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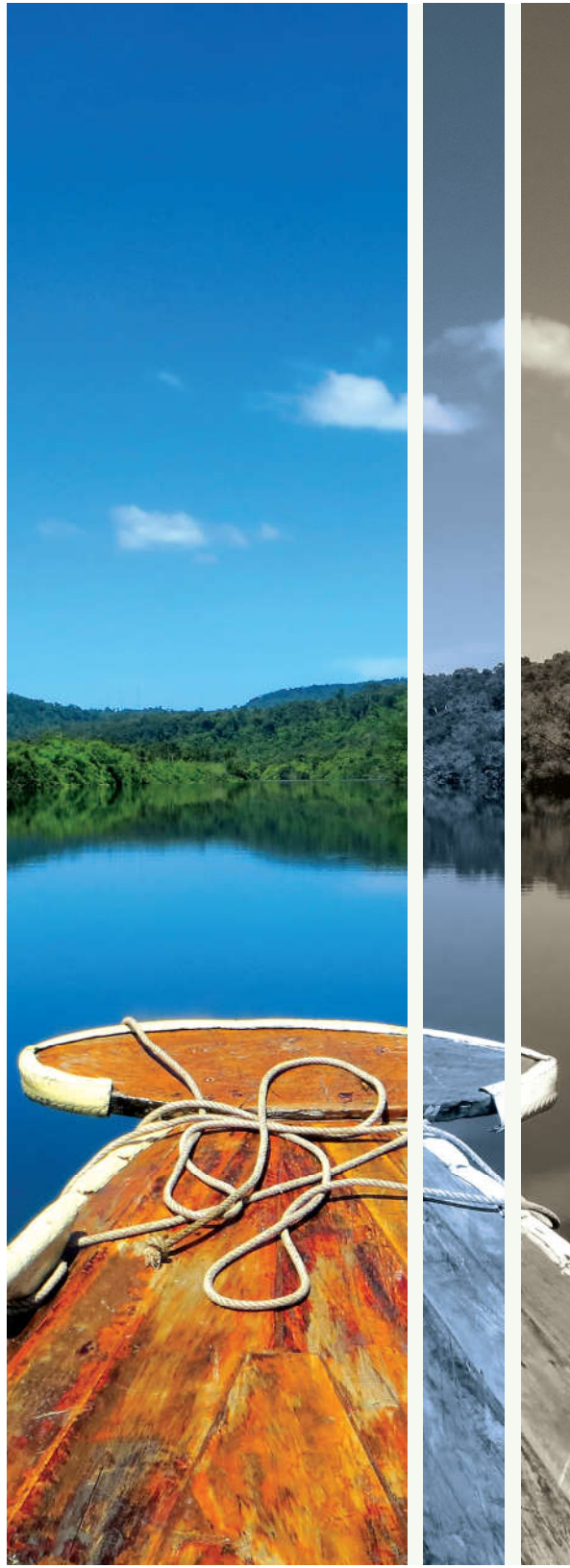
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National University of Management

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NUM  
RESEARCH SERIES  
SPECIAL EDITION

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DECEMBER 2015

# Strengthening the Research Capacity of NUM:

## Creation of the Maritime and Inland Waterways Socioeconomic Observatory

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# ABSTRACT

*The rapid economic growth in the last decade, the increasing middle class, growing foreign investment and the closer integration of ASEAN countries require an important transition from labor intensive towards knowledge based economy to be made by the Royal Government of Cambodia (RGC). Improvement of the quality of tertiary education and its capability to provide educated workforce to the labor market is not an easy task. Strengthening the research capacity of the Cambodian university is a necessary condition to face this challenge. The current paper discusses some of the major problems in tertiary education in Cambodia by emphasizing the importance of the research. It also highlights the potential role of the new research center of the National University of Management (NUM) called “Maritime and Inland Waterways Observatory” for strengthening the research capacity of NUM. The creation of the Observatory was financed by the World Bank through “Higher Education Quality and Capacity Improvement Project”. Hard work, high commitment, involvement of many students and NUM’s researchers, and close collaboration with foreign and local universities, research networks, civil societies, private companies, international organizations and public institutions are necessary steps in achieving long term sustainability of the Observatory.*

## INTRODUCTION

Education is a key factor for the economic development. An educated society (combined with robust healthcare for the people) provides a country with a productive and skilled workforce for strong and sustained economic growth (CDRI 2015). Shikher (2014) has shown that the comparative advantages of rich countries lies in the industries that make intensive use of highly educated workers. According to the World Bank, in the last decade the average economic growth of Cambodia was 7.5%, the second highest rate in ASEAN, after Lao PDR. The rapid industrialization, rising middle class and foreign investments are requiring more educated workers. Therefore, the switch from labor intensive to knowledge-based economy is a necessary step towards improvement of the living conditions and income of Cambodian citizens. By 2015, the ASEAN Economic Community (AEC) will be realized. AEC aims to create a single ASEAN market and production base, to make the region more competitive, to ensure equitable economic development and to integrate the country members into the global economy. This regional integration should lead to more research undertaken in Cambodia, because some of its neighbors (Malaysia, Thailand, Singapore and Vietnam) have made substantial efforts on a national level to develop scientific research through public funding and numerous research programs. However, the benefits of this integration for the poor countries are limited, due to the exclusion of freer movement of unskilled labor. On the other hand, the limited movement of skilled labor under the AEC would still make it easier for countries such as Cambodia to import skilled professionals (CDRI, 2015).

