MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
West Ukrainian National University
B. Havrylyshyn Education and Research Institute of International Relations
Information-Computer Systems and Control Department

BARRISTER Kenneth Appianing

Energy sector development projects management in Ghana / Управління проектами розвитку енергетичного сектору Гани

Specialty 122 – Computer Science
Educational and Professional Program - Project Management

Qualification work

Done by student of the group
KNUPma-21
Barrister Kenneth Appianing

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(signature)

Supervisor:
PhD. M. Z. Dombrovskyi

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(signature)

Qualification work is allowed to defend
«___»_____ 20___

Head of Department
_____ M. P. Komar

TERNOPIL – 2021

B. Havrylyshyn Education and Research Institute of International Relations
Information-Computer Systems and Control Department
Educational degree «Master»
Specialty 122 – Computer Science
Educational and Professional Program – Project Management

APPROVED
Head of the Department
_____ A.O. Sachenko
"____" _____20___

TASKS

FOR STUDENT'S QUALIFICATION WORK

Barrister Kenneth Appianing

(surname, name)

1. Topic of the Qualification work

Energy sector development projects management in Ghana / Управління проектами розвитку енергетичного сектору Гани

Supervisor PhD, M. Z. Dombrovskyi
approved by the order of the University of December 10, 2020 №167.

2. The deadline for students to submit completed qualification work is November 30, 2021.

3. Background of the work: tasks for student's qualification work, scientific articles, technical literature, PMBOK Guide

4. The main issues that need to be developed

- - review and analyze the state of energy supply in Ghana;
- - substantiation of tools (models and methods) for successful development of the Ghanaian energy sector on the basis of renewable energy sources;
- - development of a method for effective management of the success of international development projects.

5. List of graphic material in the work

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ABSTRACT

Qualification work on the topic «Energy sector development projects management in Ghana» for Master's degree on speciality 122 «Computer Science», Educational and Professional Program «Project Management» contains 65 pages, 20 figures, 13 tables, 3 annexes and 61 sources in the list of references.

The purpose of the Qualification work is to create conceptual frameworks and tools that define models and methods of managing Ghana's energy sector development projects based on renewable sources.

Research methods. Systems analysis - to detail and divide the object of study into some important components; synthesis - to combine the parts distributed and researched in the process of analysis, to establish a connection between them and to know the subject as a whole; modeling - to ensure the study of assumptions; methods of project and program management (to analyze options for solving problems through international projects; comparison - to compare data in dynamics, identify common and different features between them; induction - to obtain formal and logical conclusions based on individual facts; deduction - to obtain partial conclusions based on knowledge of the general provisions of the project management methodology.

Results of the study: Improved tools for international project management: model, methods of successful completion of projects on time and within budget. The PDCA model of the international development project success management cycle has been improved.

The Qualification work results can be successfully used to manage international development project for social-ecoomic progress.

Keywords: INTERNATIONAL DEVELOPMENT PROJECTS, PROJECT MANAGEMENT, CRITICAL SUCCESS FACTORS, PROJECT SUCCESS CRITERIA, PROJECT MANAGEMENT MODELLING, SCHEDULE OVERRUN, COST UNDERRUN, PROJECT OUTCOME, PROJECT FAILURE, TARGET BENEFICIARIES, PROJECT LIFE CYCLE.

РЕЗЮМЕ

Випускна кваліфікаційна робота на тему «Управління проектами розвитку енергетичного сектору Гани» на здобуття освітнього ступеня «Магістр» зі спеціальності 122 «Комп'ютерні науки» освітньо-професійної програми «Управління проектами» написана обсягом 65 сторінок і містить 20 ілюстрацій, 13 таблиць, 3 додатки та 61 джерело за переліком посилань.

Метою випускної кваліфікаційної роботи є створення концептуальних основ та інструментів, що визначають моделі і методи управління проектами розвитку енергетичного портфеля Гани на основі відновних джерел.

Методи досліджень. Системний аналіз – для деталізації і розподілу об'єкта дослідження на окремі важливі складові елементи; синтез – для поєднання розподілених та досліджених у процесі аналізу частин, встановлення зв'язку між ними та пізнання предмету як єдиного цілого; моделювання – для забезпечення дослідження припущень; методи управління проектами і програмами (для аналізу варіантів вирішення проблеми через міжнародні проекти; порівняння – для зіставлення даних у динаміці, виявлення спільних і відмінних рис між ними; індукція – для отримання формально-логічних висновків на основі окремих фактів; дедукція – для одержання часткових висновків на основі знання загальних положень методології управління проектами.

