very difficult to get data for the same time periods and at the same level of aggregation for the different analytical dimensions. This was also due to the fact that data was not collected centrally in Can Tho University. Hence, in future impact evaluations even more attention should be paid to the collection of secondary data than was done in the fact-finding mission.

- Within this evaluation Syspons and Nuffic implemented two quasi-experimental designs – one successfully and one not successfully. The lack of success in the latter one can be accorded to the small population of the treatment group as well as to the economic sensitivity of the information, as the farmers were very reluctant to give information about their income. As a result in future impact evaluations there should be a more detailed analysis of the target group regarding potential risk factors for the applied methodology. This in turn could

also imply an ethical trade-off in terms of whether an evaluation should actually take place under the given circumstances and ethical implications. In addition the population should at least encompass more than 80 beneficiaries to guarantee a sufficiently large sample based upon the response rates experienced in this field mission.

- A key success factor was the existing institutional memory in Can Tho University in the form of actually available persons who had participated in the IUC. Without them being available and still working in Can Tho University a rich data collection could not have taken place. Therefore, in future impact evaluations, a key aspect should be the analysis of available persons in fact-finding missions who have participated in the intervention under investigation.

- The applied 5C model to measure the development of Can Tho University's capacities proved very useful as it gave theoretical depths to this impact evaluation. By using this model the evaluators developed evaluation questions that would not have been posed otherwise. At the same time it is the view that the theoretical model used has to be adapted further to the specificities of the IUC intervention in question to be even more valuable in the future. In the evaluator's opinion, it should be decided whether the analysis should take place along the capabilities of the 5C model or along the developed indices of research, educational, outreach as well as an additional one regarding governance capacity. It was the view that the current structure was prone to repetitions; particularly in the chapter on organisational capacity as most findings had already been presented in the previous chapters.

- The combination of secondary and empirical data as well as the collection of quantitative and qualitative data proved in most cases sufficient to either prove or disprove the developed impact hypothesis of this IUC. This wide angle of data collection techniques should be kept in future impact evaluations.

- A particular success of this impact evaluation was the combination of different designs (before-and-after, quasi-experimental, most-significant change and contribution analysis). This proved very beneficial to not only answer questions "if" but also "how" impact occurred. Hereby we were also able to identify relevant causal mechanisms that might prove useful for the future development of IUC interventions. As result, the approach of the most "appropriate design" for impact evaluations should be introduced as a standard in future impact evaluations.

List of annexes

Annex A: Country report Vietnam VLIR-UOS

Annex A. Country report Vietnam VLIR-UOS

A.1 Bibliography

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A.2 List of conducted interviews

Name	Job title	Date	Type of interview
Prof. Khoa	Manager of Research Affairs Department/ former Local Promoter of the IUC	21.11.2017 8:30 am - 10:30 am	Personal interview
Prof. LV Dũng	Vice Rector in charge of research	21.11.2017 10:30 am - 11:30 am	Personal interview
Prof. Tran Thuong Tuan	Former President of Can Tho University	21.11.2017 13:30 pm - 14:30 pm	Personal interview
Prof. Nguyen Anh Tuan	Former President of Can Tho University	21.11.2017 14:30 pm - 15:30 pm	Personal interview
Mr. NM Trí	Manager of Academic Affairs	21.11.2017 15:30 pm - 17:30 pm	Personal interview and identifying secondary data sources
Prof. TQ Phú	Dean of College of Aquaculture & Fisheries	22.11.2017 08:30 am - 09:30 am	Personal interview
Prof. LV Hòa	Dean of College of Agriculture & Applied Biology	22.11.2017 09:30 am - 10:30 am	Personal interview
Prof. TN Dũng	Director of Biotechnology Research and Development Institute	22.11.2017 10:30 am - 11:30 am	Personal interview
Prof. NC Ngôn	Dean of College of Technology and Engineering	22.11.2017 13:30 pm - 14:30 pm	Personal interview
Mr. ĐĐ Trí and Cao Thanh Tuan	Director of Information and Network Management Centre and employee at the Information and Network Management Centre	22.11.2017 14:30 pm - 15:30 pm	Group interview
Dr. PH Hùng	Manager of Quality Assurance and Testing	22.11.2017 15:30 pm - 17:30 pm	Personal interview and identifying secondary data sources

Name	Job title	Date	Type of interview
Prof. NV Ut	Project manager - B4/ R.1.2	23.11.2017 08:30 am - 09:30 am	Personal interview
Dr. DM Viễn	Project manager - B7/ R.3	23.11.2017 09:30 am - 10:30 am	Personal interview
Prof. NH Trung	Project manager - A2/ E.2.1	23.11.2017 10:30 am - 11:30 am	Personal interview
Prof. NV Mười	Project manager - B5/ R.2.3	23.11.2017 13:30 pm - 14:30 pm	Personal interview
Dr. DT Hương Giang	Project manager - B6/ R.2.4	23.11.2017 14:30 pm - 15:30 pm	Personal interview
Prof. LV Hòa	Project manager - B2/ R.2.1	23.11.2017 15:30 pm - 16:30 pm	Personal interview
Focus group with 6 participants	Indirect beneficiaries of the College of Agriculture and Applied Biology	24.11.2017 08:30 am - 09:45 am	Focus group
Focus group with 10 participants	Staff of the College of Technology and Engineering	24.11.2017 09:45 am - 11:00 am	Focus group
Focus group with 4 participants	Indirect beneficiaries of the Institute of Biotechnology Research and Development	24.11.2017 11:00 am - 12:15 pm	Focus group
Dr. DT Công	Project manager - A2/ E.2.2	24.11.2017 14:00 pm - 15:00 pm	Personal interview
Dr. Hoa	Project manager - B1/ R.1.1	27.11.2017 10:00 am - 11:00 am	Personal interview
Mr. Pham	Technician - B1/ R.1.1	27.11.2017 11:00 am - 12:00 pm	Personal interview

Name	Job title	Date	Type of interview
1 representative	Soc Trang local government authority	27.11.2017 14:00 pm - 15:00 pm	Personal interview
1 representative	Bac Lieu local government authority	28.11.2017 10:00 am - 11:00 am	Personal interview
2 representative	An Giang local government authority	29.11.2017 10:00 am - 11:00 am	Personal interview
Focus group with 7 participants	Indirect beneficiaries of the College of Aquaculture and Fishery	01.12.2017 08:30 am - 09:45 am	Focus group
Prof. Minh	Project manager - A1/ E.1	01.12.2017 10:00 am - 11:00 am	Personal interview
Dr. Toan	Project manager - B3/ R.2.2	01.12.2017 13:00 pm - 14:00 pm	Personal interview
Prof. Khoa	Manager of Research Affairs Department/ former Local Promoter of the IUC	01.12.2017 14:00 pm - 15:00 pm	Debriefing
Prof. Merckx	Professor at the University of Leuven	05.12.2017 11:00 am - 12:00 pm	Telephone interview
Prof. Sorgeloos	Professor at the University of Gent	13.12.2017 09:00 am - 10:00 am	Telephone interview
Prof. Hendrickx	Professor at the University of Leuven	13.12.2017 10:00 am - 11:00 am	Telephone interview
Prof. Van Driessche	Professor at the Vrije Universiteit Brussels	13.12.2017 11:00 am - 12:00 pm	Telephone interview
Prof. Dhont	Professor at the University of Gent	13.12.2017 14:00 pm - 15:00 pm	Telephone interview

Name	Job title	Date	Type of interview
Mrs. Hu	Desk officer at the Vietnamese Ministry of Education and Training	29.01.2018 10:30 am - 11:30 am	Telephone interview
Mr. Van	Former scholarship holder	30.01.2018 10:30 am - 11:30 am	Telephone interview
Mr. Doan	Former scholarship holder	31.01.2018 10:30 am - 11:30 am	Telephone interview
Mrs. Dinh	Former scholarship holder	01.02.2018 09:30 am - 10:30 am	Telephone interview
Mr. Truong	Former scholarship holder	01.02.2018 10:30 am - 11:30 am	Telephone interview
Mrs. Khuong	Former scholarship holder	02.02.2018 09:30 am - 10:30 am	Telephone interview
Mrs. Thanh	Former scholarship holder	06.02.2018 09:30 am - 10:30 am	Telephone interview
Mr. Pham	Former scholarship holder	07.02.2018 09:30 am - 10:30 am	Telephone interview

A.3 Evaluation design

A.3.1 Research design

A.3.1.2 Assessing relevance

Based on the developed evaluation questions in the assessment grid (see annex), the criterion of relevance in this field mission was operationalised along the following aspects.

