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WORLD MARITIME UNIVERSITY

Malmö, Sweden

**Environmental Impact Assessment in
Cambodia: The Case of the New
Container Development Project at
Sihanoukville Autonomous Port**

**CHANDARA YEM
Cambodia**

A dissertation submitted to the World Maritime University in partial
fulfilment of the requirements for the award of the degree of

**MASTER OF SCIENCE
in
MARITIME AFFAIRS**

(OCEAN SUSTAINABILITY, GOVERNANCE & MANAGEMENT)

2021

Declaration

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

(Signature):



(Date):

21 September 2021

.....

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Abstract

Title of Dissertation: **Environmental Impact Assessment in Cambodia: The Case of the New Container Development Project at Sihanoukville Autonomous Port**

Degree: **Master of Science**

Environmental Impact Assessment (EIA) has played an important role in preventing the environmental consequence and mitigate the impact from any kind of development project. To this end, this dissertation grapples with a number of thorny issues related to EIA in Cambodia, with a special focus on the legal framework, detailed criteria and process, implementation, and the roles and relationship between relevant stakeholders. The objective remains simple: to provide a better understanding of the current EIA implementation while reflecting on crucial elements for improvement in a Cambodian context. The niche area of the research has its focus on the New Container Development Project at Sihanoukville Autonomous Port. The EIA report of the above is compared with the international EIA framework, particularly the United Nations Guidebook for Port Development. Critical principals are tabled through SWOT analysis to highlight key factors for the future recommendation of the EIA system in Cambodia.

KEYWORDS: Environmental Impact Assessment, Port Development, Legal Framework, Environmental Management Plan, Analysis, Comparative

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List of Abbreviations

EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environment Management Plan
IEE	Initial Environmental Examination
IEIA	Initial Environmental Impact Assessment
JICA	Japan International Cooperation Agency
LEPNRM	Law on Environmental Protection and Natural Resources Management
MOE	Ministry of Environment
NEPA	National Environmental Policy Act
OECD	Organization for Economic Cooperation and Development
PAS	Port Autonomous de Sihanoukville
PO	Project Owner
RGC	Royal Government of Cambodia
SEA	Strategic Environmental Assessment
UN	United Nations
UNEP	United Nations Environment Programme

Chapter 1: Introduction

1.1. Background

Cambodia adopted Law on Environmental Protection and Natural Resources Management (hereinafter referred to as LEPNRM) in 1996. The main purpose of the aforementioned legislation is to protect and promote environmental quality and public health through the prevention, reduction, and control of pollution. Furthermore, it provides provisions to assess environmental impact of all proposed projects prior to the issuance of a decision by the Royal Government (Royal-Decree [RD], 1996). Followed by *Sub-decree number 72 on Environmental Impact Assessment Process* in 1999; the first EIA related regulation has been enforced in Cambodia. Even though it has over twenty years, it remains as a new concept to the public and some small-scale local investors. However, there are many national development projects (factories, enterprises) that have not conducted Environmental Impact Assessment (hereinafter referred to as EIA) or produced reports to that end. This is because of the limited access to the legislation and lack of awareness of environmental related issue in Cambodia. In addition, the law enforcement part is still not fully implemented due to the favor to attract foreign direct investment by the Royal Government of Cambodia (hereinafter referred to as RGC). Furthermore, the cooperation between the public and private sectors is another barrier that makes the functioning of the EIA rather limited due to its lengthy procedures and process, as well as the capital-expenses that the private sector needs to incur.

According to the Prakas on General Guideline to Conduct EIA report (Ministry of Environment [MoE], 2009) states in the development phase can either hire a registered consultant firm to conduct the EIA report or they can complete it by themselves. The general practice is that private sector has always hired consultant firms to conduct the EIA. However, the quality of the EIA report has remained low, and do not reflect to mitigate of the impact. The overall quality of the report has shown as being 69% acceptable (Sam & Grunbuhel, 2015).

Even though the number of EIA report is not widely practiced by many development project proponents, the MoE has always encouraged and pushed the proponents to conduct the EIA report and submit to the Ministry for the review and approval. The number of approvals tend to increase annually. The number of registered consultant firm has also increased due to the demands with regards to new development projects, which require an EIA report.

The Sihanoukville Autonomous Port (hereinafter referred to as PAS) was constructed in 1956 and started operations in 1979 with a very small scale of goods, limited infrastructure and human resources. In response to the growth of trade in the early 1990s, the port has been transformed from packing-related role to container-dealing role. Today, it has rightfully gained the title of a multi-purpose container terminal (Port Autonomous de Sihanoukville [PAS], n.d). The PAS has commenced operations since the EIA regulation was in force. However, it is important to note that PAS conducted an EIA report for its New Container Terminal developed in partnership with Japan International Cooperation Agency (hereinafter referred to as JICA) in 2018. PAS is the only deep-sea international port of Cambodia which plays a major in maritime transport at the international level. The EIA report of the PAS has been received approval from the MoE; however, there still remains the question of how effective the results of studies will be to highlight aspects to mitigate environmental impacts.

The United Nations (hereinafter referred to as UN) has issued a Guidebook for EIA on Port Development in 1992. This Guidebook is a foundation and serves as a strong reference that reflects the EIA report of the PAS. According to the author, this certainly has the potential to determine the effectiveness of the EIA report, which meets the criteria and standards of the UN Guidebook. Based on the above, this research will illustrate the general overview of conducting assessments and developing EIA report in Cambodia through the prism of New Container Terminal Development by PAS. Subsequently, the research will reflect on UN's EIA criteria considered as a global standard. The above criteria will help delineate strong recommendations based on best practices offered that could potentially help strengthen Cambodia's efforts in the ongoing development process towards a high quality of EIA report.

1.2. Aim and Objectives

This research aims to provide a synoptic overview of how EIA is generally conducted in Cambodia and the improvements that need to be made, applied and adjusted by analyzing the effectiveness of EIA of the United Nations' Guidebook for Port Development. The research is conducted bearing in mind the following important objectives:

1. Outlining the stages as well as the main criteria for conducting an EIA from a Cambodian perspective;
2. Overview of related laws and regulations that determine the mandate and duties of relevant stakeholders;
3. Examining the criteria for conducting an EIA pursuant to the UN Guidebook;
4. A specific case study of the new container expansion at Sihanoukville Autonomous Port;
5. A sketch of the recommendations for ensuring EIA effectiveness for Sihanoukville Autonomous Port.

1.3. Research Questions

The following research questions will be answered with a view to satisfying the above aims and objectives:

1. What are the Cambodian national laws and regulations that spell-out the requirement in relation to EIA?
2. What are the specific criteria that governs the EIA report?
3. How is EIA currently conducted for the New Container Terminal Development at the Sihanoukville Autonomous Port?
4. What are the differences in the EIA provisions between Sihanoukville Autonomous Port and the UN Guidebook for Port Development?
5. What changes are required to attain effectiveness in the conduct an EIA studies and report for Cambodian port development?

1.4. Methodology

To successfully complete the research task at hand, a mixture of methodologies is applied to gather all the related information and data. Firstly, desktop research comprised of literature review of relevant books and journal articles serves as the principal method of this research. Primary sources include Cambodia's legislation and other relevant international legal instruments that will serve as foundation documents to provide the general procedure and criteria to conduct an EIA. The approval EIA report of "New Container Terminal Development at Sihanoukville Autonomous Port" will also serve as a strong reference for the real practice of EIA report of the port development in Cambodia. Subsequently, the second method includes a comparative analysis between Cambodia's EIA related legal framework and specific criteria with the UN's Guidebook for Port Development that will form a part of the expository research. The aforementioned method will help identify drawbacks that will pave the way for strategic recommendations before drawing concluding remarks to ensure effectiveness of EIA report for Port Development in Cambodia.

1.5. Expected result

This research is expected to provide an overview of the procedure and criteria to conduct an EIA report. This also includes all relevant national legislation, methodology adopted therewith, requirement and involved stakeholders from the "pre-during-post" phases. Moreover, there will be an examination of the case study of the *New Container Terminal Development at Sihanoukville Autonomous Port* EIA report which describe the real practice that have been implemented. In addition, there will be an analysis of the differences between the EIA in Cambodia, particularly for the port development with the United Nations' Guidebook for Port Development. Therefore, it can reflect and seek more effectiveness of future EIA which has not been mentioned in the report. Finally, recommendation for the improvement will be tabled that could act as a foundation for further studies in relation to EIA in Cambodia.

1.6. Potential limitations

First of all, it is important to stress that Cambodian public has limited access to EIA information and data. It is considered as confidential by relevant government institutions and development project initiators. Thus, the information of a case study and relevant legislation that is available serve as the main academic reference to this research. Furthermore, there is no monitoring report of the implementation and the enforcement after the case study received approval from the MoE. Therefore, this research is limited to the study of only the pre-period of the project and corresponding EIA report. On the other hand, this research will highly depend on literature review and other relevant documents that are available on the worldwide web.

Chapter 2: Overview of Legal Framework and Requirement of EIA

This chapter aims to provide an overview of the Cambodian national laws and regulations in relations to EIA. Various aspects of EIA regulation will be addressed in this chapter, including legal frameworks, general procedure, and requirements to conduct an EIA report.

2.1. Overview of Legal Framework

2.1.1 Law on Environmental Protection and Natural Resources Management

The Law on Environmental Protection and Natural Resources Management has been adopted in 1996 through the Royal-decree NS.RKM.1296.36. This is the Kingdom of Cambodia's first environmental legislation, demonstrating the Royal Government's commitment to environmental and natural resource conservation and security. The legislation has broadened the security of human health, the environment, and natural resources, including bio-diversities, in accordance with Article 59 of the Constitution (Water Environment Partnership in Asia [WEPA], n.d). This legislation comprises eleven chapters and twenty-seven articles which has its main purpose as follows:

- To protect and promote environmental quality and public health through the prevention, reduction, and control of pollution;
- The assessment of environmental impacts for the proposed development project;
- The assurance of preservation, development, management, and sustainable use of natural resources;
- The inclusion of public in environmental protection and natural resources management; and
- The suppression of any acts that cause harm to the environment (RD, 1996).

The LEPNRM specifically demonstrates the requirement of EIA to all newly developed project proposals as well as existing projects which were implemented before the establishment of this law (RD, 1996). In other words, the LEPNRM has a

retroactive effect. In accordance with this law, the government issued a number of regulations and policies to support the implementation and to determine the procedure and other environmental effluent and admission standard requirements that the relevant stakeholders have to carry out (RD, 1996).

The on-going Draft of Environmental and Natural Resource Code of Cambodia has remarked the new commitment to modernize the environmental legislation in Cambodia. General Principles of the Environment and Natural Resources Code, Public Participation and Access to Information, EIA, Strategic Environmental Assessment (hereinafter referred to as SEA), Pollution and Waste Management, Biodiversity and Endangered Species Protection, and Cultural Heritage are all included in the draft Environment and Natural Resources Code (Matthew, 2017). This Code aims to replace the current LEPNRM and include other relevant aspects that will be governed by the MoE and other related public organizations.

2.1.2 Sub-Decree on Environmental Impact Assessment Process

The *Sub-Decree Number 72 on Environmental Impact Assessment Process* was issued in 1999 in pursuant to the LEPNRM by the RGC (RGC, 1999). This Sub-Decree determines an overview of the EIA of development project proposal before submitting to the RGC; determination of type and scale which are required to conduct an EIA for both new development project and existing development project; and promotion of public participation in the EIA process (RGC, 1999). However, there is an exemption for special projects which have to be approved as emergency by the RGC.