Improvement of the quality of higher education is not an easy task and it requires time, commitment and external support. This is why in August 2010, the World Bank’s Higher Education Quality and Capacity Improvement Project (HEQCIP) was approved. The development objectives of HEQCIP for Cambodia are to: (a) improve the quality of teaching, management, and research in project-supported entities; and (b) pilot the targeting of disadvantaged students for enhanced retention. The Kingdom of Cambodia received a credit of US\$ 11.5 million and a grant of US\$ 11.5 million from the International Development Association toward the cost of HEQCIP. Within the framework of HEQCIP there were 45 sub-projects which were run by 25 Higher Education Institutions (HEIs). One of these sub-projects was SGA 009 NUM, “Achieving research sustainability in the National University of Management: Setting-up of a National Inland Waterway / Maritime Socioeconomic Activities Observatory”, submitted by an international team of researchers from France and Cambodia with sub-project manager, Dr. Kang Sovannara.

This paper discusses the outcomes of the World Bank’s sub-project implemented by NUM and how the research center called “Maritime and Inland Waterways Observatory of Cambodia” can improve the research capacity of NUM. The first part presents some of the major challenges in improving the quality of tertiary education in Cambodia. The second part discusses the role of the Maritime and Inland Waterways Observatory in developing the research at NUM. The next part shows the actions that have been already done by the Observatory’s team. Finally the outreach of the sub-project and a possible action plan for ensuring the long term sustainability of the Observatory are summarized.

### 1 | HOW TO IMPROVE THE QUALITY OF TERTIARY EDUCATION IN CAMBODIA?

Cambodia is passing through a transition stage of its development, by moving from predominantly labor intensive to a primarily skill intensive growth process. RGC is facing many challenges to improve the quality of higher education in order to prepare the young generations for the closer integration within AEC and to respond to the growing demand for high qualified workers.

### 2 | THE STATE OF TERTIARY EDUCATION IN CAMBODIA

Research is playing a key role in the improvement of the quality of the tertiary education. Fostering high-level research-based teaching and guidance presents both public and private HEIs with great challenges related to the quality of teaching, research activities, service delivery and innovation management (CDRI, 2015). Most of the Cambodian universities do not invest enough resources in research activities. This has a negative impact on the motivation of the teachers/researchers, because of the insufficient remuneration for their labor. Not surprisingly, the country has one of the lowest scores in Knowledge Economy Index (KEI) in ASEAN (Figure 1). “KEI takes into account whether the environment is conducive for knowledge to be used effectively for economic development. It is an aggregate index that represents the overall level of development of a country or region towards the Knowledge Economy. The KEI is calculated based on the average of the normalized performance scores of a country or region on all 4 pillars related to the knowledge economy – economic incentive and institutional regime, education and human resources, the innovation system and ICT”.

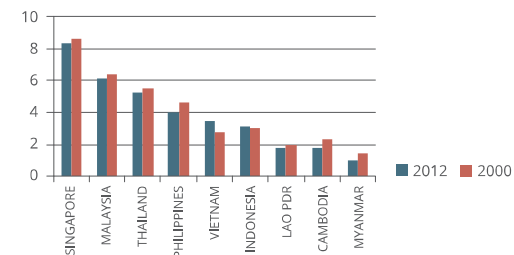


Figure 1  
Knowledge Economy Index,  
ranking of ASEAN countries  
(Compiled by using the database  
of the World Bank)

Another indicator which allows having a better idea about the implementation of the research within the educational system is the number of scientific and technical journal articles published in peer-reviewed journals.

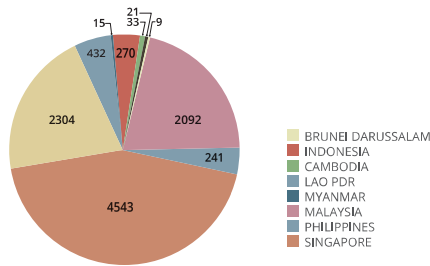


Figure 2  
Number of scientific and technical journal articles published in 2011 (Compiled by using the database of The World Bank).

Cambodia barely appears in the chart with only 33 published articles. Apparently, the universities' staff members and researchers in Singapore, Malaysia and Thailand have the best conditions in the region to publish scientific papers. Although, this indicator does not reveal the quality of the research, it gives us some indications that there are some constraints which do not allow Cambodian academics to write or/and publish articles. Qualifications of institutional leaders and faculty members to provide quality services and effective teaching are vague, and limited research work by faculty has been produced and published in peer-reviewed journals (CDRI, 2015). According to the evaluation of the Cambodian universities, there is almost non-existing scientific research undertaken on regional or international levels. In addition, there are very few publications translated in foreign languages (English, French, Spanish, and Japanese etc.). We have the following paradox in Cambodia, there are universities offering doctoral programs, but at the same time, some of them are not producing research and scientific articles<sup>2</sup>. During the last 15 years, on average, 25 diplomas are issued annually (MoEYS, 2015).