Relevance on the level of the partner: The starting point of the analysis of relevance of the IUC was the suitability of its intended objectives and impacts with the overarching needs of Can Tho University in order to identify facilitating or hindering factors for achieving impact. It was assumed that relevant interventions have a higher impact on the level of the partner as the partner is more willing to implement the intervention as it corresponds with its perceived needs. Hence, the analysis focused on the compatibility of the IUC's goals with the existing strategies of Can Tho University with regard to its organisational, research and educational capacities at the start and during the implementation of the IUC. To answer this analytical aspect we conducted an extensive desk research of strategic documents of Can Tho University, in which we mapped the Can Tho University's objectives and development strategies. Furthermore, we also conducted interviews to triangulate the findings of the desk research.

Relevance on the level of the partner country: On this level we analysed to what extent the IUC was relevant with regard to the existing national strategies and policies in Vietnam as well as for addressing developmentally relevant research gaps in Vietnam. Here it was assumed that relevant interventions are more effective in achieving impact as they firstly experience fewer hindering factors and address pressing issues for which solutions are sought. In this light we assessed the existing national strategies and policies at the time of the IUC by implementing a desk research. Moreover, we conducted interviews with internal as well as external stakeholders to analyse the developmental relevance of the addressed research gaps though the IUC.

Relevance on the level of the indirect and final beneficiaries: In order to assess the relevance on the level of the beneficiaries, we analysed and systematised their different needs and involvement in the formulation of the IUC. For this purpose we distinguished between the needs and involvement of the indirect beneficiaries (within Can Tho University) and the final beneficiaries (e.g., farmers in the Mekong Delta). It was believed that a stronger involvement of beneficiaries in the formulation of an intervention leads to a stronger needs orientation in the intervention's implementation. This in turn should result in a higher impact as the ownership of the beneficiaries is higher. For this purpose we conducted interviews with the different types of beneficiaries to identify different degrees of involvement before, during and after the IUC.

A.3.1.2 Assessing effectiveness and impact

Over the past ten to fifteen years development practitioners and agencies have considered it increasingly important to demonstrate the effectiveness and impact of their interventions. While in the past the assessment of development interventions was dominated by analysing the implementation of outputs, the following recent economic

and political trends have shifted the attention of development evaluation – according to the literature – to the outcomes and impact of development interventions:

- In light of the global financial crisis there has been a reduction of the developmental budget in many European countries.
- There has been – especially in the Anglo-Saxon world – a drive among donors for greater demonstration of "value for money".
- At the same time there is an increasing public perception in European states that five decades of development cooperation have not had the effects hoped for. This has put pressure on donors to demonstrate clear and tangible results that can be understood by the general public.
- The evidence-based policy movement, which has gained momentum over the past few years, has led to more systematic examination of some of the main assumptions underlying development work. This has led to much greater attention among development actors to measure and demonstrate what works more and less well, and to use this knowledge to leverage greater effectiveness from development programmes (Hearn & Buffardi, 2016, p. 6).

As a consequence of these trends there was a strong push to define the concept of impact and to evaluate the impact of development interventions with the most rigorous methods possible. The term "rigorous methods" was thereby equated with methods based on counterfactual analysis, which could attribute observed changes to the intervention under investigation. Other forms of methods were seen as inferior to counterfactual analysis and no distinctions were made between definitions of impacts, the concept of causal inference and possible designs for impact evaluations (e.g. Stern et al., (2012); Befani & Mayne, 201; White & Philips, 2012).

This led to a debate in academic discourse in which the concept of attribution was viewed as the "gold standard" for impact evaluations while the concept of contribution was seen as a second best option. The concept of attribution involves a causal claim about the intervention as the cause of the impact and a measurement of how much of the impact can be linked to the intervention (e.g. White, 2010). Contribution, in contrast, only makes a claim about whether and how an intervention has contributed to an observed impact by using a theory of change that takes influencing factors into account; thus reducing uncertainty about the contribution the intervention is making (Mayne, 2001).

As a result there was an effort in academic literature on impact evaluations to use experimental designs (randomised control group trials (RCTs), quasi-experimental and natural experiments) to address the impact question. The main quest in this time period was to associate the intervention as a single cause to a measure of the net impact that could be attributed to the intervention in question. This also included answers to the counterfactual question: "What would have happened if the intervention had not taken place?" Confirmation to this question was sought to demonstrate that without the intervention there would be no impact or a different impact, while focusing on the additional change induced by the intervention. Typically this is done by using control or comparison group designs which compare situations with and without the intervention in order to calculate the net impact between them (e.g. Angotti, 2007).

However, in recent years this discourse was broken up – most notably by the DFID Working Paper on Designs and Methods for Impact Evaluations authored by Stern et al. In this paper, as in others, it was firstly noted that the concept of impact is used in various forms and definitions across and within development agencies. Additionally, it was argued that the way impact is defined and understood has widespread implications on evaluation questions and possible evaluation designs to answer these questions (Hearn & Buffardi, 2016).

More importantly, however, the Stern paper raised the issue that there are different types of approaches to causal inference with different requirements, strengths and weaknesses, of which the experimental approach is one. According to their paper, there are at least four different approaches to causal inference, namely:

- The **regularity approach** assesses causality depending on the frequency of association between a given cause and an effect. This means that causality can be verified when several cases that were subjected to the same intervention have the same effects. Since several cases are analysed when using this approach, it will be possible to know with certainty whether the intervention works (namely, whether it has the desirable effects) or not. A requirement for this approach hence is to have a high number of diverse cases. Its strength lies in the fact that this approach can discover "laws" among the set of chosen cases, while its weakness is that it does not explain "how" or "why" observed effects occur (Stern et al., 2012).

    - This approach thus answers the following impact question: Which factor causes the observed intended impact of the intervention?

- The aforementioned **experiments / counterfactuals approach** requires an "intervened" and a "control/comparison" group, where the first one was subjected to the intervention while the second one was not. That means that causality is evaluated by analysing the differences between these two groups. This is a robust method that avoids several types of bias, since the groups are randomly selected or matched. Nevertheless, this approach does not focus on the "why" or "how" and it is weak at generalising the results of the experiment (external validity) since it excludes analysis of the context. Therefore, a pitfall of this approach is that an experiment that worked in a given context might not work in a different one (Ibid.).

    - This approach thus answers the following impact question: How much of a difference did the intervention (or other factors) make in terms of the intended impact?

- The **multiple causation approach** generates from the idea that an effect is caused by a combination of causes. In order to evaluate impact using this approach, the evaluators need to have access to a sufficient number of cases that have comparable characteristics. This approach is useful when dealing with cases that have a limited complexity in order to e.g., identify typologies. Vice versa, it is difficult with this approach to interpret highly complex combinations of causes within a selected case (Ibid.).

    - This approach thus answers the following impact question: Did the intervention (or other factors) make a difference with its intended impact, for whom and under what circumstances?