Результати дослідження: Вдосконалено інструменти управління міжнародними проектами: модель, методи успішного завершення проектів своєчасно і в межах бюджету, модель PDCA циклу управління успіхом міжнародного проекту розвитку.

Результати роботи можуть успішно застосовуватися для успішно для управління проектом міжнародного розвитку для соціально-економічного прогресу.

Ключові слова: ПРОЕКТИ МІЖНАРОДНОГО РОЗВИТКУ, УПРАВЛІННЯ ПРОЕКТОМ, КРИТИЧНІ ФАКТОРИ УСПІХУ, КРИТЕРІЇ УСПІХУ ПРОЕКТУ, МОДЕЛЮВАННЯ ПРОЕКТУ, ПЕРЕРЕВЕРШЕННЯ ГРАФІКУ, НЕДОСТАТНІ ВИТРАТИ, РЕЗУЛЬТАТ ПРОЕКТУ, ПОМИЛКИ ПРОЕКТУ, ЦІЛІ БЕНЕФІЦІАРИ, ЖИТТЄВИЙ ЦИКЛ ПРОЕКТУ

CONTENT

INTRODUCTION

Actuality of theme. The progressive mankind envisions a prosperous, inclusive, resilient, and sustainable future for all people of the Earth, while sustaining its efforts to eradicate poverty in the world. For developing countries, energy projects have a known impact on improving living standards and accelerating social and technical economic development. The growing transition to thermal electricity in Ghana has been accompanied by astronomical increases in electricity prices for many years. This is a matter of concern due to the strong link between access to affordable and reliable energy services and economic and social development.

Increase the access to modern, affordable and reliable energy sources (wind, solar) and capacity building through engineering programs as a basis and preconditions for overcoming poverty, therefore, it is crucial to understand the different ways to achieve energy efficiency and sustainable growth, as well as their key benefits, in order to help improve the environment without compromising economic growth.Thus, the governments of most developing countries, including Ghana, face the challenge of meeting the growing demand for new and better energy infrastructure development projects.

Given the positive correlation between access to energy and human development, access to modern energy services is crucial for sustainable socio-economic development. Therefore, Ghana needs to integrate a wide range of unconventional energy into its development portfolio in order to improve energy security technologies. To effectively manage the development of this energy portfolio, it is advisable to use a proven methodology of the project approach.

The purpose and objectives of the qualification work . The purpose is to create conceptual frameworks and tools that define models and methods of managing Ghana's energy sector development projects based on renewable sources.

To achieve this goal, the following tasks are set and solved:

- review and analyze the state of energy supply in Ghana;

- substantiation of tools (models and methods) for successful development of the Ghanaian energy sector on the basis of renewable energy sources;

- development of a method for effective management of the success of international development projects.

The object of research - the processes of project management and development programs of organizations.

The subject of the research is the management of Ghana's energy sector development projects.

Research methods. Systems analysis - to detail and divide the object of study into some important components; synthesis - to combine the parts distributed and researched in the process of analysis, to establish a connection between them and to know the subject as a whole; modeling - to ensure the study of assumptions; methods of project and program management (to analyze options for solving problems through international projects; comparison - to compare data in dynamics, identify common and different features between them; induction - to obtain formal and logical conclusions based on individual facts; deduction - to obtain partial conclusions based on knowledge of the general provisions of the project management methodology.

Scientific novelty of the obtained results. Improved tools for international project management: model, methods of successful completion of projects on time and within budget. The PDCA (continuous process improvement) model of the international development project success management cycle has been improved.

Publications and approbation. The main provisions of the qualification work were tested and received a positive assessment at the International Research Conference at the University of Applied Sciences and Arts in Dortmund (Dortmund, Germany, June 24-26, 2021) [13], certificate of oral presentation The reports are given in Appendix A. The contents of the publications in the materials of the international conference are given in Appendix B.