Figure 2 also shows that there are many areas in Cambodia where research can be undertaken. Therefore, currently it is very likely to find financial support by proposing good research projects. There will be more projects like HEQCIP launched by the World Bank, UN or other international donors. In its strategy for cooperation and development (2014-2018), the European Union states that it will support RCG in its efforts to improve the quality of higher education in order to comply with the international and ASEAN standards. It also highlights the will of the EU to support the research and scientific cooperation between Europe and Asia by promoting students' and researchers' mobility through the Erasmus program. France, in particular, is also willing to support the research work in Cambodia. Among the priorities of the Ministry of Foreign Affairs is the mobility of researchers for the benefit of development. Some of the objectives of the French Embassy in Cambodia are related to the rationalization and the better cooperation between the French organizations operating in Cambodia (particularly the research institutes).

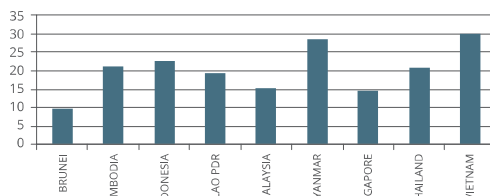


Figure 3  
Pupil-teacher ratio in tertiary education in 2011 (headcount basis) (Compiled by using the database of UNESCO)

On average the pupil-teacher ratio (the number of students who attend universities divided by the number of teachers in the institutions) in tertiary for ASEAN is 19.98. In Cambodia, the ratio is slightly above the ASEAN average, 20.7. This shows that Cambodia does not experience a major lack of teachers in the higher education. The National Institute of Statistics has data related to the pupil-teacher ratio for all schools. It was observed that in 2014, the ratio in urban areas was 24.3, while in the rural area it was 37.8. The lowest pupil-teacher ratio is in Kep province (18.1), followed by Phnom Penh (22.9). The highest score was registered in Ratanakiri, 45.4. These regional disparities are a major constraint to the improvement of the education in Cambodia. Moreover, teaching staff within the country is growing. In 2006 the number of teachers was 78 606, while in 2014, it was 88818, which is an increase by 13%. Most of the teachers (73%) are in the rural areas.

According to the statistics of MoEYS, for the academic year 2013-2014, 233 457 students were enrolled. 214 266 are in Bachelor and 18 100 in Master programs. Furthermore, the huge majority of Master's graduates (89.4%) have their diplomas in the field of social science. Stronger competition is expected between HEIs which are offering such programs. In the future, Universities providing only basic education without having close collaboration with businesses and foreign universities, and doing not enough research will become less attractive and eventually could lose the governmental support (in the case of public HEIs).

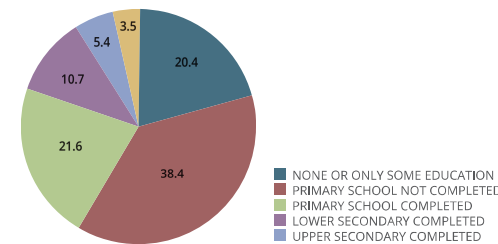


Figure 4  
Persons aged 25 years and over by educational attainment in 2013 (Compiled by using the database of UNESCO)

Figure 4 shows that in Cambodia, there are not enough people with post-secondary education. However, more than 250 000 students were enrolled in 2014 (UNESCO). Along with the growing demand of students, there is also a privatization of the higher education. In the country, there are 43 public and 67 private HEIs. In some cases, the competition between these HEIs leads to a commercialization of diplomas and low quality. In addition, the number of teachers in the tertiary education is growing as well. In 2014, there were 10 488 local and 874 foreign teachers. Among them, 3 049 (27%) have bachelors, 7 117 (63%) have masters and only 836 (7%) have Ph.D. degrees. Mr. Larry Strange from CDRI, stated that in Cambodia there are good public and private institutions, but they mostly focus on teaching, but not on building research skills. He also said that "good research is fundamental to policy-making and implementation"<sup>3</sup>. The main challenge of many Cambodian universities is to adopt a clear vision about the development of research, which means the ability to employ highly qualified teaching staff and to ensure faculty members who have full commitment to teaching and research. It is obvious that not enough priority is given to the research. Cambodia's investment in research is so low that it is not ranked by the World Bank. According to government statistics, about 275 post-graduate students, about 2.2 percent, are currently studying research and development<sup>4</sup>.

Quality is strongly associated with finance and human resources. Low investment in research and teaching facilities handicaps progress towards quality in the entire education sector (CDRI, 2015). According to the statistics of UNICEF, Cambodian government's expenditure per tertiary student accounts for 27.8% of GDP per capita (Figure 5). This is almost the same amount as Singapore's expenditure. However, we should take into account the fact that the budgets of Cambodia and Singapore are very different.