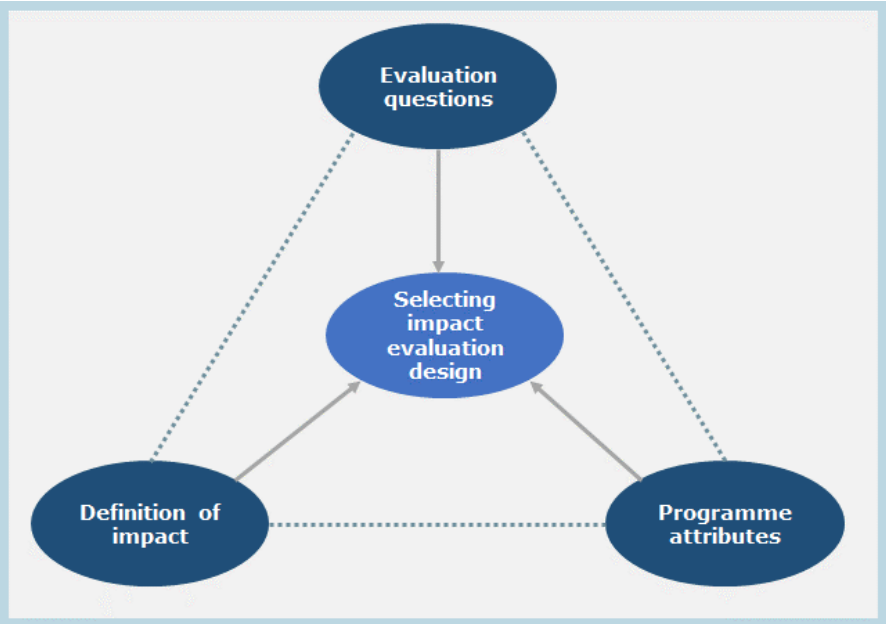
- The **generative / mechanisms approach** relies on identifying the "causal mechanisms" that generate the desirable effects. In order to use this approach, the existence of one case with good quality data sources is sufficient. The approach is based on an existing theory for the intervention in question, which allows the evaluator to understand the factors that cause the observed effect. As a result this approach permits an in-depth understanding of the case and its context, providing a detailed explanation of both of them. Nevertheless, this approach has a larger risk of bias on behalf of the researcher, since the estimation of the effect and its causality depends in a greater manner on qualitative appreciations, rather than quantitative data. This approach is mainly used in "theory-based" and "realist" evaluation designs (Ibid.)

    - This approach thus answers the following impact question: How did the intervention achieve the intended observed impact? What is it in the

intervention that made it (not) work to achieve the intended observed impact?

As a result of this and similar papers the academic discourse changed from thinking in hierarchies for evaluation designs (the experiment/ counterfactual approach as the "gold standard") to a discussion of "local" best choices for evaluation designs. Since then, the main focus has been on aligning definitions of impacts, evaluation questions and programme attributes with the best available evaluation designs to enable causal inference (see figure 23). As a consequence the most rigorous design is no longer equated with the experiment/ counterfactual approach but with the quest of finding the most appropriate design for a specific context. This also means that it is possible to use more than one design – if possible – to compensate for the weaknesses of the other designs. Moreover, it is also recommended to combine designs and methods – even within the same design approach – to strengthen causal claims (Befani & Mayne, 2014; Stern et al., 2012).

Figure 23: Design triangle



Source: Stern et al., 2012 adapted by Syspons 2017

Against this background Syspons and Nuffic conducted fact-finding missions to identify the most appropriate evaluation design for the selected interventions. The basis for this was a theoretical and practical evaluability assessment that was implemented prior to and during the fact-finding mission.[9]

In the case of the IUC with Can Tho University the theoretical and practical evaluability assessment as well as the fact-finding mission showed that the IUC is a highly complex and multi-causal intervention which aims to achieve several effects (see also chapter 2). On the one hand the IUC tries to develop the research, educational and organisational capacity of Can Tho University by providing scholarships, trainings and conceptualising relevant research projects. On the other hand it aims – via the heightened capacity at Can Tho University – at increasing the income of farmers in the Mekong Delta. Consequently, it is a highly diverse intervention that tries to achieve impacts in diverse setting with different kind of target groups (indirect beneficiaries within the university in different faculties as well as farmers in the Mekong Delta in different regions). Moreover, the number of beneficiaries in each target group also varies significantly.

At the same time it was agreed with SEO, ARES and VLIR-UOS during the inception phase of this impact evaluation that this impact evaluation should not only answer the

[9] The detailed results of the theoretical and practical evaluability assessment are documented in the submitted inception and study report.

question of whether the observed impact can be attributed to the assessed interventions, but also why and how impact occurred. This was also in line with the Terms of Reference, which stressed the learning trajectory of this impact evaluation.

As a result Syspons and Nuffic concluded that the most appropriate evaluation design for the measurement of the effectiveness and impact of the IUC with Can Tho University would be a combination of a contribution analysis, a modified-significant change approach and a before-and-after design.[10] Furthermore, it was concluded that a counterfactual approach could only be implemented for selected impact hypotheses dealing with the increase of income on the level of the final beneficiaries – the farmers in the Mekong Delta.

Therefore, the different chosen evaluation designs should fulfil the following functions:

- The **before-and-after design** compares key indicators before and after the intervention to identify the change that has occurred – particularly in the research, educational and organisational dimensions of Can Tho University. For this purpose it was envisioned to collect baseline data as well as data at the end of the intervention using secondary data and interviews.

- However, as this design is very weak in terms of robustness (e.g., the changes occurred due to other factors), we combined it with a **contribution analysis** to assess the contribution of the IUC to the observed changes in the research, educational and organisational dimension on the level of Can Tho University.

- Furthermore, on the level of two research projects (mud crab – B4/ R.1.2 and rice – B7/ R.3) it was possible to implement a **counterfactual approach** by using comparison groups to identify the intervention's attribution to the observed change.

- To substantiate these findings and also to explain why and how these changes occurred, we also combined the counterfactual approach with the aforementioned contribution analysis and a **modified most-significant change approach** on the level of the final beneficiaries (see chapter 3.1).

A.3.1.3 Assessing sustainability

In development cooperation sustainability – according to the OECD-DAC definition – is usually analysed by evaluating to what extent the positive short and mid-term impacts of an intervention can continue to exist after the funding for this intervention has ended. A particular focus is put on the long-term compatibility of the intervention with the organisational or country-specific context, as this is viewed as one of the prerequisites for sustainability. Sustainability is thus not only a continued existence of intended impacts but also includes the acceptance and ownership of the intervention's impacts by the relevant stakeholders in the partner country.

Using this definition in the field of university cooperation in Belgian development cooperation, we assessed the following three different aspects of sustainability in order to analyse whether interventions that aim at sustainability achieve higher impact.

- **Institutional sustainability**: To analyse this aspect of sustainability, we evaluated to what extent the initiated changes by the IUC have been integrated into the structures or processes of Can Tho University. Moreover, we investigated to what extent e.g., new technologies or knowledge have been adopted and integrated into daily practices on the level of the final beneficiaries outside of Can Tho University.

- **Technical sustainability**: To analyse the technical sustainability of the IUC, we investigated the suitability of the installed equipment by the IUC at Can Tho

[10] A detailed description of these evaluation designs can be found in the inception report.

University. In addition, we analysed to what extent capacities exist to maintain and use the installed equipment.

- **Academic sustainability**: Regarding this aspect, our main focus was on the development of the research and educational dimensions of Can Tho University. We analysed e.g., if research publications can be foreseen for the future, if academic staff can be retained or if mechanisms to guarantee the relevance of research are in place.

To analyse these aspects of sustainability, we conducted interviews with the different stakeholders as well as interviews with external stakeholders outside of Can Tho University.

A.3.2 Methodological approach

The evaluation of the IUC with Can Tho University consisted of three phases:

Figure 24: Phases of the evaluation of the IUC with Can Tho University

Source: Syspons and Nuffic 2018

A.3.2.1 Phase 1: Inception

At the beginning of the inception phase we conducted a **situation analysis** for the **contribution analysis** and the **before-and-after design** on the basis of secondary data to reconstruct the situation with regard to the educational, research and organisational capacity dimensions (baseline). Concerning the latter we also collected baseline data regarding the Capacity Development Index (CDI) (see below). Here we described the different challenges Can Tho University was facing prior to the IUC. Moreover, we analysed the causes and possible influencing factors that led to or maintained this situation prior to the IUC. In this regard we mapped the effects this situation caused in terms of e.g., educational quality or livelihoods in the Mekong Delta (see chapter 4). This situation analysis was then furthermore enriched through data collected through interviews during the field study phase (see below).