1. THEORETICAL PRINCIPLES AND OUTLOOK OF ENERGY SECTOR DEVELOPMENT IN GHANA

1.1 Outlook and prospects for Ghana's energy sector development

Ghana is a West African country sits on the Atlantic Ocean with a coastline on the Gulf of Guinea and occupies a total area of 239,567 sq. km. The Prime Meridian passes through it (on figure 1.1). It's population is of about 29.6 million. Ghana borders Ivory Coast, Burkina Faso, and Togo border Ghana to the west, north, and east respectively. As observed on the map below, Ghana is dissected by the largest artificial lake on the planet (Lake Volta), nearly 50% of Ghana lies less than 152 meters above sea level. The country's highest point, Mount Afadjato as marked on the map to the southeast of the country with a yellow upright triangle. It rises only 880 m. The lowest point is the Gulf of Guinea at 0 m. Ghana's coastline is low and sandy, backed by plains and scrubs and intersected by several rivers and streams, most of which are navigable only by canoe. A tropical rain forest belt (central and east) broken by heavily forested hills and many streams and rivers, extends northward from the coastline. To the north of this region, the topography varies from 91 to 396 m above sea level and is covered by low bush, park-like savanna, and scattered grassy plains (see figure 1.2). Ghana is divided into 16 regions that are further subdivided into 212 districts and then into councils and unit committees [57].

The national capital of Accra is located in the Greater Accra Region. In the past two decades, it has taken major strides toward democracy under a multi-party system, with its independent judiciary winning public trust. Ghana consistently ranks in the top three countries in Africa for freedom of speech and press freedom. The economy had grown at an average of 7% in 2017-19 years, before experiencing a sharp contraction in the second and third quarters of 2020- rapid growth was halted by the COVID-19 pandemic [83].

Figure 1.1 – Geographical location of Ghana [57]

Ghana's public energy supply dates back to 1914 under the then “Gold Coast” colonial government. These were fossil power stations that supplied electricity to a limited number of cities such as Takoradi, Koforidua, Accra, Kumasi, Tamale, Cape Coast,

Winneba and Tema [3-5, 30]. The largest of these stations, the Tema diesel power plant, had a generation capacity of 35,298 kilowatts.