In addition, this legal instrument demonstrates responsibility of the MoE and relevant government agencies at both national and sub-national level for the assessment of the EIA report and environmental monitoring report once it gets approval. Likewise, there are eighty types of projects that are required to undertake an EIA report which is divided into four main categories; (i) industrial sector; (ii) agriculture sector; (iii) tourism sector; and (iv) infrastructure sector (RGC, 1999).

A proposed EIA legislation that was being finalized in 2015 has now been incorporated into the Draft of Environmental and Natural Resource Code which the RGC has been in the works since 2015 (Kong et al, 2020).

2.1.2 Sub-Decree on Water Pollution Control

Water pollution is considered as one of the critical issues that harm the environment whether freshwater or sea saltwater. The RGC has issued the Sub-Decree Number 27 on Water Pollution Control in 1999 pursuant to the LEPNRM (RGC, 1999). This Sub-Decree regulates all pollution sources and all activities which may harm water pollution and to ensure the protection of public health and biodiversity conservation (RGC, 1999). This regulation set the environmental quality standard and the effluent standard that qualify to discharge into the public water. Furthermore, it states the obligation to install the wastewater treatment system at designated types of pollution sources to ensure the wastewater discharge is below the effluent standard as according to its category (RGC, 1999). In the EIA process, the quality standard and effluent standard are the essential reference for the measurement of environmental impact within the project area and its surrounding. It helps to determine the adequate mechanism and tool in response to minimize the water pollution (RGC, 1999).

2.1.3 Sub-Decree on Solid Waste Management

In developing nations, waste management is one of the most difficult issues to solve. Due to the huge amounts of urban waste being dumped into open landfill grounds, roads, waterways, and water sources on a regular basis without proper maintenance, developing countries in Asia, in particular, face serious environmental and public health issues (Singh et al, 2018).

According to the LEPNRM and requested by the MoE, RGC has issued a Sub-Decree Number 36 on Solid Waste Management (RGC, 1999). The aim of this Sub-Decree is to regulate solid waste management in a technical and safe manner in order to ensure human health security and biodiversity conservation. This regulation covers all

garbage and hazardous waste disposal, storage, collection, transportation, recycling, and dumping activities (RGC, 1999). This provision regulates the proper manner for the storage, transport, and recycle of the waste generated in the development project in the EIA process.

2.1.4 Sub-Decree on Air Pollution Control and Noise Disturbance

The RGC (1999) has issued the Sub-Decree Number 42 on Air Pollution Control and Noise Disturbance. This regulation has a purpose to protect the environment quality and public health from air pollution and noise pollution through monitoring, curb and mitigation activities, and apply to all movable and immovable sources of air and noise pollution (RGC, 2000). This Sub-Decree set the environmental standard and effluent standard in its attached annex regarding noise pollution and noise disturbance as according to the category of place and time (RGC, 1999).

2.1.5 Other Common Related Law/Regulation and Organization of EIA

Environment is a cross-sector that requires the involvement from many relevant institutions and stakeholders. This has demonstrated the need for cooperation from other line government agencies and regulation that is governed by those organizations. Table 1 shows other relevant government organization and regulations which are commonly included in all EIA projects, apart from environmental related legislation mentioned above.

No	Ministry/Council	Minor National Public Organization	Law/Regulations
1	The Council for the Development of Cambodia	Investment Committee of Cambodia	Law on Investment, 1994 Law on Amendment of Law on Investment of Kingdom of Cambodia, 2003
2	Ministry of Economy and Finance	- General Directorate of Taxation - General Directorate of Custom and Excise of Cambodia	Law on Taxation, 1997 Law on Amendment of Law on Taxation, 2003 Law on Customs, 2007
3	Ministry of Land Management, Urban Planning and Construction	General Department of Land Management and Urbanization	Law on Land Management, Urban Planning and Construction, 1994 Law on Land, 2001
4	Ministry of Labour and Vocational Training	General Department of Labour	Law on Labour, 1997 Law on Social Security Schemes, 2019
5	Ministry of Commerce	General Department of Commercial Service	Law on Commercial Rules and Register, 1995 Law on Enterprises, 2005

Table 1: List of Common Related Organization and Law/Regulations That Governs in EIA Process.

Source: kh.gov websites

2.2. Classification of EIA

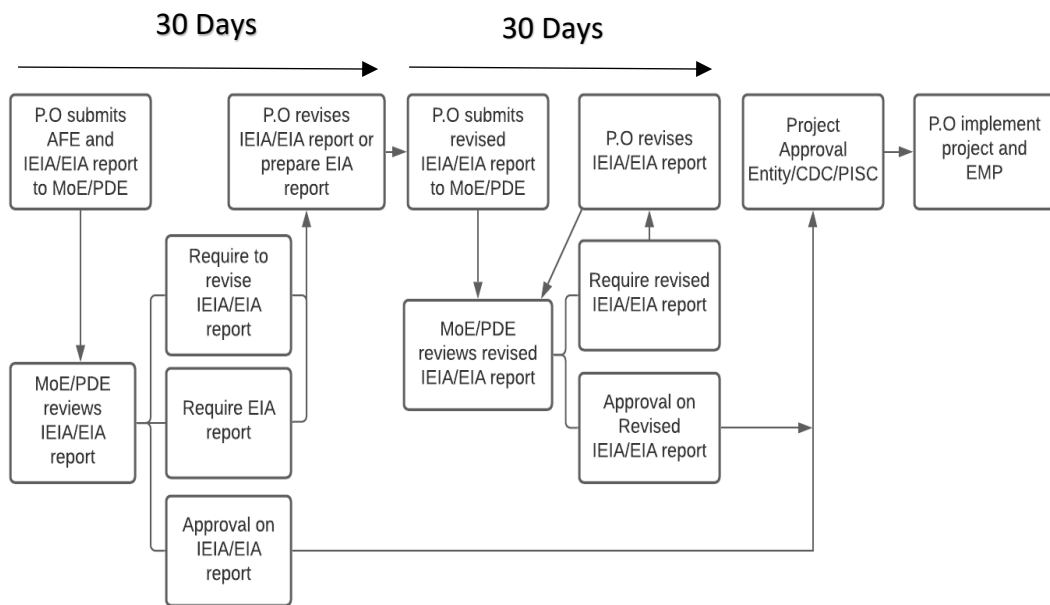
After two decades of EIA Sub-Decree implementation, MoE has developed a Minister Declaration on the Classification of EIA for Development Projects to determine the four main sector categories of the EIA required projects (MoE, 2020). The aim of this Declaration is to facilitate and guide the project owners both public and private for the effective implementation of EIA procedure in Cambodia. Besides, this shall apply to all types of proposed and on-going development projects of private sector, joint-venture, or public sector, except special development projects that need to approve as emergency by the RGC (MoE, 2020).

According to the MoE (2020), EIA for development projects is divided into three types of classification; (i) Environmental Protection Contract; (ii) Initial EIA; and (iii) Full EIA. The details of each classification and sector have been determined in the attached annex of this Declaration. However, this classification is identified according to the scale of impact and environmental degradation that may occur from the development projects. Therefore, the measurement and mechanism in response to the impact can be specifically described in the EIA report.

2.3. General Procedure of EIA

Chapter III, article 6 of the EIA Sub-Decree demonstrated that “Project Owners have to conduct Initial Environmental Impact Assessment (hereinafter referred to as IEIA) in order to comply with the EIA requirement as stated in the annex of the Sub-Decree” (RGC, 1999). This explains that in order to comply with the EIA regulation, the project owner (hereinafter referred to as PO) must perform an IEIA to determine whether EIA is required. According to Kong et al (2020), in the IEIA/EIA method, Cambodia follows the step below:

1. Screening of the project
2. Establishing the scope of the project
3. EIA Study and Environmental Management Plan (EMP) Preparation
4. Reviewing and assessment of EIA report
5. EIA Report Approval or Rejection
6. Operation and Implementation
7. Monitoring, compliance, and enforcement of the project.



Note:

- IEIA:** Initial Environmental Impact Assessment
- EIA:** Initial Environmental Impact Assessment
- CDC:** Council for Development of Cambodia
- MoE:** Ministry of Environment
- PISC:** Provincial Investment Sub-Committee
- PDE:** Provincial Department of Environment
- PO:** Project Owners
- EMP:** Environmental Management Plan
- AFE:** Application Form of Environment

Figure 1: Flowchart of EIA Process in Cambodia

Source: Ministry of Environment, 2009

- The PO submits the IEIA to the MoE for screening consideration under the EIA Sub-Decree. The MoE will decide if the proposal requires an EIA or whether the IEIA is necessary. Within 30 days, the MoE must decide if a proposal needs an EIA. The PO must then refer the IEIA to MoE for review (Article 7, EIA Sub-Decree) or to the Provincial EIA Department if the project is to be decided at the provincial level (investment under US\$2 million) (Kong et al, 2020).
- The MoE is responsible for reviewing the IEIA or EIA and making recommendations to the competent agency. The Project Approval Ministry/Institution (CDC/PISC) will assume that the revised IEIA or EIA report meets the criteria of this Sub-Decree if the MoE does not respond to the findings and recommendations within 30 days (Article 18) (Kong et al, 2020).

- The EIA Sub-Decree sets a deadline of 30 days for reviewing an EIA and responding to the PO and related ministries. Before proceeding with project implementation, the PO must consider the conclusions and suggestions of their IEIA / EIA report(s) that have been approved by the MoE (Kong et al, 2020).

2.4. Monitoring and Follow-up

Depending on the level of government (national or provincial) approved the project, the responsibility for follow-up, compliance, and regulation is also shared. The LEPNRM also contains rules for supervision, record-keeping, and inspections (RD, 1996). Furthermore, the MoE is required to cooperate with other concerned ministries on monitoring, record-keeping, and inspection under Chapter VI (Articles 14 and 15). Inspectors are required by Article 15 to report all violations to the competent agency, which may then take legal action (RD, 1996).

Chapter 3: Criteria that Govern in the EIA Report in Cambodia

EIA has currently been practiced in more than hundred countries around the globe (Abdul-Sattar, 2007). EIA as a required regulatory method began in the early 1970s, with the passage of the National Environmental Policy Act (NEPA) in the United States in 1969. A major portion of the early development occurred in a few high-income nations such as Canada, Australia, and New Zealand (1973-74). However, several developing nations, such as Columbia (1974) and the Philippines, were among the first to use EIA (1978) (Centre for Science and Environment [CSE], 2021). The fundamental concepts and purposes to conduct EIA are the same in any system which predicts and mitigates the impact on the environment from the development project.

Likewise, it applies to every development activity that is expected to have major environmental consequences, but its shape varies globally due to varied economic, social, political, and environmental conditions. Even though EIA shares the same objectives and principles, its execution differs from one country to another. This certainly means the provision and required criteria in the EIA process is different in any part of the world, particularly Cambodia. Therefore, this chapter will describe the key principles that are required to undertake an EIA and specific criteria that govern the whole process of the EIA in Cambodia.

3.1. Overview of Criteria to Conduct IEIA/EIA

As has been described in the Sub-Decree 72 on *Environmental Impact Assessment Process*, MoE has a major responsibility to examine and analyze the EIA report in conjunction with other related ministries and follow-up, monitor, and take appropriate actions to ensure that a PO follows the Environmental Management Plan (hereinafter referred to as EMP) during project construction and accepts the approval of their EIA report (RGC, 1999). In this regard, MoE has established a number of regulations as supportive documents for the PO and EIA consultant firm to conduct EIA reports with reference to Sub-Decree 72 on EIA Process.