In parallel we reconstructed the **Theory of Change** of the IUC with Can Tho University in a participatory workshop with the VLIR-UOS and Belgian promoters. The ToC was thereby reconstructed in such a way that it depicts how the IUC was actually implemented and not how it was planned. The developed ToC for the IUC can be found in the annex.

Based on the ToC we developed an **assessment grid** in which we detailed the specific evaluation questions regarding effectiveness and impact for this IUC. Furthermore, we assigned indicators and descriptors to each evaluation question in order to operationalise them. In addition, we assigned data collection sources to each evaluation question to make transparent on which data basis each evaluation question will be answered.

Next to the evaluation questions on impact in the assessment grid, a specific focus was put on the influence of the IUC on the organisational capacity of Can Tho University (e.g., in terms of internationalisation). For this purpose we adapted the proposed **CDI** in the inception report – based on the 5C model – to the particular circumstances of the IUC (see also chapter 4.3.4). We operationalised the CDI in the form of closed questions based on ordinal scales that were used in a pen-and-paper survey. This survey was given to all interview partners in Can Tho University during the field mission. In addition, both evaluators used this survey to also assess the organisational capacity of Can Tho University from an external perspective. Moreover, qualitative data regarding the CDI was collected during the interviews in the field mission. The assessment grid – including the dimensions of the CDI – can also be found in the annex.

The assessment grid then formed the basis for the development of the following **data collection instruments**

- CDI pen-and-paper survey
- Interview guide for Belgian promoters
- Interview guide for rectors, vice-rectors and deans at Can Tho University
- Interview guide for project managers at Can Tho University
- Interview guide for indirect beneficiaries at Can Tho University
- Interview guide for technicians at Can Tho University
- Interview guide for external stakeholders
- Interview guide for farmers
- Pen-and-paper household survey for rice farmers – treatment group
- Pen-and-paper household survey for rice farmers – comparison group
- Pen-and-paper household survey for mud crab farmers – treatment group
- Pen-and-paper household survey for mud crab farmers – comparison group
- Pen-and-paper household survey for Artemia farmers – treatment group

The developed data collection instruments can also be found in the annex.

Furthermore, we developed the methodology for the **counterfactual design** in form of a **quasi-experimental design** for the two following projects in order to evaluate whether the newly generated knowledge and technologies and their later adoption by early adopters and farmers increased the income of these farmers.

- Project B7 and R.3: Soil Dynamics in Terrestrial/Aquatic Environments (rice)
- Project B4 and R.1.2: Microbial Management of Crustacan Larviculture (mud crab)

For this purpose we had to determine a sufficient sample size for each project with which effects between the two groups could be measured in a robust way. However, as the population was not known for the rice project– as intended spill-over effects enlarged the population over the years – we had to calculate the sample size using an a priori power analysis. In an a priori power analysis, sample size n is determined as a function of the required power level (1 – ß), the alpha error, and the population effect size to be detected with probability 1 – ß. Thus, an a priori analysis provides an efficient method of controlling statistical power before a study is actually conducted (Hager, 2006).

The underlying assumption of an a priori analysis is that (quasi-) experimental designs assume that a difference found in a sample has been caused by chance – the so called

null hypothesis. When statistically testing if this hypothesis can be accepted or rejected in favor of the alternative hypothesis (stating that an effect has occurred due to an intervention), there are two potential errors. A type I error (false positive or alpha) occurs when the null hypothesis is rejected incorrectly, thus falsely claiming a difference. To control this error, a significance level has to be reached to reject the null hypothesis. Conventionally a significance level is set to .95, making sure the possibility of a type I error is below .05. A type II error (false negative or beta) occurs when the null hypothesis is accepted incorrectly. A beta level can be chosen to protect an (quasi-) experiment against this type of error. The beta level is directly related to the power of a test, which is the likelihood of a test detecting an existing difference in the population in the chosen sample (Cohen, 1988).

In this regard the effect size is the quantitative measure of the strength of a given effect. The standardised effect size for the family of t-tests is Cohen's d and defined as the expected difference between the means of the target values between the treatment and the control group, divided by the expected standard deviation (Cohen 1992). Cohen thereby defines a small effect size from .20 to .49, a medium effect size from .50 to 79 and a large effect size from .80.

Based on this reasoning we calculated the sample based on an effect size of 0.65 with an error probability of 0.05 and a power of 0.85. For this purpose we used the commonly software G*Power (Faul et al., 2007) and calculated a required total sample size of both treatment and control group of 70 for the "Project B7 and R.3: Soil Dynamics in Terrestrial/Aquatic Environments" based on the described parameters to measure differences between the treatment and comparison group as well as the baseline value and the current value for the income variable.

In contrast hereto, the population of the mud crab population was known as so far 20 farmers use the newly introduced farming technology. Using the same statistical parameters – effect size of 0.65 with an error probability of 0.05 and a power of 0.85 – the calculated sample size for the treatment group amounted to 19. The same sample size was calculated for the comparison group.

In addition, we also calculated the sample size for the "Project B1 and R.1.1: Study of Aquatic Environment in Vinh Chau – Bac Lieu Coastlines and Sustainable Development of Aquaculture Activities" (Artemia), in which the population was not known. However, the establishment of a comparison was not possible as almost all farmers in the region adopted the newly developed farming technology. As a consequence, we could only collect quantitative data in the treatment group.

Using the same statistical parameters – an effect size of 0.65 with an error probability of 0.05 and a power of 0.85 – for this project as for the Artemia project, a minimum sample size of 18 was calculated to measure differences between the baseline value and the current value for the income variable.

Based upon the calculations for the sample sizes for the three above mentioned projects, we planned to conduct the following numbers of household surveys, which focused on the effect of the IUC's research projects on the income of the farmers (see figure 25). We thereby chose larger sample sizes to accommodate for possible losses during the implementation of the household surveys.

Figure 25: Number of planned household surveys

Name of project	Number of household surveys planned	
	Treatment group	Control group
Project B4 and R.1.2: Microbial management of crustacan larviculture (**mud crab**)	20	20
Project B7 and R.3: Soil dynamics in terrestrial/aquatic environments **(rice**)	40	35
Project B1 and R.1.1: Study of aquatic environment in Vinh Chau – Bac Lieu coastlines and sustainable development of aquaculture activities (**Artemia**)	40	N/A
Total	100	55

Source: Syspons and Nuffic 2018

Afterwards, we organised the field mission and the practical implementation of the household surveys and interviews through our local consultant. Out of this we developed an **agenda** for the field mission.

A.3.2.2 Phase 2: Field study

The field mission in Vietnam, Belgium and Germany was carried out in November and December 2017 and encompassed in total 21 days. Its objective was to collect the necessary data to populate the developed ToC with data and to answer the evaluation questions in the assessment grid.

For this purpose 43 **interviews and focus groups** with 67 individuals were conducted with the following relevant stakeholders:

- Belgian promoters: 5
- Project manager at Can Tho University: 10
- Indirect beneficiaries: 4
- Presidents, rectors, vice-rectors and deans: 12
- Technicians: 1
- Individual scholarship holders: 7
- External stakeholders: 4

Within these interviews we not only collected qualitative data on the observed changes for the contribution analysis (see below), but also baseline data for the before-and-after design as well as qualitative data for the CDI. With regard to the latter, we also implemented the pen-and-paper survey at the end of each interview or group interview at Can Tho University to collect the necessary quantitative data for the CDI.

Within the interviews and group interviews during the field mission we also used a modified version of the **most-significant change approach**. In this regard we implemented **narrative interview techniques** in order to identify crucial factors and situations in which change and thus impact occurred. We thereby also explicitly reconstructed the situation prior to this change with the interviewees (baseline) for the before-and-after design. The identified "domains of change" centred on the four capacity dimensions of the ToC (research, education, outreach and organisational capacity) as well as changes in the external perception of Can Tho University and income increases on the level of the farmers. The collected stories of change from the interviews and group interviews were verified during the field mission using data and method triangulation. Where possible these stories were also quantified – e.g., in terms of income increase at the level of the farmers (see below).

Furthermore, we conducted the following numbers of **household surveys** with the treatment and comparison groups of farmers in the three projects that were identified in the inception phase. The participants were thereby selected via the farmer associations in the respective provinces. The farmers association informed the farmers about the survey and the farmers could sign up for it. Also in these household surveys we collected necessary data for the baseline for the before-and-after design.