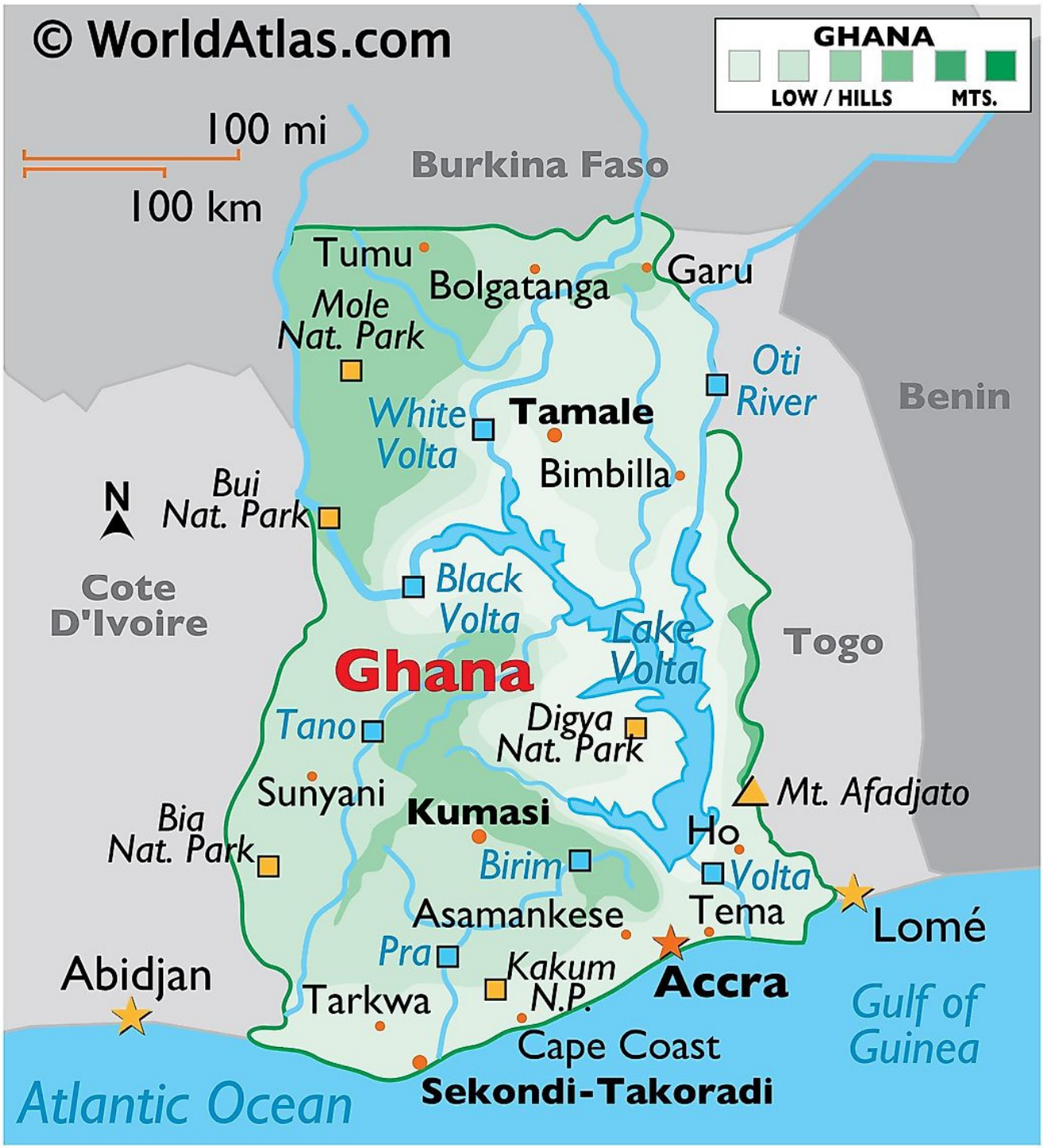

Figure 1.2 – Ghana topography variety and neighborhoods [57]

The Gold Coast Railway Administration established the first state-owned power generation system in 1914 to provide electricity for the Second Sector Railway (ISSER, 2005). In 1928 it was distributed in Takorad. Until 1955, electricity was distributed to some major cities in Ghana, including Kumasi, Tema, Accra, Nsavam, Tamale and Bolgatang under the auspices of the Department of Public Works (PWD). However, in 1947, the Department of Electricity was established within the Ministry of Labor and Housing, which took over the supply of electricity from the Department of Public Works and the Railway Administration [5, 30, 44].

The first grid transmission system was installed in 1963. It was a 161 kV transmission system for the transmission of electricity from the Tema power plant mainly to Accra. The opening of the Akosombo hydropower plant in 1966 by the then independent Ghanaian government marked a significant turning point in Ghana's electricity sector. This large dam project led to the creation of one of the world's largest man-made lakes- the largest reservoir by surface area in the world and the fourth largest one by water volume. The energy sector in Ghana was revolutionized after the completion of the Akosombo hydroelectric plant, which also exported electricity to neighboring countries, including Togo, Burkina Faso and Benin. Akosombo Hydropower Plant has a capacity of about 1,000 megawatts (MW). At the time of its opening, about 60% of the electricity generated was used to power the Volta Aluminum Company Limited smelter. The rest provided almost all of Ghana's electricity [7, 30, 40]. Ghana had a population of about 5 million at the time, compared to the current population of about 30 million. Moreover, the majority of the rural population was not connected to the national grid. There were even surplus energy exported to neighboring Togo, Benin and Burkina Faso. With the increase in demand for electricity as a result of population growth, industrial growth and the expansion of electricity from the grid to rural areas, the electricity supply from the Akosombo HPP soon became insufficient [44]. The supply shortfall has been addressed for many years through smaller hydropower and thermal power plants. Since then, demand for electricity has grown significantly to the point where supply is insufficient to meet demand, leading to serious energy crises over the past decade. In an attempt to resolve the crisis in the late

1990s, the energy sector was reformed to open up the electricity market to private sector participation to help overcome the energy crisis [7, 10, 44].