Minister Declaration (Prakas) on Technical Guidelines to Conduct IEIA/EIA Report (2009) explains general procedures for submitting an EIA report to MoE and determines the required specific criteria that need to be included in the content of an EIA report. According to the general procedure mentioned in chapter 2, PO or Consultant Firm has to submit Term of Reference (TOR) prior for the approval from MoE to conduct an EIA report. In this regard, there are a number of Prakas establishments which specifically state the criteria which the PO or Consultant Firm needs to undertake a pre-study as according to its requirement in its development sector. Therefore, the Prakas on Term of Reference for Development Project in Infrastructure and Tourism Sector (2018) states the criteria which are required to include in the IEIA/EIA report as it is relevant to the case study in this dissertation. Table 2 determines the content that the PO or Consultation Firm needs to conduct and analyze in each chapter as according to its specific criteria in either IEIA and EIA report.

Content of EIA Report	Content of IEIA Report
Chapter 1: Introduction	Chapter 1: Introduction (Including Scale and Methodology)
Chapter 2: Scale and Methodology	Chapter 2: Legal Frameworks
Chapter 3: Legal Frameworks	Chapter 3: Description of Project
Chapter 4: Description of Project	Chapter 4: Description of Existing Environmental Resources
Chapter 5: Description of Existing Environmental Resources	Chapter 5: Public Participation
Chapter 6: Public Participation	Chapter 6: Environmental Impact and Mitigation Measure
Chapter 7: Environmental Impact and Mitigation Measure	Chapter 7: Environmental Management Plan (EMP)
Chapter 8: Environmental Management Plan (EMP)	Chapter 8: Conclusion and Recommendation
Chapter 9: Economics and Environment Value Analysis	
Chapter 10: Conclusion and Recommendation	

Table 2: Specific Content of IEIA/EIA Report

Source: Ministry of Environment, 2009

3.2. Definition Terms in EIA

The key terms which are used in the whole EIA process distinguish the different criteria that need to be undertaken and the specific criteria and content that need to be included in an EIA report. According to the Prakas of the MoE (2009), there are four major terms which specifically determine the criteria in an EIA report according to its scale of impact. The four major terms explain as follows:

Initial Environmental Impact Assessment (IEIA): refers to the primary conduct of physical environment resources, biological environment resources, and socioeconomic resources which frequently rely on the existing and secondary data in the development project area and its surrounding. It is used as a fundamental reference in order to determine, assess, and analyze the environmental and social impact which may occur from the development project and its response mechanism to minimize the impact. However, if the study shows significant impact to the social and environment, it is required to conduct a full EIA (MoE, 2009).

Full Environmental Impact Assessment (EIA): refers to the comprehensive study of physical environment resources, biological environment resources, and socioeconomic resources which frequently rely on the primary data in the development project area and its surrounding. It is used as a fundamental reference in order to determine, assess, and analyze the potential of environmental and social impact which may occur from the development project and its response mechanism to minimize the impact (MoE, 2009).

Environmental Management Plan (EMP): refers to the schedule of an environmental monitoring program which is made by the PO and state in the IEIA/EIA and approved by the MoE (MoE, 2009).

Public Participation: refers to the consultation of relevant stakeholders to the development project which may include line ministries, local authorities, PO, consultation firm, representative of local residents, and Non-Governmental Organization (NGO) (MoE, 2009).

3.3. Term of Reference to Conduct for Development Project in Infrastructure and Tourism Sector

TOR determines the scale, project development activities, methodology, and format of IEIA/EIA in the context of the MoE, PO, Consultation Firm, and relevant stakeholders (MoE, 2018). This primarily describes the general overview and purpose of the TOR of the project development. Besides, it also undertakes a pre-study of significant impact which may need to be conducted after the feedback and approval from the MoE. Likewise, the fundamental purpose of the TOR is: (1) a roadmap to conduct IEA/EIA; (2) determines scale and methodology to analyze the existing environmental resources including physical environment resources, biological environment resources, and socioeconomic resources; (3) identify relevant stakeholders for consultation; and (4) establish technical working group and timeline to conduct the IEIA/EIA report (MoE, 2018).

3.4. Technical Guideline to Conduct IEIA/EIA Report

3.4.1. Executive Summary of the Project

A summary of the entire report, including project objectives and activities, existing environmental resources, public consultation output, scope of environmental and social impacts and mitigation measures, environmental management plans, conclusions, and recommendations to minimize environmental impacts, will be provided in this section (MoE, 2009).

3.4.2. Introduction

- Project overview: a description of the project background, the justification for project development, and the overall status on the project site;
- Objectives of the current EIA study; and
- Study Methodologies and Scope: To explain the information and data requirements, as well as the data collecting and analysis techniques. The PO must give comprehensive methodology as a distinct chapter in the entire EIA report (MoE, 2009).

3.4.3. Legal Framework

PO must offer a description of laws, sub-decrees, and various rules relevant to the project type to be executed in this chapter. All of the above-mentioned legal and regulatory regulations must be applicable to environmental protection, natural resource management, and the development project in question. Environmental regulations and standards included in the project must be clearly referenced (MoE, 2009).

3.4.4. Description of the Project

This section must provide a thorough explanation of the following items, as specified in the company's pre-feasibility study, feasibility study report, or master plan:

- The POs'/company's background and experience
- Project site (included with a map of the local government and the project location);
- Project type/scope, as well as project activity schedule (project pre-operation, operation and closure);
- Work plan: (1) input sources and quantities to be used; (2) machinery requirements; (3) local and international labor force requirements; (4) amount of final goods; (5) revenue and expenditure; (6) project production chain; and (7) overall waste management plan;
- Project activities schedule (MoE, 2009).

3.4.5. Description of Existing Environmental Resources

The chapter describes the natural environment and socioeconomic factors (based on primary and secondary sources) inside and surrounding the project area, including:

I. Natural Environment

- Physical Resources

- Geology, soil formation/topology, soil kinds, soil erosion, and sedimentation are all aspects of soil. A thorough seismology and geology study (mine resources, if appropriate) must be given for EIA.
- Weather conditions include temperature, rainfall, wind speed and pattern, air pressure, wind direction, and humidity.
- Air quality (the ambient air quality at the project site), noise, and vibration (the level of noise and vibration at the project site). Table 3 demonstrates the list of parameters that the PO or Consultation Firm needs to undertake at least two samples; one in the development project site and one at the surrounding area where residents are located. While Table 4 and 5 show the measurement standard of air quality and vibration.
- Hydrology: Surface and ground water quality and quantity (including an investigation of water quality in the project region), flow and discharge. Table 6 determines the list of parameters that the PO or Consultation Firm needs to undertake as according to the geographical location for at least two samples; one at the nearby natural water source and one at the final discharge point of the wastewater system of the development project.

No	Parameter	Unit	Standard	Period of Time
1	Carbon monoxide (CO)	mg/m ³	20	8 Hours
2	Nitrogen dioxide (NO ₂)	mg/m ³	0.1	24 Hours
3	Sulphur dioxide (SO ₂)	mg/m ³	0.3	24 Hours
4	Ozone (O ₃)	mg/m ³	0.2	1 Hour
5	Lead (Pb)	mg/m ³	0.005	24 Hours
6	Total Suspended Particulate (TSP)	mg/m ³	0.33	24 Hours
7	Particulate Matter (PM10)	mg/m ³	0.05	24 Hours
8	Particulate Matter (PM2.5)	mg/m ³	0.025	24 Hours

Table 3: List of Air Quality Emission Standard Parameters

Source: Ministry of Environment, 2018

No	Areas	Period of Times		
		From 6 am to 6 pm	From 6 pm to 10 pm	From 10 pm to 6 am
1	Quiet Areas -Hospital -Library -School -Kindergarten	45 (dB (A))	40 (dB (A))	35 (dB (A))
2	Residential Areas -Hotel, Administrative Office - Villa, Flat	60 (dB (A))	50 (dB (A))	45 (dB (A))
3	Commercial and Services Areas, Area of Multiple Business	70 (dB (A))	65 (dB (A))	50 (dB (A))
4	Small Industrial Factories in Residential Areas	75 (dB (A))	70 (dB (A))	50 (dB (A))

Table 4: List of Maximum Standard of Noise Level
Source: Ministry of Environment, 2018

No	Period of Times	Standard (dB (A))
1	From 6 am – 6 pm	65
2	From 6 pm – 6 am	60

Table 5: List of Maximum Standard of Vibration Level
Source: Ministry of Environment, 2018

No	Parameter	Unit	River	Lake & Reservoir	Coastal
1	pH	-	6.5 – 8.5	6.5 – 8.5	7.0 – 8.3
2	Total Dissolved Solid (TDS)	mg/l	<1000	<1000	<1000
3	Total Suspended Solid (TSS)	mg/l	25 – 100	1 – 15	<60
4	Dissolved Oxygen (DO)	mg/l	7.5 – 2.0	7.5 – 2.0	7.5 – 2.0

5	Biochemical Oxygen Demand (BOD) ₅	mg/l	1 – 100	<30	<30
6	Chemical Oxygen Demand (COD)	mg/l	<50	1 – 8	2 - 8
7	Oil and Grease	mg/l	<5.0	<5.0	0
8	Detergent	mg/l	<5.0	<5.0	0
9	Sulphate (SO ₄)	mg/l	<300	<300	<300
10	Total Nitrogen (TN)	mg/l	0.1 – 0.6	0.1 – 0.6	0.2 – 1.0
11	Total Phosphorus (TP)	mg/l	0.005 – 0.05	0.005 – 0.05	0.02 – 0.09
12	Lead (Pb)	mg/l	<0.01	<0.01	<0.01
13	Arsenic (AS)	mg/l	<0.01	<0.01	<0.01
14	Cadmium (Cd)	mg/l	<0.001	<0.001	<0.001
15	Iron (Fe)	mg/l	<1	<1	<1
16	Mercury (Hg)	mg/l	<0.0005	<0.0005	<0.0005
17	Total Coliform	MPN/100 ml	<5000	<1000	<1000

Table 6: List of Surface Water Quality Standard

Source: Ministry of Environment, 2018

- Biological Resources
 - Forest: forest land area, forest cover kinds, and forest categorization;
 - Wildlife species, uncommon species, endangered species, and endemic species, as well as their migratory patterns;
 - Habitats;
 - Biodiversity and ecosystems;
 - Wetland habitats (attached with relevant maps).
- Socioeconomic Factors
 - Demography and settlement; Economic situation: employment and income (primary and secondary);

- Land usage;
- Water consumption;
- Energy consumption;
- Physical infrastructure
- Education;
- Health and well-being of the general public;
- Cultural and historical sites, old temples, pagodas, and customs/traditions, ethnic minorities, indigenous peoples, etc; and
- Tourist attractions (MoE, 2009).

3.4.6. Public Participation

The section gives details on public consultations with the following topics:

- Introduction
- Public participation
 - Dissemination of the development project by the PO to local authorities and communities;
 - Feedback from concerning ministries/agencies/departments and relevant local authorities;
 - feedbacks from related NGOs;
 - Dialogue with local communities which are impacted by the development.
- Overall result of the consultation (MoE, 2009).

3.4.7. Environmental Impacts and Mitigation Measures

The chapter discusses both the positive and negative environmental and socioeconomic consequences of their project operations, such as:

- a. A description of the negative environmental and socioeconomic consequences that will occur throughout the project's pre-operation (design and construction), operation, and closure, as well as mitigating strategies;

- b. A summary of point a, on the scope of negative environmental consequences and mitigating actions as outlined in the checklist;
- c. Cumulative effects should be reported in the EIA report; and
- d. Describe the beneficial environmental and socioeconomic consequences (MoE, 2009).