Figure 26: Number of implemented household surveys

Name of project	Number of household surveys implemented	
	Treatment group	Control group
Project B4 and R.1.2: Microbial management of crustacan larviculture (**mud crab**)	20	16
Project B7 and R.3: Soil dynamics in terrestrial/aquatic environments **(rice**)	40	35
Project B1 and R.1.1: Study of aquatic environment in Vinh Chau – Bac Lieu coastlines and sustainable development of aquaculture activities (**Artemia**)	40	N/A
Total	100	51

Source: Syspons and Nuffic 2018

As can be seen from a comparison of the planned and conducted number of household surveys, it was not possible to reach the planned number of households in the comparison group of the mud crab project. This has ramifications for the statistical validity of the data in this project. These will be explained in chapter 5 and 7.

In addition, we also collected **secondary data** from Can Tho University that was continuously analysed to add information to the performance story of the envisioned ToC for the contribution analysis and for the baseline for the before-and-after design.

During the field mission we continuously tested the developed ToC; meaning that we tested if the envisioned ToC worked out as planned with all its depicted mini-steps. Hereby we differentiated between different stakeholder groups and locations (e.g. different faculties or departments). In this regard we also continuously tested:

- if the observed impacts occurred in the sequence envisioned in the ToC,
- if the timing of the occurrence of the impacts meets the voiced expectations of the stakeholders and of the assembled evidence in secondary literature,
- if stakeholders (e.g. farmers), who have been affected longer by the IUC, react as expected,
- if the different interviewed stakeholders described the observed impacts in a plausible and credible way and
- if there are differences in the observed impacts in different locations (e.g., between faculties or different project areas on the level of the farmers) and if there are explanations for these differences.

Based on the collected data we constantly assembled, assessed and revised the gathered performance story of the IUC during the field mission. For the interpretation of the data the following four questions guided the evaluation team:

- To what extent was the IUC implemented in an appropriate way?
- To what extent was the IUC accepted by the different target groups?
- To what extent did the IUC reach its intended short- and mid-term impacts?

- To what extent did the IUC reach its intended long-term impacts?

Based on these questions, we also analysed whether the implementation of the IUC was flawed or correct, whether the IUC was accepted or not by the target group and if the programme theory was flawed, correct or missing crucial external factors.

Moreover, the evaluation team analysed to what extent alternative explanatory factors might have caused the observed impacts. We paid particular attention to singular cases that did not follow the described impact pathway. In addition, we assessed to what extent:

- participants or Can Tho University have been affected by other interventions,
- observed impacts could only be reached due to the combination of different interventions (e.g., portfolio approach of VLIR-UOS but also other external interventions) and
- observed impacts were caused by changes in external circumstances (e.g., changes in the regulatory framework for universities).

At the same time the evaluation team continuously sought out additional evidence where it was needed to complete the performance story. Hence, the final performance story described in chapter 5 was assembled in an iterative process throughout the field mission.

At the end of the field mission a **debriefing session** was conducted with the relevant persons from Can Tho University, in which the preliminary results were presented. A complete list of all conducted interviews and group interviews during the field mission can be found in the annex.

A.3.2.3 Phase 3: Synthesis and reporting

At the beginning of the synthesis and reporting phase we verified and validated the quantitative data. Subsequently to this quality assurance, we started with the **quantitative data analysis**. From a methodological standpoint the data analysis was divided into two steps. In a first step we analysed the data using univariate statistical analysis such as frequencies, percentages or means. We edited the data and depicted the results in graphs and tables in order to get an overview of the findings and to identify relevant aspects and developments. Those were then analysed in-depth. In order to find causal relations between variables, we then used bi- and multivariate data analysis methods.

In parallel to the quantitative data analysis we also conducted the **qualitative data analysis**. For this purpose we analysed, triangulated and synthesised the collected qualitative data on the basis of the assessment grid. In a next step we assessed the data in order to identify explanatory frameworks (e.g., recurrent themes, patterns, respondent clusters, etc.) for each evaluation question and aspect. Then we deducted explanatory factors and patterns from the qualitative data. Furthermore, we also developed and used a scale to assess and transparently depict the confidence of a probability regarding the assessment of the causal inference of an analysed impact hypothesis by using Bayesian updating (Befani & Mayne, 2014). The latter being a technique used within process tracing to assess the probability of a causal mechanism based upon the probability of finding relevant evidence (confirming/infirming the causal mechanism). The less probable (prior to observing the evidence), the higher the confidence (once the evidence yet observed). (see figure 27). The assessment of the causal inference for each impact hypothesis was conducted during the internal workshop (see below) and is used in this report accordingly.

Figure 27: Measuring confidence with probabilities

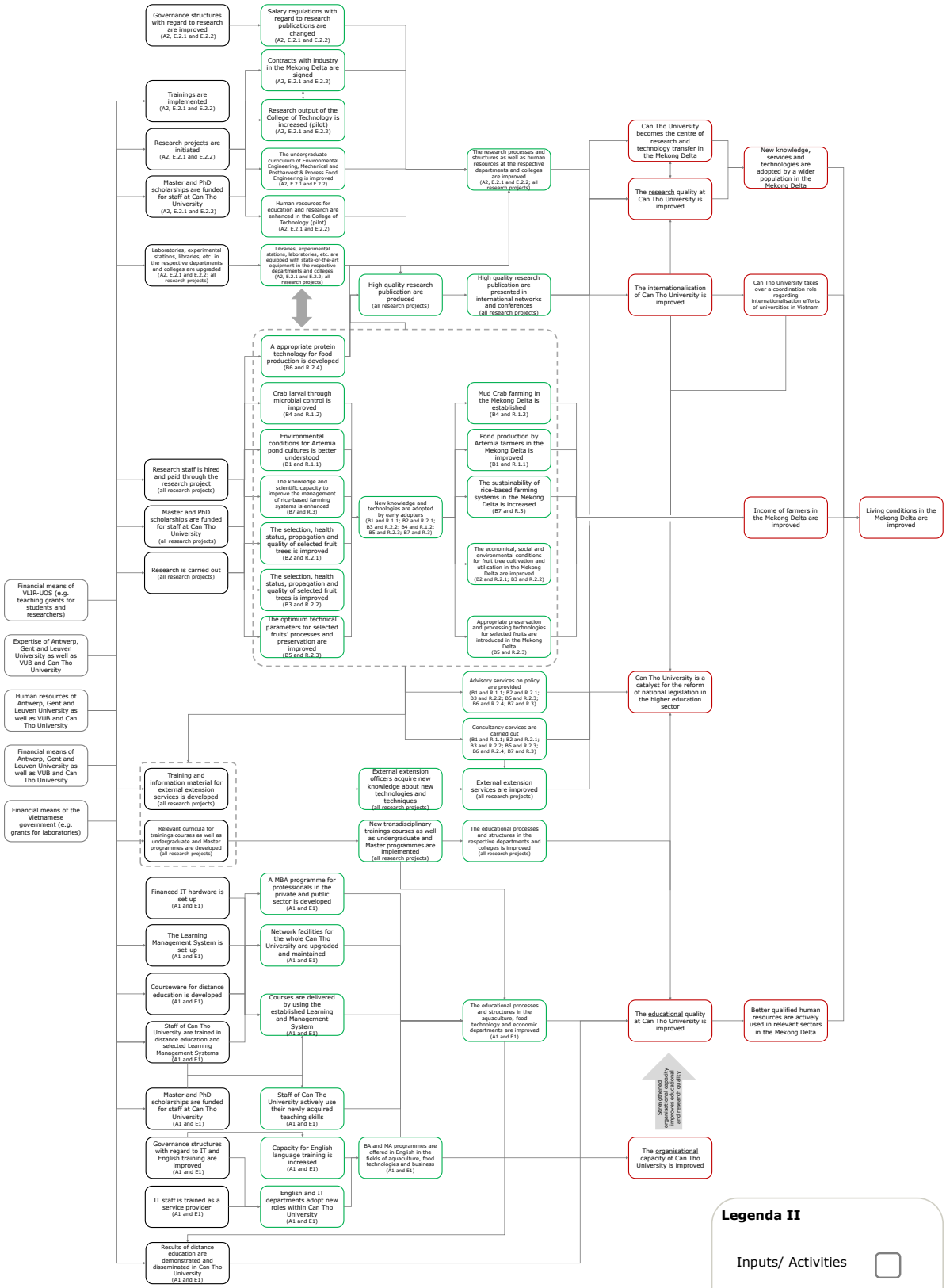
Qualitative assessment	Quantitative scale
Practically certain that () is true	0.99+
Reasonably certain that () is true	0.95 – 0.99
Highly confident that () is true	0.85 – 0.95
Cautiously confident that () is true	0.70 – 0.85
More confident than not confident that () is true	0.50 – 0.70
Neither confident nor not confident that () is true (or false) – no idea	0.5
More confident than not confident that () is false	0.30 – 0.50
Cautiously confident that () is false	0.15 – 0.30
Highly confident that () is false	0.05 – 0.15
Reasonably certain that () is false	0.01 – 0.05
Practically certain that () is false	Less than 0.01