As a developing country, demand for electricity in Ghana has been relatively low in the past, but now demand is growing due to economic growth, urbanization and other activities [10]. Ghana's economy has grown significantly over the past 20 years from a low-income economy to a lower-average economy, leading to a significant 28% reduction in poverty between 1999 and 2013 [2, 3, 5], as well as urban migration and urbanization average about 4% per year [10]. There is no doubt that there are a number of problems in Ghana's electricity sector. The current installed capacity is not fully used due to many factors, but mainly due to uncertain fuel supply restrictions and low rainfall. The negative impact of low rainfall is due to high dependence on hydropower. More than 50% of electricity is generated by hydroelectric power plants [2,4, 8]. In fact, variability and low rainfall have significantly affected the adequacy and reliability of electricity supply in Ghana. This has forced electricity producers to turn their attention to expensive imported oil and gas-fired power plants to fill the deficit. However, the tariff regime for electricity, which is traditionally based on cheap hydropower, makes it impossible to recoup the cost of expensive oil generating units [10]. In addition, it has a negative impact on the capacity expansion needed to ensure population growth [5, 8], the lack of which is blamed on recent electricity shortages [33]. Ghana is reported to need an additional annual capacity expansion of approximately 200 MW to meet growing demand [2, 10]. In addition to the high cost of using oil and gas power plants to fill the supply gap, there is the problem of security and restrictions on oil and gas supplies from Nigeria, as Ghana does not produce enough oil and gas to meet its domestic needs. [2, 3, 5. 7, 61].

The current electricity network in Ghana (depict on figure1.3) has three main entities: electricity producers, the transmission company and distributors. The category of electricity producers includes both public and private companies [40]. The state producer of electricity is the Volta River Authority (VRA). It owns and operates the Akosombo Hydroelectric Power Plant, the Kpong Hydroelectric Power Plant, five thermal power

plants and one solar power plant. In total, state power plants have a current installed capacity of 2,269.5 MW and a reliable capacity of 2,031.75 MW [26, 31].