3.4.8. Environmental Management Plan

Ministry of Environment (2009) demonstrates that as part of a project, the PO shall provide sufficient funds and a unit/team with sufficient skills and expertise, equipment, methodology, and schedule for monitoring environmental quality in close collaboration with relevant ministries/agencies in order to implement measures to minimize adverse socioeconomic and environmental impacts.

The EMP must include the following:

- A review of the principal negative environmental consequences and mitigation strategies;
- Trainings to be delivered;
- An environmental monitoring program for the construction, operation, and closure periods that demonstrates the following:
 - Agency in charge of project monitoring;
 - Identified parameters to be monitored;
 - Monitoring technique;
 - Environmental standards or guidelines to be used as a foundation for monitoring;
 - Controlled schedule and cycle;
 - Assessment of monitoring results
 - A quarterly report will be sent to the Ministry of Environment and other relevant ministries/agencies (MoE, 2009).

3.4.9. Economic and Environment Values Analysis

The PO must offer a description of the project's benefits in relation to the scope and value of environmental harm resulting from project operations for the EIA report (MoE, 2009).

3.4.10. Conclusion and Recommendation

The result of the environmental impact assessment research must demonstrate that the negative impacts have been minimized in terms of physical, biological, and socioeconomic elements. It is critical that the investment project recommends mitigation of unfavorable environmental consequences that can sustain positive environmental benefits and enhance local livelihood with development initiatives in the region. This section must offer PO confidence and accountability for their environmental impact assessment studies, as well as applicable development project suggestions (MoE, 2009).

The existing EIA related legislation only recognizes the necessity for consultants; however, it does not specify the role of consultant and which firms are competent to provide professional evaluation services to customers (Chanthy & Grunbuhel, 2015). Prakas on *Technical Guidelines to conduct IEIA/EIA Report*, under article 5 & 6 mentions that the PO may hire a consultant firm to develop the IEIA/EIA report or develop on their own with qualified experts who are recognized by the MoE (MoE, 2009). However, in real practice, the PO has always hired the consulting service to conduct the IEIA/EIA report and deal with approval from the MoE.

According to the quality evaluation, the overall quality of the information was 69 percent acceptable. Nonetheless, the assessment found that many aspects of the EIA reports provide insufficient information for infrastructure development project choices. PO has no choice but to use one of the country's licensed consulting companies to undertake the EIA in accordance with legislation (Chanthy & Grunbuhel, 2015). In addition, Chanthy & Grunbuhel (2015) identifies six significant challenges

that the private consultants have faced regarding the development of IEIA/EIA report as follows:

The Role of Consultants in Legislation: there is a lack of regulatory mechanism for comprehensively assessing the accuracy and consistency of ESIA reports. Furthermore, there is no legal authority for the public or other stakeholders to oppose or condemn the project proponents and consultants in the case of unsatisfactory reports or wrongdoing (Chanthy & Grunbuhel, 2015).

Political influence by local elites: the conception of the elites influencing project decision-making in Cambodia was obvious to the public, since a select number of international and local businesspeople possessed substantial resources, who had strong ties with officials or their families – some of whom had ownership in these firms (Clement et al, 2010).

Time constraints and lack of access to baseline data for evaluation: the quality of the report is determined by the amount of time spent on data collecting, analysis, and public consultation. In order to analyze the patterns of probable changes and consequences, EIA requires time for the conduct of technical study. However, Chanthy & Grunbuhel, 2015 found that the time spent on evaluation and approval, particularly for comprehensive assessments, was essential. According to a study of 39 reports, fieldwork took 1–7 months, regardless of whether it was for IEIA/EIA.

Consultants with limited expertise: the limited specialist competence of both government personnel and consultants constituted a significant threat to a successful EIA in Cambodia. Furthermore, analyzing project effects and evaluating EIA reports both need specialized knowledge (Chanthy & Grunbuhel, 2015).

Limited budget for the assessment: EIA consultancy was deemed good businesses because of the comparatively large charge for the service. The fee figures are based on expert fees, field data gathering, public consultation, MoE reviewing services, administrative expenditures, and other unofficial fee for the approval of the EIA report (Chanthy & Grunbuhel, 2015). This has resulted in the insufficiency of the budget used for the actual work to conduct a quality EIA report.

POs have little regard and believe in consultants: The PO wanted the evaluations completed and endorsed as soon as possible, with no regard for quality or a commitment to follow-up later. Additionally, PO did not have much trust in the consultants in which they were unable to build scenarios to analyze and prevent potential consequences without appropriate project involvement (Chanthy & Grunbuhel, 2015). Therefore, many EIA reports do not have sufficient data and effective responsive mechanisms.

Although the Sub-Decree on *Environmental Impact Assessment Process* under article 1 encourages public engagement in the execution of the EIA process and considers their comments and recommendations in the project approval process (RGC, 1999). However, it does not go into explanation on the degree or kind of public engagement that is necessary.

One of the most significant challenges for the public in submitting comments on EIA reports and achieving meaningful engagement is limited internet access to EIA reports. As of 2020, EIA reports from project participants are not freely accessible on the open-access website for project-related materials. Despite the fact that the MoE is responsible for delivering project-related information as needed, officials' attitude toward giving information appears to be one of hesitation (Open Development Cambodia, 2020). Chhun (2013) also mentions a number factors of public participation challenges such as (1) unclear consulting procedure; (2) shortage of consulting information; (3) time constraint; (4) number of representatives; (5) communication barrier; (6) consultation result monitoring; and (7) lack of affected people consultation.

The public participation generally has been selected in the development project site and its surrounding circle as determined in the TOR recommended by the Department of EIA of the MoE. However, the voice of the affected people do not really influence the EIA process and approval from the MoE.

Chapter 4: A Critical Appraisal of International EIA Framework with a Focus on the work of the United Nations

This chapter has the main purpose to demonstrate an overview of the history of the emergence of the EIA framework and noteworthy developments at the international level. Accordingly, the UN guidebook for EIA of port development will also be analyzed for highlighting the key principles, which shall serve as a benchmark reference for further comparisons with Cambodia's current status in relation to port development.

4.1. The Origin of the EIA

EIAs were initially utilized as a part of a logical decision-making process in the 1960s. It entailed a comprehensive assessment that would result in objective decision-making. Subsequently, in 1969, the National Environmental Policy Act (NEPA) of the United States adopted EIA into its national law. Notably, this was the first piece of legislation to establish a solid foundation for addressing identified environmental issues (UKEssays, 2018). Environmental Assessment (hereinafter referred to as EA)'s history has been marked by tremendous progress. In retrospect, three notable trends are observed:

- The global adoption of EA from its US foundation;
- The changes in legislation, technique, and procedure that have fueled the process' development; and
- The extension of the scope of assessment in response to new difficulties and issues (Sadler, 1996).

4.2. The Evolution of the EIA

UNEP (2004) describes that EIA has become widely used by developing nations during the last decade. In this context, the development banks' and overseas assistance agencies' EIA processes for borrowing and recipient nations, respectively, have had an impact. In the late 1970s and early 1980s, a number of emerging nations, such as

Brazil, China, the Philippines, and Malaysia, had already developed their own EIA systems (UNEP, 2004). Following Rio, developing nations have expedited their adoption of structured EIA systems, especially via the implementation of new legislation and processes, while EIA practice remains restricted in several regions of the developing world, particularly Africa. However, as a result of local and international regulations and initiatives to improve EIA competence, the status quo is undergoing changes as we speak (UNEP, 2004). Many developing nations and countries in transition are striving to enhance and consolidate their EIA systems.

EIA has attracted the attention of a number of international organizations. In the process of giving aid to developing nations, the Organization for Economic Cooperation and Development (hereinafter referred to as OECD, 2021) suggests that member states adhere to the EIA processes and techniques. In 1989, the World Bank determined that EIA for significant projects should ideally be undertaken by the borrower nation under the supervision of the Bank. Moreover, the UNEP has offered suggestions to member nations on how to set up EIA procedures, as well as develop and strengthen EIA aims and principles (Wood, 2003).

The Environment Ministry of Japan (n.d) emphasizes on the international efforts for the implementation of EIA which primarily identifies four categories as shown below:

- International treaties and protocols are examples of legally binding international agreements;
- International documents that are not legally enforceable, such as resolutions, recommendations, and statements issued by international organizations;
- Development assistance guidelines; and
- Project guidelines for international projects (Ministry of Environment, n.d).

From a general standpoint, it is more efficient and beneficial to conduct an EIA as early as feasible, such as during the policy or project development stages. In fact, the EIA's implementation duration, as well as its scope and processes, differ according to states and agencies whereby each system is seen as containing distinct features.

Time period	Development of EIA
Pre-1970	<ul style="list-style-type: none"> - assessment of the project founded on technical/engineering and economic analysis; and - inadequate attention for environmental implications.
Early/mid – 1970s	<ul style="list-style-type: none"> - the EIA was established (NEPA, 1970); - fundamental concepts, standards, and processes, as well as public involvement; - standard techniques for impact analysis, which include creating matrix, checklists, networks etc.; - many other nations (e.g., Canada, Australia, and New Zealand) have taken a NEPA-based strategy; and - major public inquiries (rather than judicial action) aid in the development of their processes.
Late 1970 and early 1980s	<ul style="list-style-type: none"> - the use of EIA by developing countries (for example, Brazil, the Philippines, China, and Indonesia); - inclusion of Strategic Environmental Assessment (SEA) and risk analysis in EIA processes; - greater focus on ecological modelling, prediction, and assessment methodologies; - Environmental Impact Statement (EIS) program prepared in the United States; - environmental investigations in various nations include policy review components; - non-hearing (informational) provisions for public participation; and - coordination of EIA with land use planning procedures (for example, in New South Wales and Victoria).

<p>Mid 1980s to end of decade</p>	<ul style="list-style-type: none"> - the European Commission's EIA Directive provides fundamental principles and procedural criteria for its member states; - stepping up efforts to address the cumulative impacts; - establishment of follow-up procedures (for example, compliance and effect monitoring); - approaches at the ecosystem and landscape levels have been used (for example, to assess wetland losses); - EIA standards are established by the World Bank and other international financing and aid organizations; and - a growing number of developing nations conduct EIAs (e.g., Asia).
<p>1990s</p>	<ul style="list-style-type: none"> - Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) requires consideration of transponder impacts; - EIA designated as implementation vehicle for UN climate change and biological diversity conventions; - a growing number of countries have developed the SEA system; - incorporate mediation into EIA requirements (still limited); - there is a greater emphasis on environmental principles and global concerns (some EIA guidance but still limited); - significant increase of EIA training, networking, and collaboration activities; - many developing nations have passed EIA laws; - increased use of Geospatial Information System (GIS) and other information technologies; - more extensive use of EIA to international development operations; and

	- increased corporate use of EIA, including screening investment and lending choices and conducting site and property assessments to determine obligations.
From 2000 - present	- SEA evolved from EIA to overcome its problems; - new approaches to EIA and SEA are introduced, such as Analytical Strategic Environmental Assessment (ANSEA) and Environmental Impact Description (EID); and - sustainability principles are now completely integrated into every step or level of the EIA system.