Source: Syspons and Nuffic 2018

After the data analysis, we then conducted an **internal workshop** with all involved experts of the field mission team to synthesise and systematise the collected data. In this setting we once again assembled and assessed the ToC of the IUC by considering all different perspectives of the experts. The workshop added value by triangulating and validating the findings by using data, method and researcher triangulations. In this light, the objective of the workshop was to synthesise the findings of the interviews and surveys as well as to identify key weaknesses and strengths of the developed ToC.

Based on the systematised, triangulated and synthesised findings, we then **drafted the country report for Vietnam VLIR-UOS** and submitted it to SEO and the reference group in February 2018. All feedback received was incorporated into the report by Syspons and Nuffic and the final report was submitted to SEO and the reference group in February 2018.

A.4 Theory of Change



Legenda I

Education Projects

A1 and E.1 – Distance Education

A2, E.2.1 and E.2.2 – Undergraduate Curriculum Development for Environmental Engineering, Mechanical and Postharvest Food Processing Engineering

Research Projects

B1 and R.1.1 – Study of Aquatic Environment in Vinh Chau – Bac Lieu Coastlines and Sustainable Development of Aquaculture Activities

B2 and R.2.1 – Phytotechnology: The Selection, Propagation and Production of Valuable Fruit Tree Varieties in the Mekong Delta

B3 and R.2.2 – Biotechnology Studies on Plant-Microbe Interaction and their Biodiversity

B4 and R.1.2 – Microbial Management of Crustacan Larviculture

B5 and R.2.3 – Technology: Fruit Preservation and Processing

B6 and R.2.4 – Enzymology: Development of an Appropriate Enzyme Technology for Food Processing

B7 and R.3 – Soil Dynamics in Terrestrial/ Aquatic Environments

Legenda II

Inputs/ Activities

Output

Outcome

Impact

A.5 Assessment grid

Evaluation Criteria	Evaluation Question	Analytical Focus	Indicators and/ or Descriptors	Sources of Verification								
				Interviews with Deans/ Vice-Rectors	Group Interviews with Project Managers	Focus Groups with Indirect Beneficiaries	Interviews with External Stakeholders	Household Surveys with Beneficiaries	Group Interview with Technicians	Interview with Farmers	Interviews with Belgian Promoters	Secondary Data Sources
Relevance	To what extent did the objectives and the priorities of the IUC address the needs of Can Tho University?	Research Capacity	1. Qualitative description of Can Tho University's objectives and priorities in the field of research capacity prior to the IUC 2. Qualitative comparison of Can Tho University's objectives and priorities with the IUC's objectives in the field of research capacity in terms of a) Need for equipment and laboratories b) Need for more research publications	x	x	x	x				x	x
		Educational Capacity	1. Qualitative description of Can Tho University's objectives and priorities in the field of educational capacity prior to the IUC 2. Qualitative comparison of Can Tho University's objectives and priorities with the IUC's objectives in the field of educational capacity in terms of a) Need for new curricula/ courses b) Need for qualification of staff c) Need for transdisciplinary education d) Need for distance learning e) Need for teaching based on current research	x	x	x	x				x	x
		Organisational Capacity	1. Qualitative description of Can Tho University's objectives and priorities in the field of organisational capacity prior to the IUC 2. Qualitative comparison of Can Tho University's objectives and priorities with the IUC's objectives in the field of organisational capacity in terms of a) Need for new research processes and structures b) Need for new educational processes and structures c) Need for new IT service structures and processes d) Need for new English language teaching service structures and processes e) Need for better extension service structures	x	x	x	x				x	x
	To what extent did the IUC take into account national strategies and policies, when formulating its objectives?	Higher Education Strategies and Policies	1. Qualitative comparison between the IUC's objectives and the objectives of the Vietnamese higher education strategies and policies	x	x	x	x				x	x
		Development Strategies and Policies	1. Qualitative comparison between the IUC's objectives and the Vietnamese national strategies' and policies' objectives for the development of the Mekong Delta	x	x	x	x				x	x
	To what extent did the funded research projects under the IUC address developmentally relevant research gaps for Vietnam?	Research Topics	1. Qualitative assessment of the needs-orientation of the newly created knowledge and technologies by the IUC's funded research projects for the development of the Mekong Delta, differentiated by a) Research on Artemia (B1 and R.1.1) b) Research on Mud Crab (B4 and R.1.2) c) Research on rice-based farming (B7 and R.3) d) Research on fruit tree cultivation and utilisation (B2, B3 as well as R.2.1 and R.2.2) e) Research on preservation and processing technologies for fruits (B5 and R.2.3) f) Research on protein technology for food production (B6 and R.2.4)		x	x		x	x	x	x	x
	Which relevance did the integrated scholarships have to achieve the IUC's and its project's objective?	Integrated Scholarships	1. Qualitative assessment of the integrated scholarships to increase the capacity of Can Tho University 2. Qualitative assessment of the integrated scholarships to further the individual career of the scholarship holder	x	x	x					x	
	How were the needs of the final beneficiaries of the IUC taken into account, when formulating the IUC's objectives?	Needs of Final Beneficiaries	1. Qualitative description of the involvement of the final beneficiaries in the funded projects under the IUC, differentiated by a) Project formulation phase b) Implementation phase 2. Qualitative assessment by the final beneficiaries regarding the adequacy of their involvement into the respective funded project under the IUC		x	x		x	x	x	x	

Evaluation Criteria	Evaluation Question	Analytical Focus	Indicators and/ or Descriptors	Sources of Verification								
				Interviews with Deans/ Vice-Rectors	Group Interviews with Project Managers	Focus Groups with Indirect Beneficiaries	Interviews with External Stakeholders	Household Surveys with Beneficiaries	Group Interview with Technicians	Interview with Farmers	Interviews with Belgian Promoters	Secondary Data Sources
Effectiveness	To what extent did the IUC strengthen the research capacity of Can Tho University?	Research Processes and Structures	1. Number of reformed or newly introduced research regulations a) Salary regulations regarding research b) Regulations regarding the interdependence between education and research 2. Number of newly introduced research processes or structures 3. Qualitative assessment of the understanding of shifting context in the field of research among Can Tho University staff (CDI - capability to adapt)	x	x	x					x	x
		Research Publications	1. Number of research publications produced under the IUC, differentiated by a) International journals b) National journals 2. Number of academic publications produced before the IUC compared with the number produced after the IUC, differentiated by a) International journals b) National journals	x	x	x					x	x
		Human Resources	1. Number of staff trained in new research methods, differentiated by a) Male b) Female 2. Number of scholarships funded and successfully concluded, differentiated by a) Gender b) MA/ PhD 3. Number of research staff hired and maintained, differentiated by a) Gender b) MA/ PhD 4. Qualitative assessment of the adequacy of the trained human resources in the field of research (CDI - capability to act)	x	x	x					x	x
		Research Infrastructure	1. Number of upgraded laboratories (CDI - capability to act) 2. Qualitative assessment of the availability of adequate space to conduct state-of-the-art research (CDI - capability to act) 3. Qualitative assessment of the adequacy of the research infrastructure vis-à-vis the staff's technical expertise (CDI capability to act)	x	x	x	x		x		x	x
	To what extent did the IUC strengthen the educational capacity of Can Tho University?	Educational Processes and Structures	1. Number of curricula or courses, which incorporate new research findings, differentiated by a) Curricula b) Courses 2. Qualitative assessment of the understanding of shifting context in the field of education among Can Tho University staff (CDI - capability to adapt)	x	x	x					x	x
		Curricula Development	1. Number of newly developed curricula or courses, differentiated by a) Curricula b) Courses 2. Number of newly introduced transdisciplinary curricula or courses, differentiated by a) Curricula b) Courses 3. Qualitative assessment of the availability of adequate space to deliver classes (CDI - capability to act) 4. Number of newly developed curricula and courses in which relevant external stakeholders were/ are involved, differentiated by (CDI - capability to relate) a) Curricula b) Courses	x	x	x	x				x	x
		Distance Education	1. Number of newly developed course ware for distance education 2. Number of courses which are delivered using the newly introduced Learning and Management System 3. Number of students who are taught using the newly introduced Learning and Management System 4. Existence of the newly Learning and Management System 5. Qualitative assessment of the adequacy of the Learning and Management System (CDI - capability to act)	x	x	x					x	x