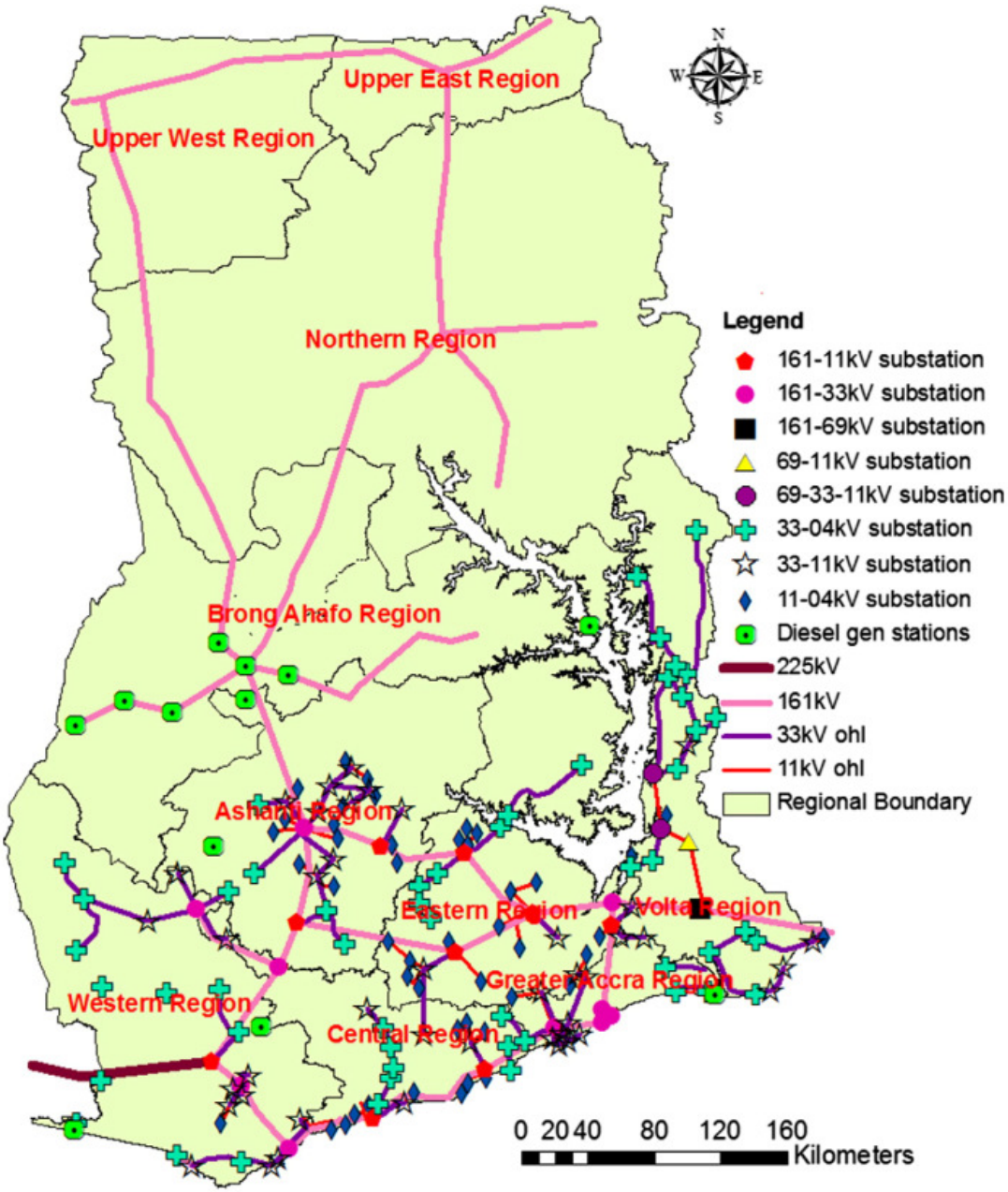

Figure 1.3 – Electricity network of Ghana [40]

Private electricity producers are called independent electricity producers (IPPs). The main IECs are twelve thermal power plants and one hydroelectric power plant, with a total installed capacity of 2,867.5 MW and a total reliable capacity of 2,625.6 MW Commission, 2020). This energy is sold to the state for further transmission and distribution.. In 2020,

the peak demand for electricity was 2957 MW, which is a slight increase compared to the peak demand in 2019 of 2665.68 MW (Energy Commission, 2020). The total reliable capacity of the network was 4657.35 MW: approximately 30% of hydropower plants, approximately 69% of thermal and approximately 0.64% of solar; and about 44% public and about 56% private (depict on figure 1.4) [26, 40].

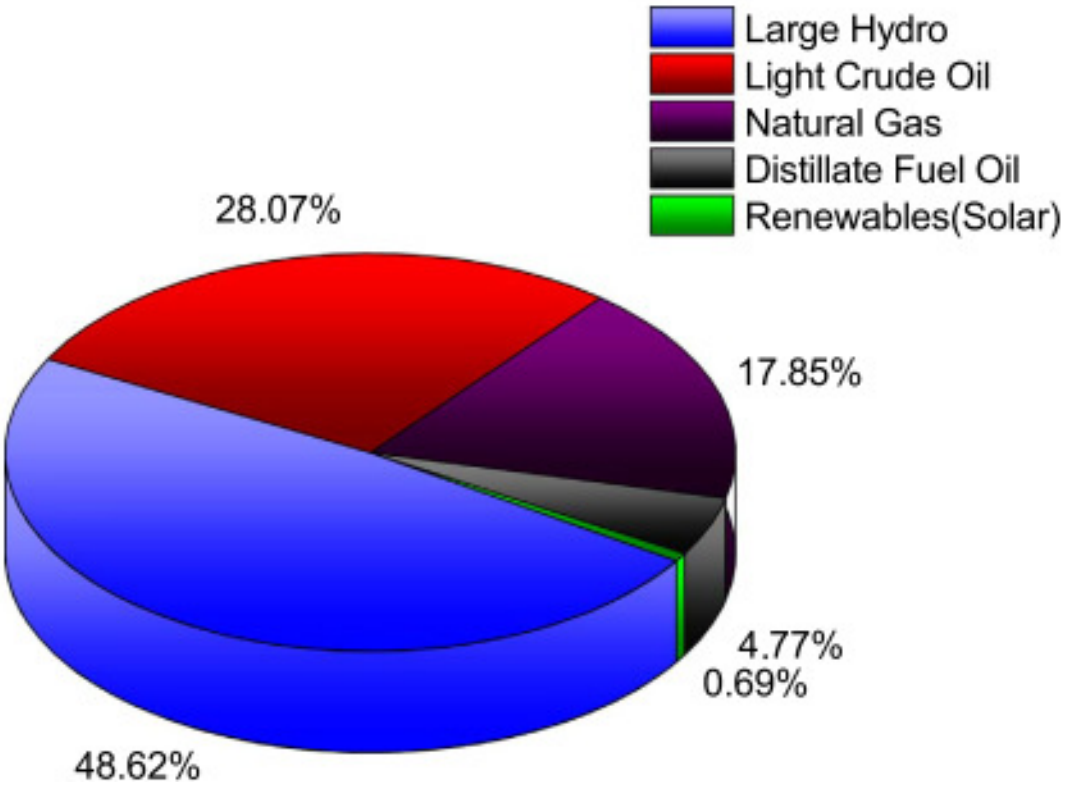

Figure 1.4 – Power generation per fuel type in Ghana [26]