Table 7: The Origin and Development of the EIA

Source: Alshuwaikhat; Dalkmann et al.; Modak and Biswas; Sankoh; Sadler, as cited by Abdul-Sattar, N. (2007)

In addition, Sadler (1996) mentions the following important phases that were submitted during the global acceptance of EA:

- Australia, Canada, and New Zealand were the earliest nations to adopt NEPA in 1973 and 1974. Despite Australia, which adopted EIA legislation, Canada and New Zealand started with administrative processes;
- A number of industrialized and developing nations, like as France and the Philippines, implemented official EIA standards throughout the 1970s;
- The European Union's EIA Directive of 1985 imposed minimal requirements for member nations to follow. The Directive, which went into effect in 1988, sparked national legislation and procedure development, however progress is said to be unequal across member states;
- In 1989, under Operational Directive, EAs became a standard requirement for all World Bank-financed investment projects (amended 1991). Borrowing countries bear the major responsibility for adhering to the Bank's EA procedures. As a result of these and other comparable criteria employed by other financial institutions and donors, EA became extensively utilized in developing countries; and

- International legislation and policy emerged from the 1992 Earth Summit, which, among other things, supports the use of EA by signatory nations to the treaties on biological diversity and climate change. Following Rio, multilateral and donor organizations are currently engaged in different capacity-building efforts, which constitute a new phase in the global expansion of EA (Sadler, 1996).

4.3. The United Nations Guidebook for EIA of Port Development

4.3.1. The Requirement of EIA

While effective ports are critical to the economic growth of their surrounding areas; the associated ship traffic, commodities processing in ports, and hinterland distribution may have a variety of detrimental environmental consequences (OECD, 2021). The impact of ports on the environment may thus be divided into three categories: (1) issues caused by port operations; (2) issues caused at sea by ships calling at the port; and (3) emissions from intermodal transportation networks serving the port region. (OECD, 2021).

Ships, cargo handling equipment, transport trucks, and other vehicles may release harmful diesel pollutants during port activities, resulting in a significant amount of pollution (Wisdom, 2018). As a result, the ports and adjacent densely populated regions suffer from poor air quality, which can lead to ailments such as asthma, cancer, and other afflictions. It may also have a negative impact on marine life, which cannot flourish in the contaminated seas. Consequently, ports engage in environmental measures to mitigate the negative influence on the neighborhood (Wisdom, 2018). Therefore, EIA procedures have become vital in minimizing the negative impacts that port development projects may have. Likewise, EIA legislation and administrative rules are being implemented in many countries, partly as a result of pressure from financial organizations that need EIA as part of the evaluation of development projects, and partly as a result of increased environmental consciousness among regional member nations (UN, 1992).

The United Nations (1992) emphasizes on the procedure of the preliminary and detailed stages - Initial Environmental Examination (IEE) and Environmental Impact Studies (EIS) or basically comprehensive EIA. The IEE is a study of the possible environmental effects of a proposed project. The IEE is utilized in the early (pre-feasibility) stages of project development and comprises a concise summary of significant environmental problems based on easily accessible information (UN, 1992). The IEE also serves as an indicator should more research is required. Whereas, an EIA is a more thorough analysis of the possible major consequences, either positive or negative, of a proposed development project on the environment. The key elements of an EIA procedure are as follows:

- Review environmental legislation and regulations (where necessary, prepare a IEE based on specific terms of reference);
- Examine the IEE provided to decide if an EIA is necessary;
- Examine the EIA report to ensure its comprehensiveness, consistency, regulatory compliance, and the adequacy and suitability of proposed environmental protection techniques;
- Inform the public and seek their feedback;
- Develop remedies to avoid or reduce expected negative consequences;
- Accept or reject the proposed project; and
- Follow-up environmental consequence throughout construction and future operations (UN, 1992).

4.3.2. Environmental Consequence

According to the United Nations (1992), numerous institutions, comprising the World Bank, the Asian Expansion Bank, and the International Association of Ports and Harbors, have developed EIA checklists founded on detrimental impacts of port development. The link between variables in port development and their environmental consequences has been presented in table 8 based on an evaluation of these criteria. The three major drivers of these negative impacts are: (1) location of port; (2) port construction; and (3) port operation, which includes vessel transportation and discharges, cargo handling and storage, and land transportation (UN, 1992). These are described as follows:

- **The location of the port:** denotes the presence of structures or landfills, as well as the development site's location.
- **Port construction:** dredging, disposal of dredged materials, and transfer of construction materials are all elements of construction operations in the sea and on land.
- **Port operation:** include vessel traffic, ship discharges and emissions, spills and leakage from ships, as well as cargo-related variables such as cargo handling and storage, handling equipment, hazardous chemicals, waterfront industrial discharges, and land transit to and from the port. (UN,1992).

The environmental factors to be examined in connection with port development is divided into nine specific categories: (1) water quality; (2) coastal hydrology; (3) bottom contamination; (4) marine and coastal ecology; (5) air quality; (6) noise and vibration; (7) waste management; (8) visual quality; and (9) socio-cultural impacts.

Environment Factor	Location of Port	Construction and Dredging	Port Operation	
			Ship traffic and discharges	Cargo Operation and Water Front Industry
Water quality	√	√	√	√
Coastal hydrology	√	√	-	-
Bottom contamination	√	√	-	√
Marine/coastal ecology	-	√	√	√
Air quality	-	√	-	√

Noise and Vibration	-	√	-	√
Waste management	-	√	√	√
Visual quality (8)	√	-	-	√
Socio-cultural impact	√	-	√	√

Table 8: The significant environmental impact of port development

Source: UN, 1992)

Water quality is comprised of five components:

- a) general characteristics such as temperature, salinity, pH, color, transparency, oil and grease content, and total organic carbon (TOC), chemical oxygen demand (COD), or biochemical oxygen demand (BOD) (UN, 1992);
- b) turbidity as determined by suspended solids (SS) (UN, 1992);
- c) dissolved oxygen (DO), nitrogen (N), and phosphorus (P) as indicators of eutrophication (UN, 1992);
- d) hazardous or toxic substances, such as heavy metals including mercury, cadmium, lead, and pesticides (UN, 1992); and
- e) the quantity of coliform bacteria in a sample is used to evaluate sanitation-related variables (UN, 1992).

Coastal hydrology refers to variables such as currents, tidal flow, littoral drifts, beach erosion, water drainage, sediment deposition, groundwater movement, and other physical phenomena in the shore zone (UN, 1992).

Bottom contamination refers to the contamination of bottom sediments by poisonous or hazardous chemicals, oils, oily mixes, and other hazardous elements. Bottom sediment contamination is frequently measured by particle size, pH, colour, smell, oil and grease, organic materials, and concentrations of organic nitrogen, phosphorus, sulphide, and hazardous compounds such as heavy metals and pesticides, as well as harmful components of antifouling coatings (UN, 1992).

Marine/coastal ecology comprises a diverse range of aquatic fauna and flora, including bacteria, phytoplankton, zooplankton, benthic organisms, coral, seaweed, shellfish, fish, and other aquatic biota, as well as terrestrial flora such as mangroves and wetlands. This category also includes important concerns such as the loss of bottom habitat and fishing resources (UN, 1992).

Air quality is comprised of two major components:

- a) soot and dust, as measured by suspended particulate matter (SPM), which come from dry bulk cargo handling and storage, site building, and road activity (UN, 1992);
- b) concentrations of Sulphur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), and hydrocarbons (HC) released by ships, cars, and other port-related equipment. In this area, harmful chemicals and odors must also be considered (UN, 1992).

Noise and vibration from road traffic, cargo operations, ship transportation, and other related port operations also annoy the locals (UN, 1992).

Waste management is concerned with all types of waste, either liquid and solid, which are possible to be disposed of in the port zone. Dredged debris, trash and oily mixes released from vessels, wastes from cargo activities, and other sorts of discharges from urban and waterfront industrial activities are among these pollutants (UN, 1992).

Visual quality refers to the visual impact of the surroundings, the view of port facilities, the discomfort of bright lights used for night operations at a port, and other visual issues (UN, 1992).

Socio-cultural impact encompasses various sorts of influences on the local community and residents' livelihood, such as village resettlement, industrialization, surrounding rise in population, and the establishment of slums (UN, 1992).

4.4. Conclusion

EIA techniques were first designed to fulfil the demands of environmental lobbies, but they have now evolved into a critical, integrated component of planning as a result of the recognition that environmental issues must be included into decision-making

processes (UN, 1992). However, the potential negative consequences of port development are so broad in scope and nature that has called attention to the promulgation of niche environmental regulations for the shipping sector. Although EIA is becoming more common in developing countries, numerous problems have been encountered in the past when carrying out EIA processes and properly designing projects (UN, 1992). These have been emphasized below:

- Lack of knowledge among decision-makers about environmental issues: EIA is commonly viewed as a technique to assist authorities in making project approval decisions and determining which requirements must be met as efficiently as feasible (Leknes, 2001). Besides, the environment minister gives environmental decisions precedence over all other decisions, as well as the legal validity of any implementation requirements (Wood & Bailey, as cited by Morrison-Saunders & Bailey, 2000). Therefore, environmental knowledge is indispensably important prior to approving generic development project;
- Legal and institutional restrictions resulting from insufficient EIA implementation procedures: A concrete institutional arrangement between and among relevant stakeholders is vital for the effective implementation of the EIA project. As environmental issues are multidisciplinary in nature and ambit, good cooperation must be met between public and other related institutions, including NGOs;
- Lack of expertise and experience, particularly qualified people: Individual EIA practitioners' technical skills, knowledge, abilities, and educational background contribute to the formation of a successful EIA (Shah, 2013). However, the limited skill of EIA's practitioners poses a big challenge in many developing countries;
- Lack of access to the most up-to-date technical knowledge on EIA: some development projects require advanced technical skills and knowledge. However, the lack of access to information continues to remain, by far, the biggest challenge in relation to EIA expertise in developing countries;

- Limitation of suitable environmental data and information necessary for EIA: A number of developing countries lack adequate data gathering techniques which results in inaccurate and/or incomplete information. In the course of conducting an EIA, it may be essential to consult information such as the geology of the land or the flood history of the area. Because each project must produce its own data rather than using accessible local, regional or national data. The absence of data severely restricts EIA and contributes to high data collection costs (Ayomide, 2013); and
- Limited public understanding of possible environmental consequences of development projects: Public participation has always been integrated into the process of carrying out an EIA. However, the awareness of environmental issues that may arise from the development project is very limited to the public, especially for the public in the rural area (UN, 1992).

Finally, port development remarkably generates a huge impact into the environment from both port construction and port operation. These environmental consequences require adequate and sufficient evaluation and monitoring from relevant stakeholders. Therefore, the author submits that the above-mentioned categories of environmental factors should be undertaken and included in the content of any given EIA reports.

Chapter 5: Case Study of New Container Development Project at Sihanoukville Autonomous Port and the Comparative Analysis of the EIA

The purpose of this chapter is to present a case study of a practical EIA report of port development in comparison with the UN guidebook. The author has selected the scoping methodology for the conduct of the proposed comparative analysis. In addition, a SWOT analysis of the Cambodian EIA process has been conducted to highlight the strengths, weaknesses, opportunities and threats that serves as an important take-away from this chapter.

5.1. Overview of the Sihanoukville Autonomous Port

5.1.1. A Brief History of the Port



Figure 2: Sihanoukville Autonomous Port

Source: Port Autonome de Sihanoukville [PAS], 2019

The Sihanoukville Autonomous Port (PAS), which opened in 1956, restarted operations in 1979 from a limited base, relying on direct labor, human resources, minimal equipment, and machinery to handle cargo and container processing and transport. Since then, the port has expanded and progressed steadily owing to ongoing

research and upgrades, as well as technical support from various developmental organizations and other partner countries (PAS, 2019). Consequently, the port upgraded its transportation means from small packaged to larger containerized cargoes to keep up with the increasing volumes of cargo throughput during the early 1990s. In order to be more convenient, efficient and effective, a need for container terminal development was then realized, and with the assistance of the Royal Government of Cambodia (RGC) and the Japan International Cooperation Agency (JICA), the container terminal was built in 2002 (PAS, 2019).