Evaluation Criteria	Evaluation Question	Analytical Focus	Indicators and/ or Descriptors	Sources of Verification								
				Interviews with Deans/ Vice-Rectors	Group Interviews with Project Managers	Focus Groups with Indirect Beneficiaries	Interviews with External Stakeholders	Household Surveys with Beneficiaries	Group Interview with Technicians	Interview with Farmers	Interviews with Belgian Promoters	Secondary Data Sources
Effectiveness	To what extent did the IUC strengthen the educational capacity of Can Tho University?	Human Resources	1. Number of staff trained in new didactical/ teaching methods, differentiated by a) Male b) Female 2. Number of staff trained in new distance learning methods as well as Management and Learning Systems, differentiated by a) Male b) Female 3. Number of scholarships funded and successfully concluded, differentiated by a) Gender b) MA/ PhD 4. Qualitative assessment of the adequacy of the trained human resources in the field of education (CDI - capability to act)	x	x	x					x	x
	To what extent did the IUC strengthen the governance structures of Can Tho University?	IT	1. Number of upgraded network facilities at Can Tho University 2. Number of IT staff trained as service providers, differentiated by a) Male b) Female 3. Existence of an IT department that functions as a service provider for Can Tho University 4. Qualitative assessment of the availability and adequacy of the IT infrastructure at Can Tho University (CDI- capability to act) 5. A shared vision regarding the mission of the IT department exists (CDI- capability to achieve coherence) 6. Principles for the governance/ management of the IT department exist at Can Tho University (CDI - capability to achieve coherence)	x	x	x					x	x
		English Language	1. Number of BA and MA programmes which are taught in English, differentiated by a) BA b) MA 2. Existence of an English department that functions as a service provider for Can Tho University 3. Number of staff trained in English, differentiated by a) Male b) Female 4. Qualitative assessment of the availability and adequacy of the English capacity at Can Tho University (CDI- capability to act) 5. A shared vision regarding the mission of the English department exists (CDI- capability to achieve coherence) 6. Principles for the governance/ management of the English department exist at Can Tho University (CDI - capability to achieve coherence)	x	x	x					x	x
		Regulations	1. Number of revised regulations, differentiated by a) Service structures b) Education c) Research d) Extension 2. Qualitative description of the revised regulations 3. Qualitative assessment of the consistency between the changed regulations and the vision and strategy of Can Tho University (CDI- capability to achieve coherence) 4. A shared vision and strategy regarding the newly introduced regulations exist (CDI- capability to achieve coherence) 5. Existence of an incentive system at Can Though University which rewards innovation, creativity and change (CDI - capability to adapt) 6. Existence of a knowledge management system to learn from past mistakes and successes (CDI - capability to adapt)	x	x	x					x	x

Evaluation Criteria	Evaluation Question	Analytical Focus	Indicators and/ or Descriptors	Sources of Verification								
				Interviews with Deans/ Vice-Rectors	Group Interviews with Project Managers	Focus Groups with Indirect Beneficiaries	Interviews with External Stakeholders	Household Surveys with Beneficiaries	Group Interview with Technicians	Interview with Farmers	Interviews with Belgian Promoters	Secondary Data Sources
Effectiveness	To what extent did the IUC improve the extension services of Can Tho University?	Advisory Services	1. Number of advisory services provided to external stakeholders, differentiated by a) Government b) Private sector c) Non-governmental sector 2. Existence of a strategy for advisory services (CDI - capability to relate) 3. Qualitative assessment of the abilities to network and communicate with regard to advisory services (CDI- capability to relate) 4. Qualitative assessment of network activity in the field of advisory services (CDI - capability to relate) a) Density of contact (monthly/weekly)	x	x	x	x				x	x
		Consultancy Services	1. Number of consultancy services provided to external stakeholders, differentiated by a) Government b) Private sector c) Non-governmental sector 2. Existence of a strategy for consultancy services (CDI - capability to relate) 3. Qualitative assessment of the abilities to network and communicate with regard to consultancy services (CDI- capability to relate) 4. Qualitative assessment of network activity in the field of advisory services (CDI - capability to relate) a) Density of contact (monthly/weekly) b) Variety of stakeholders	x	x	x	x				x	x
		Extension Services	1. Number of extension services provided to external stakeholders, differentiated by a) Government b) Non-governmental sector 2. Number of extension officers trained, differentiated by a) Male b) Female 3. Number of information and training material developed 4. Existence of a strategy for extension services (CDI - capability to relate) 5. Qualitative assessment of the abilities to network and communicate with regard to extension services (CDI- capability to relate) 6. Qualitative assessment of network activity in the field of extension services (CDI - capability to relate) a) Density of contact (monthly/weekly) b) Variety of stakeholders	x	x	x	x				x	x