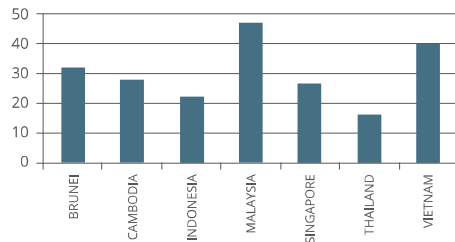


Figure 5  
Government expenditure per tertiary student as % of GDP per capita (%) in 2010 (Compiled by using the database of UNESCO)

It is necessary for RGC to find a way to increase its budget for tertiary education and to invest in facilities such as libraries, laboratories and research centers. In addition, capacity building for management and lecturing staff should go hand-in-hand with meaningful remuneration and incentives (CDRI, 2015). According to UNICEF, in 2010, the budget for tertiary education in Cambodia accounted for 0.3% of GDP, which is low compared to other ASEAN countries. Not surprisingly, the external support in terms of expertise and funds is essential for the development of the research.

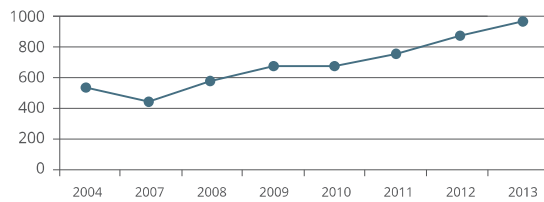


Figure 6  
Average annual expenses of graduates and undergraduates students (Compiled by using the database of the National Institute of Statistics)

Cambodian students enrolled in HEIs are spending more money on their studies, which means that people are aware of the importance of the higher education. Therefore, the universities can increase their tuition fees in order to provide additional funds for improvement of infrastructure and hiring qualified teachers. However, the capacity of universities to raise funds and generate income from the services they offer is low. All public universities still rely heavily on central government support and tuition fees (CDRI, 2015). Not surprisingly, one of the main objectives of HEQCIP was to build up an administrative capacity of the public HEIs in order to train universities' staff to seek for alternative financial sources.

Figure 7 shows that Cambodia has one of the lowest gross enrollment tertiary education ratios (15.8%). Only Myanmar has a lower score (13.4%). The highest score has Thailand (more than 50%). Data for Singapore are not available. The quantity of higher education graduates is still too low for the labor market in countries like Cambodia, China, and Vietnam (the World Bank, 2012). This low enrollment rate indicates that RGC has a long way to go before switching to knowledge-based economy. There is a need of substantial efforts to improve the quality of the higher education as well as to ensure the employability of the universities' graduates.

Cambodia is facing a growing gap between the required skills of the industry and the competences of the graduate students (CDRI, 2015, Mondhur, 2014, the World Bank 2012). Mondhur (2014) defines two main gaps in the education system in Cambodia. The first one is the schooling gap, which refers to the result of low enrollment rates, high dropout rates and low completion rates at various levels of education. The learning gap is related to the quality of education and it is widening because students are not learning enough and do not have the necessary skills to be competitive in the labor market. Development of research will eventually reduce the learning gap. Mondhur (2014) also emphasizes the following points: a) none of

the Cambodian HEIs is among the top 300 Asian universities while 43 higher education institutions from other ASEAN countries are b) research development in the country is in its initial stage; c) almost 90% of the lecturers have never published any papers d) HEIs often lack adequate bandwidth, computer terminals, subscription to academic journals, up-to-date laboratories or any other expensive, but essential, tools for today's top students around the world.

### 2.1 | IMPROVEMENT OF THE QUALITY OF EDUCATION IN CAMBODIA'S HEI'S

RGC has a priority not only to improve the quality of teaching in the tertiary education, but also to develop the culture of research. Based on extensive review of literature, the following actions could be undertaken by most of the Cambodian universities in order to achieve these objectives:

- Hiring full-time academic staff with doctoral degrees and committed to research. This might seem obvious, but many Asian universities lack professors capable of doing research (CDRI, 2010).
- The research activities should be included in the remuneration of every teacher. Academic workers who are conducting good quality research and publish in scientific journals, should have fewer teaching hours.
- Improvement of the university's infrastructure such as libraries, internet connection, laboratories, supplies, equipment, access to international scientific journal etc. These facilities must be also kept up-to-date.
- Form a cohort of top quality students, who are involved in research activities. Integration of the research in the school curriculum is also a necessary action.
- Establishment of long term vision of development of education and research. A bottom-up approach should be applied, which includes shared ownership and responsibility, voluntary membership and participation, mentoring of younger researchers, community outreach, policy engagement, effective communication and dissemination of research findings, and exchange between local and global research networks (CDRI, 2010).
- HEIs should create more partnerships with civil societies, private companies, foreign universities and international institutions. They have to be an engine of new ideas for the local businesses.
- Include research methodology and involve students in research activities through creation of students' journals, students' research competition and offering scholarships to students who demonstrate solid research skills. A research university needs good students interested in the research. Students should have some incentives to be involved in research activities.

Many other actions can be included. When these actions are applied by a given HEI, it is very likely that this particular institution will eventually become a flagship university, which not only teaches the students, but is also an incubator of new ideas and innovative solutions for the society as a whole. In the literature, such establishments are also defined as entrepreneurial universities. An entrepreneurial university is characterized by its ability to adapt to environmental change, and to improve the technological transfer and linkage between academia and businesses. It contributes to the economic development through undertaking new activities and new methods of teaching as well as through the commercialization of the research. Guerrero et al. (2014) show the positive significant impact of teaching, research and entrepreneurial activities in UK. Arocena et al. (2013) define HEIs as a vital part of any national innovation system emergence and consolidation of the democratization of knowledge as development universities. They provide effective incentives to include in their research agendas the kind of problems whose solutions can lead to an enhancement of social inclusion.