5.1.2. General Background

PAS is Cambodia's primary deep-sea port, with a total land area of about 125 hectares. Located at the Bay of Kompong Som, PAS is a sole international port that promotes marine transit by taking advantage of natural features such as deep-sea water, a line of islands to shield against high wind and tidal waves, and a location that does not need constant dredging of navigational channels (PAS, 2019).

Notably, due to significant economic growth driven by the garment sector, Sihanoukville's container transaction volume has increased by 10% on average over the last five years. However, Sihanoukville Port's container throughput is currently approaching its handling maximum capacity. Nonetheless, the port's operating authority has a short-term plan to increase handling capacity by adding more cranes (JICA, 2017). New container terminals are being built in three stages to meet the expected increase in container demand. Phase I's yard and berth will be completed by 2023 pursuant to the medium-term plan. The intended container capacity is roughly 1.15 million Twenty-foot Equivalent Units (TEUs), allowing the port to satisfy the projected demand by 2030. Under the long-term plan (2040), the remaining two yards and berths will be built in a sequential manner to meet increased demand (JICA, 2017).

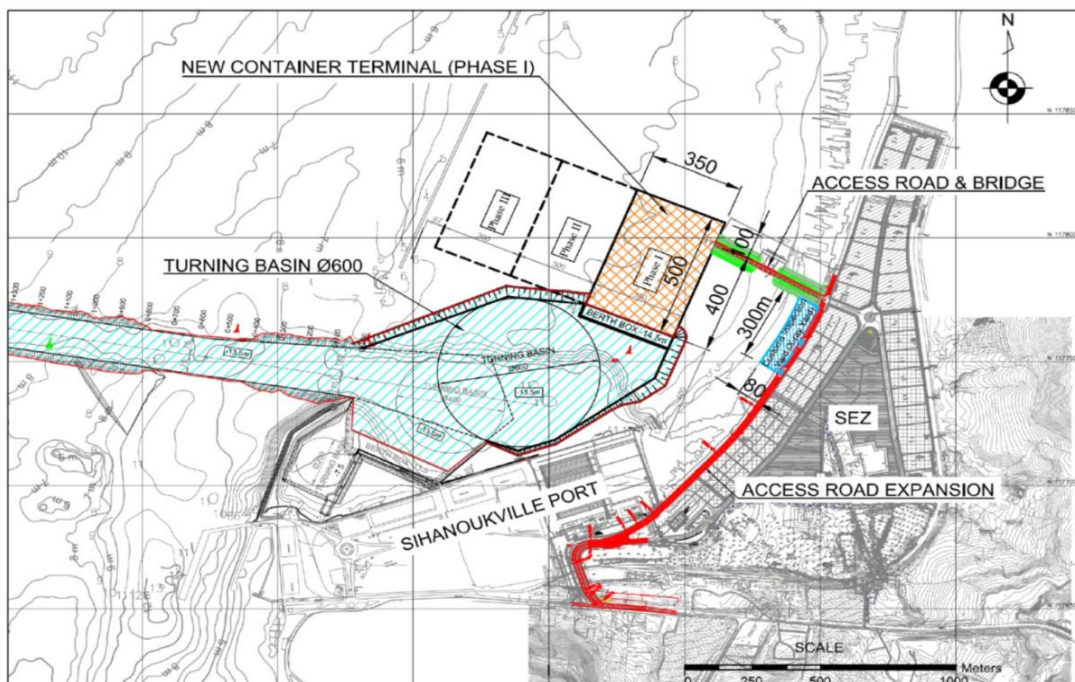


Figure 3: Layout of Sihanoukville Autonomous Port Development Plan
 Source: Japan International Cooperation Agency, 2017

5.2. The EIA Report of the New Container Terminal Development of PAS

The MoE has reviewed and approved the EIA report on the new container terminal development with the total land cover of 17.5 hectares of PAS (Phase I) in July 2018 (MoE, 2018). The study and development of the above EIA report has been undertaken from June to December 2016 after the approval of ToR from the MoE. As per the Prakas Guideline Technical Guidelines to Conduct IEIA/EIA Report (as mentioned in Chapter 3), this EIA report is divided into 10 chapters as seen in table 9

Chapter 1	Introduction, purpose of study, and report format
Chapter 2	Scoping and Methodology
Chapter 3	Legal Frameworks
Chapter 4	Description of Project
Chapter 5	Description of Existing Environmental Resources

Chapter 6	Public Participation
Chapter 7	Environmental Impact and Mitigation Measure
Chapter 8	Environmental Management Plan (EMP)
Chapter 9	Economics and Environment Value Analysis
Chapter 10	Conclusion and Recommendation

Table 9: Format of EIA report of the New Container Terminal Development
Source: PAS, 2018

5.2. SWOT Analysis of EIA in Cambodia

A SWOT analysis is a tool that may be used to help an organization or business determine its strategic path. The technique's predictive capabilities are based on taking into account the system's strengths and limitations in the context of the environment, which may provide opportunities and dangers. The goal is to see how the system will fair in light of the changes that are occurring around it (Paliwal, 2006). Jha-Thakur & Fischer (2016) mentions that SWOT assessments were originally used to assess business possibilities. However, they have been used in a variety of settings over the years, including planning and EIA. The SWOT analysis identifies priority actions for improving the system by focusing on its strengths, decreasing threats' vulnerability, and exploring chances to overcome weaknesses (Khusnutdinova, 2004). Ergo, this section provides a SWOT analysis of the Cambodian EIA system to highlight its key issues and opportunities based on assumption in the earlier chapter.

5.2.1. Strength

“Strength” identifies the EIA system’s resources and capabilities, which can assist in developing it further. It demonstrates that the system has numerous potentials, but a clear legal framework is a good and supporting element (Paliwal, 2006). The availability of regulatory bodies to carry out the law across the country is also a strength of the Cambodian system.

5.2.1.1. Strong Legislative Structure

The operating principles of the system are well established in law and regulation. The LEPNRM (1996) clearly defines all types of developmental project activities that private or public institutions must undergo with respect to environmental impact assessment, which will then be reviewed and assessed by the MoE before being submitted to the RGC for approval. In addition, the Sub-decree noticeably states the type and scale of EIA that is necessary for both new and current developmental projects and promotion of public engagement in the EIA process. Moreover, it specifically demonstrates the eighty types of projects into the four main categories (RGC, 1999). Although the current LEPNRM and Sub-decree on *EIA Process* have never been amended over two decades; however, the ongoing Draft on Environmental and Natural Resource Code provision has the potential to fulfill the outdated legislation and show the strong commitment of the RGC in regard of environmental protection for the sustainable development in Cambodia.

5.2.1.2. Strong Institutional Structure

In Cambodia, the Ministry of Environment is responsible for management of the EIA procedure. Within this responsibility, the Ministry shall: (1) examine and analyze the EIA report in collaboration with other ministries; and (2) follow up, monitor, and take relevant actions to ensure that a PO adheres to the EMP during project construction and accepts the approval of their EIA report (RGC, 1999). In addition, the four Bureau under the Department of EIA is responsible to review and evaluate the proposed EIA report in accordance with its main classifications: (1) industrial sector; (2) agriculture sector; (3) tourism sector; and (4) infrastructure sector (RGC, 2015).

5.2.1.3. EIA Consultant Firm

According to the regulation (which regulation: be specific), the Pos can either hire the private consultant to carry out the EIA or undertake to conduct the work by themselves in Cambodia. The customary practice is for POs to hire consultants to undertake the EIA so that they can ensure the approval from the MoE. Similarly, all the EIA

consultant firms are subject to registration with the MoE for licensing purposes to be able to conduct the EIA. It is noted that there are currently 16 registered firms comparing to only 8 registered firms in 2014 (Chanthy & Grunbuhel, 2015; DoEIA, 2021).

5.2.2. Weakness

5.2.2.1. Inadequate Time and Insufficient Baseline Data

The quality of the report is dependent on sufficient time being set aside for data collection, analysis, and public participation. EIA reports usually require time for technical analysis in order to analyze the patterns of potential changes and their implications (Chanthy & Grunbuhel, 2015). Besides, Paliwal (2006) that is an indication that drafting an EIA report --- high-quality data is critical. Inconsistency is constrained by limited sample networks and ill-defined sampling and analysis methods. On the other hand, the study indicates that the time spent on the assessment and approval procedure, particularly for comprehensive evaluations, was significant in Cambodia. According to an examination of 39 reports, fieldwork took 1–7 months, regardless of whether it was for an IEIA/EIA, altogether accounting for 64% of the time spent on fieldwork and report preparation (Chanthy & Grunbuhel, 2015). Many developing countries lack the necessary data collecting tools. As a result, the data that is accessible is frequently inaccurate or incomplete (Ayomide, 2013). Cambodia is no exception to that because some data heavily rely on the Official Development Assistance (ODA) project or NGO research which are not up-to-date and do not reflect the current environmental condition. Furthermore, some data from relevant public institutions are not easily accessible and not fully accurate.

5.2.2.2. Limited Expert and Resources

In Cambodia, the lack of specialized competence among public employees and private consultants presents a serious challenge to a successful EIA (Chanthy & Grunbuhel, 2015). Furthermore, Chanthy and Grunbuhel (2015) also emphasize the under-table fee which consultants tend to pay to the MoE for ensuring successful approval of the EIA report. Due to budgetary constraints, the firm prefers to hire the local and low

qualified staffs or fresh graduates rather than professional or foreign experts. As a result, low quality reports are produced that accomplish very little in terms of the needed assessment.

5.2.2.3. Limited Public Participation

The LEPNRM and Sub-decree on *EIA Process* mention the involvement of public in environmental protection activities, particularly EIA process. However, the public participation in the EIA process is greatly limited and do not have much influence. Chhun (2013) emphasizes on the weaknesses of public participation as there is no clear procedure, shortage of data, selecting affected people, and overall result of consultation. In addition, the limited knowledge of the environmental impact from the development project of the local people with less compensation from the PO have easily convinced the support from them.

5.2.2.4. Lack of Penalties

Article 20 of the LEPNRM requires the MoE to issue a written order requiring corrective measures for observing any illegal behavior. Furthermore, MoE has the authority to impose a halt to all operations until the offense is resolved, as well as to mandate pollution cleanup (Royal-decree, 1996). In addition, Chapter 7 of Sub-decree on *EIA Process* does not provide for penalty for violation of the EIA regulation. It is unclear whether any enforcement actions under the LEPNRM or the EIA Sub-Decree have been taken. Therefore, the weakness of current EIA process in Cambodia is that the PO is not subject to any fine or penalty for breaching the implementation of the EMP. Furthermore, there is also no penalty in cases where development projects are operationalized without conducting EIA. As a result, only 285 IEIA and 114 of EIA which have been approved from the MoE since the Sub-decree on *EIA Process* come into force in 1999 (MoE, 2019).

5.2.2.5. Limited Implementation and Follow-up Program

The PO requires the assessments completed and authorized as soon as possible, with little regards to quality or commitment to follow-up afterwards (Chanthy & Grunbuhel, 2015). Moreover, the limited resources have resulted in the lack of monitoring programs after the project is approval from the MoE. For instance, there is no monitoring report for the case of new container terminal development of PAS since the EIA was approved in 2018 (personal communication). The author asserts that the PO does not pay sufficient attention to the monitoring program as stated in the EMP after they are approved from the MoE.

5.2.3. Opportunity

People are becoming more environmental conscious as a result of increased knowledge and awareness. Changes in income levels, consumer desire for personal comfort, and industrial units' socially responsible behavior all present possibilities to enhance the execution of laws and regulations (Paliwal, 2006). After two decades of regulation enforcement, the quantity of the EIA report has been increased annually. Moreover, the collaboration between relevant stakeholders including government, private, NGOs, and public is crucial to the amelioration of the EIA report (MoE, 2019). Likewise, the requirement from relevant government institutions, international development agencies, and international business partner can act as a vital force for rejuvenating the awareness aspect of the EIA for PO and the relevant public at large.