Evaluation Criteria	Evaluation Question	Analytical Focus	Indicators and/ or Descriptors	Sources of Verification								
				Interviews with Deans/ Vice-Rectors	Group Interviews with Project Managers	Focus Groups with Indirect Beneficiaries	Interviews with External Stakeholders	Household Surveys with Beneficiaries	Group Interview with Technicians	Interview with Farmers	Interviews with Belgian Promoters	Secondary Data Sources
Effectiveness	To what extent did the funded research projects under the IUC develop new knowledge and technologies, which were adopted by early adopters?	Aquaculture	1. Number of funded research projects under the IUC, which created new knowledge, differentiated by a) Research on Artemia (B1 and R.1.1) b) Research on Mud Crab (B4 and R.1.2) 2. Number of funded research projects under the IUC , which created new technologies, differentiated by a) Research on Artemia (B1 and R.1.1) b) Research on Mud Crab (B4 and R.1.2) 3. Number of early adopters, which adopted the new knowledge/ technology, differentiated by a) Research on Artemia (B1 and R.1.1) b) Research on Mud Crab (B4 and R.1.2)	x	x	x	x	x	x	x	x	
		Food Technology	1. Number of funded research projects under the IUC, which created new knowledge, differentiated by a) Research on rice-based farming (B7 and R.3) b) Research on fruit tree cultivation and utilisation (B2, B3 as well as R.2.1 and R.2.2) c) Research on preservation and processing technologies for fruits (B5 and R.2.3) d) Research on protein technology for food production (B6 and R.2.4) 2. Number of funded research projects under the IUC , which created new technologies, differentiated by a) Research on rice-based farming (B7 and R.3) b) Research on fruit tree cultivation and utilisation (B2, B3 as well as R.2.1 and R.2.2) c) Research on preservation and processing technologies for fruits (B5 and R.2.3) d) Research on protein technology for food production (B6 and R.2.4) 3. Number of early adopters, which adopted the new knowledge/ technology, differentiated by a) Research on rice-based farming (B7 and R.3) b) Research on fruit tree cultivation and utilisation (B2, B3 as well as R.2.1 and R.2.2) c) Research on preservation and processing technologies for fruits (B5 and R.2.3)	x	x	x	x	x	x	x	x	
	To what extent was the IUC successful in establishing new farming techniques in the Mekong Delta?	Aquaculture	1. Number of farmers in the Mekong Delta, who adopted Mud Crab farming 2. Number of farmers in the Mekong Delta, who adopted Artemia farming	x	x	x	x	x	x	x	x	
		Food Technology	1. Number of farmers in the Mekong Delta, who adopted rice-based farming 2. Number of farmers in the Mekong Delta, who adopted new processing and preservation technologies for fruits 3. Number of farmers in the Mekong Delta, whose condition for fruit tree cultivation and utilisation have improved	x	x	x	x	x	x	x	x	
	What kind of effect did the integrated scholarships have on Can Tho University?	Capacity of Can Tho University	1. Number of integrated scholarship holders who have remained at Can Tho University		x	x					x	x
	To what extent are the observed results in line with the developed Theory of Change?	Sequence and Timing	1. Qualitative assessment of the sequence of impacts foreseen in the Theory of Change 2. Qualitative assessment of the timeliness of the observed impacts	x	x	x	x	x	x	x	x	x
		Differences in Cases	1. Qualitative assessment of the observed impacts between cases 2. Qualitative description of possible explanatory factors for the observed differences	x	x	x	x	x	x	x	x	x
	Which causal mechanisms support the underlying Theory of Change?	Impact Hypotheses	1. Qualitative assessment of the adequate implementation of the IUC 2. Qualitative assessment of the ownership of the IUC, differentiated by a) Indirect beneficiaries b) Final beneficiaries	x	x	x	x	x	x	x	x	x
		Plausibility of the Theory of Change	This evaluation question will be answered through the synthesis of the evaluation results.									
	What are necessary and sufficient conditions for the intended impact?	Conditions for Impact	This evaluation question will be answered through the synthesis of the evaluation results.									
	What other internal or external factors could explain the observed impact?	Factors	This evaluation question will be answered through the synthesis of the evaluation results.									

Evaluation Criteria	Evaluation Question	Analytical Focus	Indicators and/ or Descriptors	Sources of Verification								
				Interviews with Deans/ Vice-Rectors	Group Interviews with Project Managers	Focus Groups with Indirect Beneficiaries	Interviews with External Stakeholders	Household Surveys with Beneficiaries	Group Interview with Technicians	Interview with Farmers	Interviews with Belgian Promoters	Secondary Data Sources
Impact	To what extent could Can Tho University improve its research quality due to the IUC?	Research and Technology Transfer Centre	1. Amount of external research fund raised, differentiated by (CDI - capability to development results) a) Sources of funding b) Duration of funding	x	x	x	x				x	
		Significance of Research	1. Qualitative assessment of the research produced by Can Tho University, differentiated by (CDI - capability to deliver development results) a) developmental relevant and not relevant research b) transdisciplinary vs. disciplinary research 2. Change of overall research output, differentiated by (CDI - capability to deliver development results) a) International journals b) National journals 3. Number of conferences and seminars in which Can Tho University is resenting research results, differentiated by (CDI - capability to deliver development results) a) International events b) National events	x	x	x	x				x	x
		Uptake of Research	1. Number of final beneficiaries adopting new technologies or knowledge outside of the funded IUC	x	x	x	x				x	x
	To what extent did the IUC give an impetus for the internationalisation of Can Tho University?	Internationalisation Can Tho University	1. Qualitative assessment of Can Tho University's awareness of the importance to enter into strategic alliances (CDI - capability to relate) 2. Number of active MoU with foreign universities 3. Number of BA/MA or PhD programmes with double or joint degree 4. Number of international research groups in which Can Tho University participates	x	x	x	x				x	x
		Coordination of Internationalisation Efforts in Vietnam	1. Number of projects, in which Can Tho University plays a role in the internationalisation efforts for Vietnamese University (CDI - capability to relate)	x	x	x	x				x	x
	To what extent could Can Tho University improve its educational quality due to the IUC?	Better Qualified Students	1. Change in students numbers regarding intake 2. Change in graduate numbers (CDI - capability to deliver development results) 3. Rate of graduates who get employed after their studies (CDI - capability to deliver development results) 4. Change in BA/ MA and PhD Programmes offered, which are relevant for development (CDI - capability to deliver development results)	x	x	x	x				x	x
	To what extent did Can Tho University influence reforms in the higher education sector?	Catalyst for Reform of National Legislation	1. Number of policy changes in national legislation to which Can Tho University contributed to (CDI capability to deliver development results) 2. Number of public policy processes regarding national policy in which Can Tho University participated in (CDI capability to deliver development results)	x	x	x	x				x	x
	To what extent did Can Tho University improve the living conditions of farmers in the Mekong Delta due to its conducted research under the IUC?	Income of Farmers	1. Change in income of farmers affected by the research projects funded under the IUC, differentiated by (CDI capability to deliver development results) a) Artemia b) Mud Crab c) Rice-based farming					x	x	x		x
	To what extent does the granting of integrated scholarships contribute to brain drain or the increase of inequality?	Brain Drain	1. Number of integrated scholarship holders who have remained at Can Tho University		x	x						
		Inequality in terms of Concentration at Elite Level	1. Qualitative assessment of the socio-economic background of the interviewed integrated scholarship holders			x						
	What kind of effect did the integrated scholarships have on the individual level of the integrated scholarship holders?	Career Development	1. Qualitative assessment of the career development of the integrated scholarship holders		x	x					x	
	To what extent have there been synergies between different interventions of VLIR-UOS which strengthened the observed impact?	Portfolio Approach	1. Qualitative description of observed synergies between the IUC and other VLIR-UOS interventions, in terms of a) Timing b) Content	x	x	x					x	
	To what extent have there been unintended positive or negative impacts?	Unintended Impacts	This evaluation question will be answered through the synthesis of the evaluation results.									

Evaluation Criteria	Evaluation Question	Analytical Focus	Indicators and/ or Descriptors	Sources of Verification								
				Interviews with Deans/ Vice-Rectors	Group Interviews with Project Managers	Focus Groups with Indirect Beneficiaries	Interviews with External Stakeholders	Household Surveys with Beneficiaries	Group Interview with Technicians	Interview with Farmers	Interviews with Belgian Promoters	Secondary Data Sources
Sustainability	To what extent has the IUC led to sustainable results?	Institutional Sustainability	1. Qualitative assessment of the institutionalisation of the changes initiated by the IUC in Can Tho University, into a) strategic plan b) academic plan c) policies and procedures d) commitment of (top) management 2. Qualitative assessment of the number of staff available for continued implementation of the changes initiated by the IUC, differentiated by a) number of available staff b) number of staff who left for employment elsewhere c) number of current vacancies 3. Number of staff members continue to perform tasks for which they were trained 4. Qualitative assessment of the local ownership of the IUC, differentiated by a) project activities integrated into regular tasks of project staff b) initiative for writing project plan, progress report, budgets, etc.	x	x	x					x	x
		Technical Sustainability	1. Qualitative assessment of user rates of upgraded equipment and laboratories 2. Qualitative assessment of the adequacy of the amount of technical staff available for use and maintenance of upgraded equipment and laboratories	x	x	x					x	x
		Academic Sustainability	1. Qualitative assessment of the student enrolment trend for supported courses 2. Qualitative assessment of the academic staffing situation trend 3. Qualitative assessment of the mechanisms in place to ensure continued relevance of the curricula/courses 4. Qualitative assessment of initiatives to attract new students that are undertaken on a regular basis	x	x	x					x	x
	To what extent did the IUC initiate a sustainable partnership between the participating universities?	Sustainability of Partnerships	1. Number of interventions in which Can Tho University and at least one Belgian project partners are still working together, differentiated by a) Funded projects by VLIR-UOS b) Self-financed projects c) Funded projects by other stakeholders 2. Number of spin-off projects which can be directly attributed to the IUC	x	x	x					x	x

A.6 Data collection instruments

- See additional documents (zip file)