The importance of research and number of published articles is vital not only for the universities, but also for the businesses. Fixed-effect panel data models reveal a positive effect of both university graduates and scientific publications on the technological performance of firms (Leten et al., 2014). The observation that spillovers from academia into the industrial texture of provinces rely on education and research in an industry-specific manner is relevant to the design of appropriate research and innovation policies. Universities investing in research and development, and entrepreneurial activities cannot operate alone.

Therefore, the collaboration with the industry is increasingly perceived as a vehicle to enhance innovation through knowledge exchange (Ankrah and Al-Tabbaa, 2015).

### 3 | HOW TO STRENGTHEN THE RESEARCH AT NUM THROUGH THE MARITIME AND INLAND WATERWAYS OBSERVATORY?

The World Bank's sub-project gave a golden opportunity to NUM not only to improve facilities, but also to build an administrative and research capacity. The NUM's research team had the chance to attend many field trips, conferences, workshops and meeting with stakeholders. Moreover, the Observatory is addressing some of the main issues in the Cambodian educational system. It can play a key role in making NUM a flagship (entrepreneurial or development) university.

The primary objectives of the Observatory are a) to consolidate the research at NUM and b) to found a research body in charge of producing multi-sectorial evidence-based academic research about the sectors of Fisheries and Water Transport. To achieve these goals, the Observatory should implement the following tasks:

- Collect micro and macro data from various sources and stakeholders. Some organizations agree to provide data under the condition that these data will be kept strictly confidential. The Observatory's research team will use aggregated data for its analyses.
- Create many partnerships with public, private non-governmental and academic organization. The Observatory's team should gain the trust and build long-term partnerships in order to be provided regularly with data and information.
- Invite experts in relevant fields to present major issues in the sectors of Fisheries and Water transport. The research capacity of the people involved in the project as well as the NUM's PhD students and teachers will be increased.
- Build a capacity to transmit clearly the important issues in the relevant sectors to the decision makers. The sectors' analyses have to be based on facts and reliable information.
- Submit research proposals to different international, public and non-governmental organizations in order to finance the future activities of the Observatory.
- As an independent research center, the Observatory should facilitate the dialogue and improve the cooperation between different stakeholders.
- Researchers working at the Observatory should have the capacity to produce a few papers every year and to analyze the trends in the sectors of fisheries and water transport in both long and short terms.
- A link between the Observatory's team and the researchers, professors, students and teachers should be built. The data, reports and information of the Observatory will be available for them. In the future, a master or bachelor programs in the field of shipping, trade or fisheries economics could be created (Kutin and Vallée, 2015).

The Observatory can play a major role in the specialization of NUM. The autonomy of Cambodian universities to create their own strategies leads to their specialization, based on social considerations (demand from students and parents) but also, largely, on labor market needs. Specialization of each university cannot be based exclusively on demand considerations (students and employers), it has to also take into account the "supply" side, which includes material base, human capacity and capability in terms of teaching and research. Indeed, the specialization requires qualified teachers and qualified researchers specialized in specific field(s). In the context of a limited budget, a university should be specialized in limited number of fields, which requires making choices<sup>5</sup>. Regarding the fact that not many public or private HEIs are conducting socioeconomic analyses about the fisheries and water transport, NUM could have specialization in these fields.

Another mission of the Observatory is to create long term partnerships with stakeholders in the sectors of fisheries and maritime transport. Regular meetings, conferences and workshops have to be organized with them. It will eventually lead to joint-work on specific research projects, scholarships for NUM's

students and commercialization of the research. Creation of a research environment at NUM is essential for formation of soft and technical skills not only for students but also for faculty members and teachers. Those who do not have these skills today can build them over time, as the environment can be changed through well designed and effectively implemented public policies, programmes and projects (Madhur, 2015).

The Observatory can play a key role in the building of partnership with international research networks such as IMBER<sup>6</sup>, TBTI<sup>7</sup> and foreign universities (i.e. the Nantes University). The implementation of other joint-research projects is a key for the sustainability of the Observatory. It is essential to collect primary data from the stakeholders in the sectors of fisheries and maritime transport in order to produce innovative research. With an external support and high level of commitment in the coming years, the NUM's researchers would be able to publish articles in international peer-reviewed journals.

The activities of the Observatory are in line with Goal 2: "Promote Research Activities" of the NUM's strategic plan (2014-2018). The sub-project of the World Bank allowed achieving some of the objectives in the agenda:

- "Develop physical facilities for supporting research activities and publications" – renovation of the research center, purchase of equipment and econometric software were made.
- "Develop research culture for the university" – a number of workshops, seminars and field trips were organized within the sub-project's framework.
- "Develop active partnership with other universities" – MoU between the Nantes' University and NUM was signed in November, 2014. NUM has also established an official partnership with Maersk Line Cambodia Ltd. Moreover, NUM's Research team is maintaining good collaboration with key stakeholders in the sector of fisheries and maritime transport.