5.2.4. Threats

5.2.4.1. Political & Tycoons Influence

Under Article 2 of the EIA Sub-decree provision, there is an exemption of the EIA report for special projects which have to be approved as a matter of emergency by the RGC (RGC, 1999). This has shown the influence in which environmental impact might arise under this special condition and consider as a threat for the EIA in Cambodia. Many project evaluations were politically influenced, which means that local tycoons and politicians were project owners or shareholders, and generally

interfered on their behalf (Chanthy & Grunbuhel, 2015). In addition, Clement et al. (2010) states that major resources were contracted to a select group of local and international businessmen who had close relationships with government officials or their families – some of whom had shares in those businesses – and the concept of tycoons influencing project decision-making was evident to the public in Cambodia.

5.2.4.2. Role of EIA Consultant

In Cambodia, there has been inadequate legislation to control private consultants. The LEPNRM and the EIA Sub-Decree references the necessities for consultants, but they don't specify which firms are competent to provide professional evaluation services to customers (RD, 1996; RGC, 1999). Furthermore, there is no thorough statutory mechanism for assessing the completeness and quality of ESIA report. There is no legal authority for the public or other stakeholders to report or penalize project proponents and consultants in the case of unsatisfactory reports or wrongdoing (Chanthy & Grunbuhel, 2015).

5.2.4.3. Trustful of Consultant

EIA was seen as merely a requirement for project approval, rather than a tool for managing effects and conserving resources. The consultants were treated with low respect by the PO, who did not have much faith in them. Consultants were unable to design scenarios to analyze and minimize potential consequences due to a lack of project involvement (Chanthy & Grunbuhel, 2015). Consequently, the PO is likely to hire the consultant to carry out the EIA to ensure the approval from the MoE rather than mitigating the impact unveiled from respective development projects.

Chapter 6: Recommendation and Way Forward Based on Comparative Analysis

This chapter presents a synthesis of findings based on research pertaining to a comparative analysis between important suggestions highlighted in the EIA report of the New Container Terminal Development of PAS and the UN Guidebook with the latter serving as an invaluable model.

6.1. Comparative Analysis of Environmental Consequences

Water quality: The adverse effects of water quality may happen at any stages of construction and operation of the port, including ship traffic and discharge, and cargo operations and waterfront industry (UN, 1992). Thus, a number of parameters need to be measured as indicators for a regular monitoring of the water quality. According to PAS (2018), six major points have been taken as water samples from the port area. Results show that coliform, oil, and phosphorus have already exceeded the standard of the MoE which means that the water quality has already partly been polluted because of existing port operations. Therefore, according to the author, a wastewater treatment system should be in place before discharge to the sea. Furthermore, the prevention of oil spill and leakage from the ship should also be carefully considered.

Coastal hydrology: Current, tidal flow, waterway system, and water flow may have significant impact during the construction of a port. These studies have been carried out at the location of the PAS from June to December timeline. In addition, the numerical simulation of dispersion of disposed soil/sedimentation modeling was carried out to study the scope of impact during the construction (PAS, 2018). However, the period of the study took place between the rainy season and the beginning of dry season. This has hindered the gathering of sufficient data during the dry season to determine the measurement of the impacts. Therefore, the measures against impact may not be so much effective.

Bottom contamination: The bottom sedimentation consequence can occur at the location of the port, during the construction and the cargo operations, and waterfront industry (UN, 1992). According to PAS (2018), two samples were taken at the port area and twelve parameters were measured. The MoE does not have any pre-determined standards regarding bottom contamination. The result gathered from the samples were considered as a baseline-reference for further monitoring. Consequently, the findings from observing those parameters have shown that bottom sedimentation has already been impacted by hazardous elements. Therefore, the choice of disposal sites, disposal techniques, and capping regulations are all important considerations when dumping at sea. In shallow water, silt curtains, as well as cautious dredging process selection may be helpful in reducing re-suspended sediment distribution (UN, 1992).

Marine/coastal ecology: The development and operation related activities in a port has huge impacts on the marine/coastal ecology at all stages (UN, 1992). However, studies found that there are less flora and fauna in the port and surrounding areas since the operation started since 1960s. The survey of the fauna has been used by interviewing the fishermen and there were 66 species found surrounding the port (PAS, 2018). As a result, the studies of marine/coastal ecology in the project area were very weak as there were no adequate or accurate data in relation to flora and fauna. Interviewing the fishermen alone cannot find out all the existing species. Therefore, a thorough assessment of the biological features of a project area is required if the welfare of endangered and vulnerable species is to be addressed and interruption of their spawning seasons, habitats, and migration is to be avoided. Planting green plants around the port might be an efficient way to minimize negative impacts on terrestrial environment (UN, 1992).

Air quality: The construction of the port and cargo operations, and the waterfront industry generate a negative effect on the air quality around the area (UN, 1992). There were two samples that were taken with seven parameters measurement. As a result, total suspended particulate (TSP) exceeded the MoE's standard whereas PM_{2.5} and PM₁₀ goes above the World Health Organization (WHO) standards (PAS, 2018). PAS

(2018) regulates the use of high-quality gasoline, air quality monitoring, and the movement of vehicles in the port area. However, within the 17.5 hectare of land projects, there should be more sampling taking, including around the ship terminal area.

Noise and vibration: Construction and cargo operations as well as waterfront industries can cause to noise and vibration in the area (UN, 1992). The noise level of the two sampling points has shown slightly above the MoE's standard due to the construction activities and movement of the vehicles (PAS, 2018). However, MoE does not have any set-standards for vibration measurement. According to the results, the vibration level slightly exceeds at night (considering the second sample) when compared with the Japanese standard (this standard has considered as indicator for Cambodia). PAS (2018) states that all the measurements recommended in the UN guidebook should be implemented to regulate the working hours, speed limit, and lower noise from engines in the area.

Waste management: This includes construction and port operations, including both ship traffic and discharge, and cargo operations and waterfront industry-generated waste (UN, 1992). PAS (2018), however, only mentions municipal solid waste management; however, the contaminated waste from construction such as dredging and land reclamation have not been included in this section. Besides, there is a lack of absence of proper facility for oily wastes such as bilge water, ballast water, washing water, lubricating oil, and other leftovers from ship. Therefore, the establishment of these facilities, the enactment of rules regulating the discharge of oily wastes, and accurate detection are all essential components of effective ship discharge management (UN, 1992).

Visual quality: The development of a port, port facility, illumination, and other optical disturbances all impact the visual quality of a project area. The environment may be transformed into a man-made industrial setting (UN, 1992). However, the EIA report of PAS did not incorporate this important section (PAS, 2018). Therefore, it is vital to include this section into the EIA report for port development.

Socio-cultural impact: Building or extending a port frequently necessitates the migration of the local community, which might result in ethnic, cultural, tribal, or religious tensions. Industrialization and modernization have the potential to alter local cultural practices (UN, 1992). As the port operated since 1950s, there is no requirement for relocate the people. According to PAS (2018), there are only 4,639 families around the project area. Interviews were conducted with 329 families out of 4,639 families that worked in the service sector. The Khmer ethnicity is dominant accounting for 92.4% of Buddhists (PAS, 2018). Therefore, this project does not produce the desired effects in term of socio-cultural impact.

Thematic Strand	UN Guidebook	PAS Practice
Water Quality	Adverse water quality impacts might occur at any stage of development and operation of the port.	It was determined that the port area had been sampled twice and that twelve parameters had been measured.
Coastal Hydrology	A port's construction may be significantly affected by current, tidal flow, the waterway system, and water flow.	This research were conducted at the PAS From June through December.
Bottom Contamination	It's possible that the port's bottom sedimentation will occur during the construction and cargo operations, as well as in the waterfront industry.	At the port area, two samples were collected, and twelve parameters were analyzed.
Marine/Coastal Ecology	It is greatly impacted by port construction and operating operations at all stages.	The information was gathered by interviewing the fishermen which are not adequate and accurate.
Air Quality	The port's construction and cargo activities, as well as the waterfront industries, have a severe impact on the air quality in the area.	There were two samples taken, each with seven different parameters measured.

Noise and Vibration	Noise and vibration can be caused by construction and shipping activities, as well as waterfront industry.	There were two noise and vibration samples were taken for measurement.
Waste Management	This comprises construction and port activities, such as ship traffic and discharge, as well as cargo operations and waste generated by the waterfront industry.	Only municipal solid waste was mention. There was the absence of contaminated waste from the construction and wastewater from the ship.
Visual Quality	Aesthetic value of the environment, view of port facilities, and other visual difficulties.	No study of visual quality for PAS
Socio-cultural Impact	All types of influences on the local community and people's lifestyles, such as village relocation, industry, population increase nearby, and the creation of slums, are examples of socio-cultural repercussions.	The studied of local residents were focusing on the ethnicity, standard of living, and the occupation.

Table 10: The following table captures in brief the differences between the stipulations found in the UN Guidebook and the current practices of PAS

6.2. Recommendations and Way Forward

Based on the comparative analysis of the EIA report of new container terminal development project of the PAS and the SWOT analysis, some recommendations have been provided in table 11 for the further improvement of overall EIA report as well as the port development project in Cambodia. In addition, further study or inquiry is necessary to make the EIA system satisfactory, acceptable and relevant to policymakers based on the quality of report.

Current problems	Recommendation	Suggestion
Time constraint	<ul style="list-style-type: none"> - Classification timeline 	<ul style="list-style-type: none"> - The duration to undertake EIA should be set as according to the scale and size of the project.
Lack of baseline data	<ul style="list-style-type: none"> - Development of data portal - Collaboration among government institution 	<ul style="list-style-type: none"> - The research of environmental, ecological, and socio-economic data should be available for the EIA report. - Sharing the data and information among relevant stakeholders is necessary and accessible.
Limited expert	<ul style="list-style-type: none"> - Training - Networking 	<ul style="list-style-type: none"> - Human resources and capacity building is important to make a quality EIA report and effective monitoring. - Networking of relevant stakeholders to sharing experience and offer a platform for discussion.
Lack of public participation and accessible	<ul style="list-style-type: none"> - Workshop - EIA report portal 	<ul style="list-style-type: none"> - Local residents are required to know the detail of the impact of the project. - NGOs and other stakeholders should be invited for more inputs. - Approved EIA report should be accessible by the public.
Lack of implementation of EMP and follow-up	<ul style="list-style-type: none"> - Decentralize to sub-national - Environmental inspection 	<ul style="list-style-type: none"> - Provincial Environmental Department should be authorized to monitor the implementation of the EMP for the small-scale impact project. - Expand the inspection group to be able to follow-up all the project which got approval EIA from MoE - By making arrangements for required monitoring equipment, skilled personnel, logistics, and transportation, the implementation capacity may be improved. - Strictly fine the PO who do not implement the EMP.