### 4 | WHAT HAS BEEN DONE?

During the implementation of the World Bank's sub-project, a number of research activities took place at NUM which allowed building capacity. The research team members have improved significantly their analytical, writing and problem-solving skills. The following events took place during the implementation of the project:

- A 3-day Workshop on "Research Outcomes and Challenges for Project's Implementation of Maritime and Inland Waterways Observatory of Cambodia"
- A Five-Day workshop on Research Analysis (The World Bank)
- Conference on Maritimes Issues
- Continuous training in Maritime Transportation in Cambodia
- Continuous Training in oil and gas exploration, production and revenue management in Cambodia
- Continuous training on Maersk line and its presence in Cambodia
- Continuous training on the fisheries issues in Cambodia
- Continuous training on water transport under JICA's Assistance
- Global Forum on Rights-based Approaches for Fisheries, FAO
- International Symposium on Research Outcomes of the Observatory
- Procurement trainings
- Two round tables on the fisheries and maritime transport
- Workshop on data analysis
- Workshop on trade and maritime transport

The Nantes' University supported the project implementation by sending seven interns, organizing workshops and providing expertise.

Two reports were written: *1) A Stakeholders' Analysis, and 2) A Final Report.*

#### 4.1 | STAKEHOLDERS' ANALYSIS IN THE CONTEXT OF MARITIME AND INLAND WATERWAYS OBSERVATORY

At the beginning of the implementation process, a review of the literature was made and the important stakeholders in the Fishing industry and Maritime Transport in Cambodia were identified. In order to have a clear idea which stakeholders could be valuable partners, they had to be contacted. A stakeholders' analysis was conducted by the research team in 2014. A number of public, private, NGOs and academic organizations were approached in order to present the project, collect data and discuss a future collaboration. The research team decided to apply two complementary methods in order to assess the importance of each of the selected stakeholders. The first one was more qualitative and based on the use of the Mendelow Power Versus Interest Grid in order to detect which groups of stakeholders deserve or require the attention of the Observatory, and which do not. The second applied method was more quantitative, based on the Social Network Analysis. It highlighted the relations between the stakeholders in the selected economic sectors. The research team did not independently analyze each of the selected economic sectors because the objective of the report was mainly to detect the inter-sectorial organization by measuring closeness and betweenness centralities. In order to understand the relations between the selected stakeholders, the research team created a survey which was filled out by the stakeholders' representatives. All selected stakeholders were listed and the respondents had to assess the relation of his organization with each one of them. Four types of centralities have been analyzed: Degree, Closeness, Betweenness and Eigenvector (Kutin et al., 2015).

#### 4.2 | FINAL REPORT: MARITIME AND INLAND WATERWAYS SOCIOECONOMIC OBSERVATORY OF CAMBODIA

The first part of the Final report describes the sub-project and its evolution. It always takes a long way to build a project, while the time to implement it is always too short. The knowledge and expertise that has been developed within the Observatory about fisheries and maritime transport is structurally highlighted.

An up-to-date outlook of the sectors of fisheries and maritime transport is provided in the second part. We decided to zoom in, by first presenting the world facts and then moving down to the regional scale (i.e. ASEAN), concluding with the Cambodian situation. We know that the sustainability of the resources is one of the key issues for fisheries. This is why the review of the sector not only proposes a comparison between the Cambodian catches or production with those of other ASEAN countries, but also provides specific discussions on productivity measures and sustainability, as observed for example, by the trophic level index. The situation of Cambodia can be easily summarized. Firstly, the aquaculture sector is not enough developed. Secondly, the same conclusion was drawn for the maritime fisheries, although we may fear a weakness of the biomass as measured by the trophic level index. Third, and finally, we may also have concerns about the sustainability of inland fisheries for which Cambodia has the highest productivity among ASEAN countries. Regarding the Maritime Transport, it is important to emphasize that seaborne trade accounts for 89.6% of global trade in terms of volume and 70.1% in terms of value. Hence, all countries having a maritime coast should be part of this trade. Yet, only a few of them grasp the biggest "share of the pie". Then we compare the performances of ASEAN ports in terms of volume of imported and exported cargo. We show that Cambodia is far behind the best performing ASEAN countries like Singapore and Malaysia. Some composite indicators of performances highlight the weaknesses of Cambodia in terms of logistic performance, quality of port infrastructure and connectivity. It is quite clear that Cambodia does not belong as adequately as it should to the network of the shipping trade. For example, among the ASEAN countries Cambodia ranks last in the Liner Shipping Connectivity Index which measures how a given country is connected to global shipping networks. Consequently in Cambodia, the growth of production in the seaborne trade sector (+17% between 2010 and 2012) does not reach its full potential in line with the growth of international trade (+40% for exports, and +30% for imports). The second part of the report concludes with a more detailed review of the evolution of the production in Cambodia's two ports. One important fact is the increase in exports of empty containers. It can be seen as a sign of an excess of supply,

which is a consequence of the loss of competitive advantage within the ASEAN region. It can also be understood as a lack of export diversification. The current research developed by the Observatory on the basis of the creation of composite indicators is presented in the third part. The ten-step method proposed by OECD (2008) was discussed as well as the availability of databases that can be used to create composite indexes. We know that Cambodian fisheries are highly vulnerable to the effects of climate change. By 2030, following Eastham et al. (2008), the runoff throughout the Mekong Basin is expected to increase by 21%, and the wet season flood level of the Tone Sap Lake is expected to rise by 2.3 meters. It could also be expected that climate change will bring more extreme weather events such as floods or storms. As a consequence, adaptive capacity is obviously an important component closely related to the sustainability of a given industry. This explains why our road map to build composite indicators for fisheries and maritime transport sectors was designed to select individual variables within specific dimensions, such as economic, social, environmental and institutional, highlighting the performance, the sustainability or the adaptive capacity of the sector. In order to restrict the list of potential variables, we decided to organize two round tables with different stakeholders. We analyzed the opinions of experts and professionals who participated in these two round tables hosted by the National University of Management in February 2015. According to the opinions of these experts and professionals involved in the Cambodian fishing sector, there are two important factors for the development of the industry: economic and environmental. The capacity of the institutions and social aspects do not seem so important. For the shipping trade industry, the most important dimension is the economic one. The other dimensions are less important. Due to the lack of data, the development of composite indicators is not yet finished.

The last part of the reports presents actions which should be undertaken in order to sustain the Observatory. This part highlights the role of the website ([www.miwobservatory.org](http://www.miwobservatory.org)) and how it could be developed in the future. Some potential research projects, which could be implemented with the support of international and public institutions are also summarized (Kutin and Valée, 2015).

## 5 | OUTREACH

The long-term sustainability of the sub-project can be ensured only by hard work and strong commitment. The constant improvement of research capacity and analytical skills are the key factors for making the Observatory a leading national research center. The benefits in the long run for NUM to support such activities will be substantial. The following activities should be implemented.

### 5.1 | IMPROVEMENT OF THE WEBSITE OF THE OBSERVATORY ([WWW.MIWOBSERVATORY.ORG](http://WWW.MIWOBSERVATORY.ORG))

One of the main goals of the Maritime and Inland Waterways Observatory is to collect and share socioeconomic data related to the sectors of fisheries and water transport. According to the Digital, Social and Mobile in APAC 2015, 25% of 14.41 million Cambodians now use internet. It is 36% for the whole Asia-Pacific region, while the global internet penetration is 42%. Since January 2014, the number of active internet users in Cambodia has grown by 400%, which makes the Cambodian market the fastest growing market in the whole Asia-Pacific region. Moreover, every country in the area has an increasing number of active internet users (Kemp, 2015). Therefore, having a website is the easiest way to provide accessible information to a large number of people. In order to achieve the main objective of sharing data with a large number of people, the following actions have to be accomplished:

- Update the information on the website regularly. Dissemination of data and reports is very good for the Observatory's visibility.
- Make the data "open". According to the Open Definition website, an open data is a data which "anyone can freely access, use, modify, and share for any purpose (subject, at most, to requirements that preserve provenance and openness)". We should find a way to share data about fisheries and maritime transport. Hiring a data visualization developer is inevitable.

Constant upgrading of the website's design is also necessary.

### 5.2 | ACTION PLAN ABOUT THE OBSERVATORY

In the coming years the following activities should be undertaken in order to make the Observatory sustainable and to build up a research capacity at NUM.

- A permanent staff from NUM should be hired as the “director” of the Maritime and Inland Waters Observatory Centre (MIWOC) to be in charge of developing its activities.
- A list of all NUM Staff members interested in working in Fisheries/Aquaculture or Maritime transport should be shortly set and committed to undertake research work within the MIWOC.
- In December 2015: at least one PhD student should start working on issues related to the objectives of the MIWOC, as long as funding resources could be obtained. Fund-raising applications should be rapidly initiated both by NUM and the University of Nantes to obtain PhD scholarships in that regard.
- Two working groups should be organized by the end of 2015, mixing up researchers and industry people or policy-makers. These working groups, one dealing with Maritime Transport and the other one with Fisheries and Aquaculture, should prepare a short report serving as a Strategic Plan for future research within each field. The groups should meet on a monthly basis.
- Interns both from the University of Nantes and NUM should be hired for the period covering May to September 2016 to help achieving these two working group reports.
- Not later than at some point in 2016, some Master students of NUM should be proposed Master thesis topics in connection with the Fisheries/Aquaculture or Maritime transport industries. Main difficulty: Some funds should be found in order to help organization of the working groups, payment of the interns. In the long run, The Observatory should become a research center, which is a working place for researchers/teachers, PhD students and researchers. It could cover more fields of research or restrain its activities only to fisheries for example. The Observatory should be able to publish regularly working papers, organize national and international conferences and take active role in the policy making of NUM (hiring teachers/researchers, internal quality evaluation etc.). It should contribute to the coherence between teaching and research at NUM.

### 5.3 | ACTION PLAN ABOUT THE JOINT-DOCTORAL PROGRAM

The World Bank sub-project has led to a Joint Doctoral Program between NUM and the Nantes’ University. By involvement of PhD students working on topics related to the Observatory, the long-term sustainability of the sub-project will be ensured. So far there is one student who subscribed to this dual program (cotutelle). A brief Action Plan for the coming months was elaborated.