Role of EIA consultant	- Professional criteria	<ul style="list-style-type: none"> - Strictly require the number of relevant environmental skilled staff - License suspended or withdrawal of the false information and data in the report.
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Table 11: The current problems of the EIA with recommendations

Chapter 7: Conclusion and Summary

This dissertation has the main purpose to provide an overview of how EIA is typically done in Cambodia and the modifications that need to be made, implemented, and modified by assessing the efficacy of EIA of the United Nations' Guidebook for Port Development. To achieve this goal, five research questions were developed, each of which would give the information needed to better comprehend the ultimate goal of the research at hand. In order to respond to these research questions, the content analysis approach to interpret the underlying meaning of secondary data comprised of literature review of relevant books and journal articles and relevant Cambodia's legal frameworks, including government policy and the approval EIA report. This research describes an overview of main EIA legislation and other related regulation which governs in the EIA process. In addition, this research explains the general requirement and procedure to conduct EIA and the criteria which have to carry out for the EIA report. Moreover, this research discussed the evolution of the EIA and the key principles of the international EIA framework which highlights the key challenges and reflection for a better improvement in term of port development. Furthermore, this research discussed a case study and the SWOT analysis to seek for the potential strength and explore chances to overcome the weakness. Hence, this research found the lack of cross-sector collaboration and other relevant issues which require to strengthen the law enforcement, the EIA consultation firm, and involvement of public participation. Therefore, this research analyses and offer a comprehensive recommendation to improve the EIA process in Cambodia.

Accordingly, this research demonstrated a general overview of the EIA in Cambodia which also identified the procedure, criteria, legal framework, and relevant stakeholders. In addition, this research also discussed the UN perspective of EIA for port development which specifically illustrated the requirement and criteria that should be conducted in the EIA report. Thus, this research examined a case study of port development and found out the inadequacy issues which has not carried out in the report.

The different aspects of specific EIA legislation and other commonly related regulation has notably been addressed. Besides, the general procedure of the pre-during-post period and the classification to undertake EIA also explained which identified the responsible of the PO to get the EIA report from the MoE.

Moving forward, this research explained the detailed criteria including terms, TOR, and the guideline which governs in the EIA report as according to its project types. However, the research found a number of challenges rendering the Cambodian insufficient underscoring the causes which makes the report low-quality. The roles of private consultant share an important responsibility of the EIA report; however, the pressure from PO and inadequate resources remain as the reason behind the status quo quality.

Subsequently, the research described the emergence and evolution of the EIA in the international framework which has continuously practice in any part of the world. In addition, the highlight of key principle and criteria of the UN's guidebook for port development also defined to serve as a benchmark to reflect the EIA in Cambodia. Thus, the discussion of environment related consequence of the port development provided an EIA overview for comparison with Cambodia's framework.

A case study of new container development project of PAS offered an overview of EIA implementation in Cambodia. The research discussed the critical environmental related consequence and highlight the key different criteria which mentioned in the UN's guidebook. Moreover, the SWOT analysis of the EIA in Cambodia demonstrated the critical issues which requires the collaboration and involvement from relevant stakeholders to strengthen the EIA system.

Last but not least, the research discussed the key environmental consequence of the PAS' EIA report in comparison with the UN's guidebook. As a result, the analysis found the potential limitation which was not define in the EIA report of PAS. Thus, the research provided comprehensive recommendation which could possibly improve the quality of the EIA report as well as the techniques which should carry out in the study of the EIA.

Based on the findings of the research, the author submits that EIA has played an important role to prevent potential environmental issues that may arise from any development project around the globe, and Cambodia is certainly no exception to that. Although the practice of Cambodia's EIA system is not as effective as other developed countries; however, the system has notably continuously improved in a persistent manner and implemented accordingly. Notwithstanding, revision of the current legal framework is in order to respond to the current drawbacks and further crucial development on the subject matter. In addition, the baseline data and the qualified expert are deemed as the potential force to improve the quality of EIA report. Accordingly, the relevant government staffs also share a vital responsibility to enhance the EIA implementation effectively to support the RGC's policy for sustainable development in Cambodia. Much work lies ahead for the government.

References

- Abdul-Sattar, N. (2007). *Comparative Analysis of EIA System of Developed and Developing Countries: Case of Hydroelectric Power Plants* [Master's Thesis, Chalmers University of Technology].
<https://publications.lib.chalmers.se/records/fulltext/43366.pdf>
- Ayomide, O. (2013). Environmental Impact Assessment, Developing Countries and Water Resources. <https://blogs.surrey.ac.uk/cce/wp-content/uploads/sites/7/2013/05/EIA-developing-countries-and-water-resources.pdf>
- Chanthy, S. & Clement, G. (2015). Critical challenges to consultants in pursuing quality of Environmental and Social Impact Assessments (ESIA) in Cambodia. <https://www.tandfonline.com/doi/full/10.1080/14615517.2015.1049488>
- Centre of Science and Environment. (2021). Understanding EIA. <https://www.cseindia.org/understanding-eia-383>
- Chhun, K. (2013). Review Current Environmental Impact Assessment (EIA) System in Cambodia on Hydropower Project. *Mekong Environmental Symposium*.
<https://data.opendevelopmentmekong.net/dataset/7eae3f48-5d43-4656-83f4-aa85be855cc3/resource/e3a47b12-c04b-4fa4-9f99-b173e03d6e5f/download/hydrodam-eia-reviewkhunvirya-chhun.pdf>
- Clement, T., John, A., Nielsen, K., An, D., Tan, S. Milner-Gulland, E. (2010). Payment for biodiversity conservation in the context of weak institutions: comparison of three programs from Cambodia.
<https://doi.org/10.1016/j.ecolecon.2009.11.010>
- Coskun, A.A. & Turker, O. (2010). Analysis of environmental impact assessment (EIA) system in Turkey. *Environmental Monitoring and Assessment* (2011), 175: 213 -226. <https://doi.org/10.1007/s10661-010-1507-3>
- Japan International Cooperation Agency. (2017). *Preparatory Survey for Sihanoukville Port New Container Terminal Development Project*.
https://openjicareport.jica.go.jp/pdf/12283990_01.pdf
- Jha-Thakur, U. & Fischer, T.B. (2016). 25 years of the UK EIA System: Strengths, weaknesses, opportunities and threats. *Environmental Impact Assessment Review*, 61: 19 – 26. <https://doi.org/10.1016/j.eiar.2016.06.005>
- Khusnutdinova, G. (2004). Environmental impact assessment in Uzbekistan. *Impact Assessment and Project Appraisal*, 22 (2), 167 – 712.
<https://www.tandfonline.com/doi/pdf/10.3152/147154604781765978>
- Kong, P., Rasmeykanyka, B., Lloyd, G., Hoy, R., & Reasey, S. (2020). THE LAW TALKS: contemporary environmental law in cambodia and future perspectives.
<https://www.kas.de/documents/264850/8652138/Contemporary+Environmental+Law+in+Cambodia+and+Future+Perspectives.pdf/1d483f29-615b-f02c-6f1b-48a1411d5452?t=1587641697247>
- Leknes, E. (2001). The Role of EIA in the Decision-making Process. *Environmental Impact Assessment Review* 21.

- <https://www.researchgate.net/publication/222872886> The roles of EIA in the decision-making process
- Matthew, B., (2017, January 5). Draft Environment and Natural Resources Code of Cambodia Finalised. Matthew Baird ENVIRONMENTAL LAW AND POLICY. <http://matthewbaird.com.au/uncategorized/draft-environmental-code-cambodia-finalised>
- Ministry of Environment (2009). Prakas on Technical Guidelines to Conduct Initial Environmental Impact Assessment and Full Environmental Impact Assessment Report.
- Ministry of Environment (2018). Term of Reference of EIA for Infrastructure and Tourism Project.
- Ministry of Environment. (2019). General Assembly of the Environmental Progress. *Annual Report of General Directorate of Environmental Protection.*
- Ministry of Environment (2020). Declaration on the Classification of EIA for Development Projects
- Ministry of Environment of Japan (n.d). History of EIA System and Measurement Taken Around the World.
<https://www.env.go.jp/earth/coop/coop/document/10-eiae/10-eiae-2.pdf>
- Morrison-Saunders, A. & Bailey, J. (2000). Transparency in environment impact assessment decision-making: recent developments in Western Australia. *Impact Assessment and Project Appraisal* 25(4), 260-270.
<https://core.ac.uk/download/11232179.pdf>
- OECD. (2021). Environmental impacts of International Shipping. *The Role of Ports.*
https://www.oecd-ilibrary.org/environment/environmental-impacts-of-international-shipping_9789264097339-en
- Paliwal, R. (2006). EIA practice in India and its evaluating using SWOT analysis. *Environmental Impact Assessment Review*, 26(5), 492 – 510.
<https://doi.org/10.1016/j.eiar.2006.01.004>
- Port Autonome de Sihanoukville. (2018). *Environmental Impact Assessment Report on New Container Terminal Development of the Sihanoukville Autonomous Port.*
- Port Autonome de Sihanoukville. (2018). *Environmental Impact Assessment Report on New Container Terminal Development of the Sihanoukville Autonomous Port.*
- Port Autonome de Sihanoukville. (2019). Overview.
<http://www.pas.gov.kh/en/page/port-history>
- Port Autonome de Sihanoukville (n.d). History of the Port.
<http://www.pas.gov.kh/page/port-history>
- Prakas (2009). General Guideline to Conduct Environmental Impact Assessment Report.
- Royal-decree (1996). Law on Environmental Protection and Natural Resource Management.
- Royal Government of Cambodia, (2000). Sub-Decree on Air Pollution Control and Noise Disturbance.
- Royal Government of Cambodia, (1999). Sub-Decree on Environmental Impact Assessment Process.

- Royal Government of Cambodia, (1999). Sub-Decree on Solid Waste Management.
- Royal Government of Cambodia, (1999). Sub-Decree on Water Pollution Control.
- Sadler, B. (1996). *Environmental Assessment in A Changing World: Evaluating Practice to Improve Performance*.
<https://unece.org/DAM/env/eia/documents/StudyEffectivenessEA.pdf>
- Shah, N. (2013). Roles of EIA Practitioner in Improving EIA Reporting Quality – Challenge and Solution: A Case Study of EIA System in Punjab Pakistan.
<https://conferences.iaia.org/2013/pdf/Final%20papers%20review%20process%2013/ROLE%20OF%20EIA%20PRACTITIONERS%20IN%20IMPROVING%20EIA%20REPORTING%20QUALITY%20-%20CHALLENGES%20AND%20SOLUTIONS.pdf>
- Singh, R. K., Yagasa, R., & Onogawa, K. (2018). *State of waste management in phnom penh, cambodia*. Unpublished. <https://10.13140/rg.2.2.35708.03208>
- UKessays. (2018). Origin History And Development Of EIA Environmental Sciences Essay. Retrieved from
<https://www.ukessays.com/essays/environmental-sciences/origin-history-and-development-of-eia-environmental-sciences-essay.php?vref=1>
- United Nations. (1992). *Assessment of Environmental Impact of Port Development. A Guidebook for EIA of Port Development*.
https://www.unescap.org/sites/default/files/pub_1234_fulltext.pdf
- United Nations Environment Programme. (2004). *Environmental Impact Assessment and Strategic Environmental Assessment: Toward an Integrated Approach*.
https://wedocs.unep.org/bitstream/handle/20.500.11822/8753/Environmental_impact_assessment.pdf?sequence=3&isAllowed=1
- Water Environment Partnership in Asia (n.d). *Law on Environmental Protection and Natural Resources Management: Overview*. <http://www.wepa-db.net/policies/law/cambodia/01.htm#:~:text=Law%20on%20Environmental%20Protection%20and%20Natural%20Resources%20Management,-Year%20of%20Enactment&text=To%20ensure%20the%20rational%20and,protection%20and%20natural%20resource%20management>.
- Wisdom. (2018, May 4). *Environmental Impacts of Ports*.
<https://wisdom.events/environmental-impacts-ports/>
- Wood, C. (2003). *Environmental Impact Assessment in Developing Countries: An Overview. Conference on New Directions in Impact Assessment for Developing: Methods and Practice*.
file:///C:/Users/haith/Downloads/Environmental_impact_assessment_in_devel.pdf