- The list of Professors from NUM and Nantes who can jointly supervise PhD should be compiled. - A list of subjects, if possible in relation with the Observatory goals, should be provided in order to help PhD student to choose their topics of dissertations.
- The obligations in terms of training courses, either at the NUM or at Nantes University, should be defined.
- A summer school for the PhD students, Staff, and some Master Degree students, may be organized in 2016. Part of this summer school can give credits for the PhD training.
- A junior conference may be launched in 2017. Main difficulty: finding scholarships and funds for the organization of the summer school.

### 5.4 | IMPLEMENT NEW RESEARCH PROJECT

In order to find funds and to engage more people in the Observatory’s activities, it is crucial to submit research proposals to different international donors such as Asian Development Bank, the World Bank, United Nations, Danita, European Union, JICA etc. The following research projects were drafted.

#### • Competition For The Waters In Cambodia: Multiplier Effects Of Marine Sectors

The goal of this research is to analyze the total multiplier effects of the different marine sectors that claim to use (inland or outland) waters of Cambodia. Water resources (ocean and inland water) are vital for the economy of each country and cover many sectors such as tourism, aquaculture, fisheries, off-shore or hydropower energy, transport etc. Therefore, as the competition increases for the use of the water resources, every government needs to have a well-defined strategy for their development in order to avoid any conflicts between various stakeholders.

#### • A Global Performance Index Of ASEAN Ports

The goal of this research is to analyze the global performance of the ASEAN ports including social, economic, environmental and institutional dimensions. As we have seen, in the last decade, the importance of the East Asian ports has risen significantly, as a result of the increase in the world trade and the role of China as the leading manufacturing center.

#### • Assessment Of The Vulnerability Of The Fishery Communities In Cambodia

Fisheries support livelihoods of millions of people who are exposed to global warming, extreme events (floods) and structural changes (population dynamics). The concept of vulnerability is a multidimensional concept. It could be estimated by taking into account the following factors: exposure, sensitivity, and adaptive capacity. Exposure can be defined as the nature and degree to which a system is exposed to some events such as significant climatic variations, sea-level rise, etc. On the other hand, sensitivity is the degree to which a system is affected by or responsive to stimuli, and, finally, adaptive capacity as the ability or capacity of a system to adjust to some events, as climate change, to take advantage of opportunities, or to cope with the consequences. By combining these three notions in a composite index, we propose to estimate the vulnerability of around 28 Community Fisheries in Cambodia. This project proposal was already submitted and is currently in process of evaluation.

Other research projects are also in the conceptual phase.

## CONCLUSION

The ongoing rapid growth in Cambodia requires more and more investment in the research and closer collaboration between the academia and the industry. HEQCIP and the sub-project of creation of Maritime and Inland Waterways Observatory was a golden opportunity for NUM to build capacity and to create important links with some stakeholders in the sector of fisheries and maritime transport. It took more than two and a half years for the implementation of the World Bank sub-project. The goals of the Observatory are to provide research and a specific outlook on fisheries and water transport, which are important sectors for the Cambodian economy. The Research Team had to deal with many difficulties in order to achieve the following goals:

- Make the Observatory visible,
- Create partnerships with major stakeholders,
- Organize a number of field trips and trainings in order to increase the research capacity of NUM’s researchers and PhD students,
- Take part in many trainings, workshops and events,
- Involve international researchers, experts and interns in the project,
- Produce reports about the overview of the sectors and stakeholders’ analysis,
- Elaborate research proposals,
- Create a long term strategy for the sustainability of the project.

The Observatory could have substantial contribution to making NUM a research university, which is in line with its mission "to develop human capital for society". However, it requires a high level of commitment and a lot of efforts to make the World Bank's sub-project sustainable. The Observatory could also be used to launch other research projects. A key factor for the sustainability is the success of the joint-doctoral program and creation of many partnerships with stakeholders and foreign research centers and universities. Many challenges lie ahead and a lot of work must be done in order to make the Maritime and Inland Waterways Observatory an internationally recognized research center.

"Challenges are what make life interesting  
and overcoming them is what makes life  
meaningful"

– JOSHUA J. MARINE

#### Notes

1 <http://web.worldbank.org/WBSITE/EXTERNAL/WBI/WBIPROGRAMS/KFDLP/EXTUNIKAM/0,,contentMDK:20584278~menuPK:1433216~pagePK:64168445~piPK:64168309~theSitePK:1414721,00.html>

2 Perraudeau Y. (Septembre, 2015). *Projet de création d'une Ecole Doctorale au Cambodge. Note à l'attention de S.E.M. HANG Chuon Naron, Ministre de l'Education, de la Jeunesse et des Sports.*

3 <http://www.voacambodia.com/content/cambodia-lacks-research-enough-to-tackle-its-problems-analysts-say/1638656.html>

4 <http://www.voacambodia.com/content/cambodia-lacks-research-enough-to-tackle-its-problems-analysts-say/1638656.html>

5 Perraudeau Y. (May, 2015). *Note to H.E. Hang Chuon Naron, Minister of Education Youth and Sport*

6 <http://www.imber.info/>

7 <http://toobigtoignore.net/>

8 Downloadable at : <http://www.oecd.org/social/soc/handbookonconstructingcompositeindicatorsmethodologyanduserguide.html>

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