The category of electricity transmitters is the state-owned company Ghana Grid Company Limited (GRIDCO). It operates high-voltage lines that transmit electricity from production areas to cities where electricity is consumed. The electricity distribution category consists of two state-owned companies: the Electricity Company of Ghana (ECG), which is responsible for the distribution of electricity in southern and central Ghana, and the Northern Electricity Company Limited (NEDCO), which is responsible for the distribution of electricity in northern Ghana. These two companies are responsible for reducing the high voltage of transmitted electricity to the voltage of consumption, the distribution of electricity among houses and industrial enterprises, as well as the collection

of income from electricity consumers. [5-7]. In 2019, there were attempts to privatize electricity distribution in Ghana, but disputes over privatization halted the process. If we compare the current situation with electricity supply in Ghana with the past, noticeable changes over the years are: the transition from exceptional hydroelectric energy to hydrothermal mixtures, with thermal electricity accounting for about 69% of current production; and the transition from exclusively public supply to public-private supply, with approximately 56% of current supply coming from private companies. These changes were driven by the need to expand energy supplies to meet growing demand by 10-15% per year through population (see figure 1.5), industry and network expansion. Additional thermal power plants and private electricity producers were mainly involved during periods when the country was experiencing an energy crisis. Problems with unstable electricity in Ghana began in 2001. However, the peak was reached in 2014 and 2015, partly due to long dry seasons during this period, which led to a decrease in electricity production at the Akosombo hydropower plant [26, 44, 70].

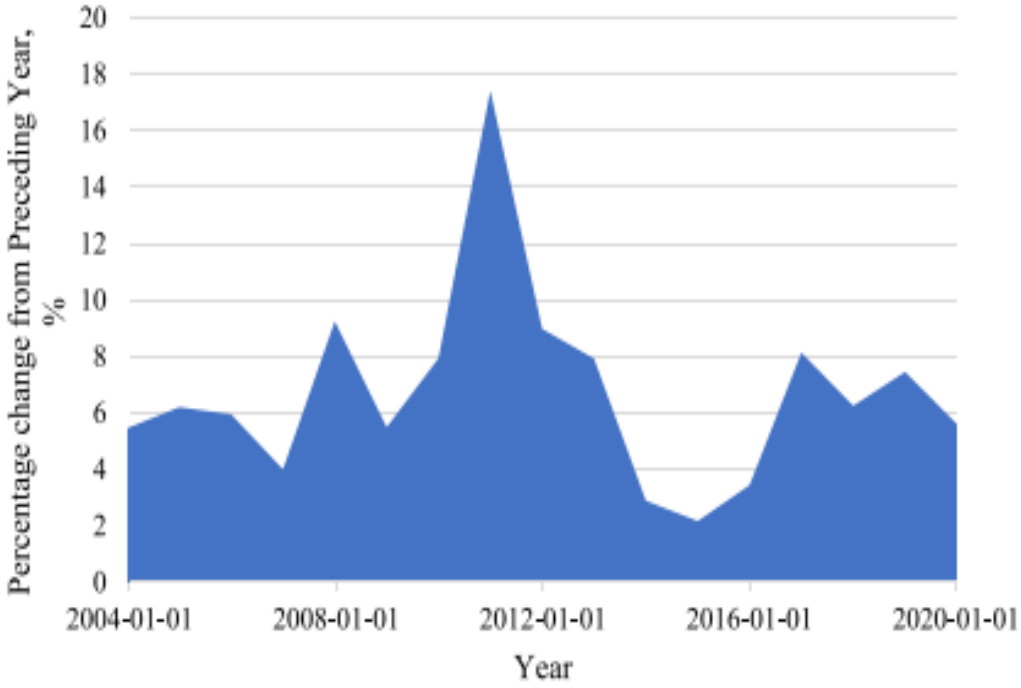

Figure 1.5 – Ghana's Growth rate from 2004 to 2020 (Permission from IMF granted) (IMF, 2020).

In 2015, power outages were so severe that the term "dumsor", which literally means "off and on", became common in Ghana. The then government signed a 10-year contract with Turkey's Karadeniz Energy Group to supply thermal electricity from two power vessels. The agreement did not require Ghana to pay the initial costs of energy ships, but rather about 450 MW of electricity to be supplied to the national grid. The growing transition to thermal electricity in Ghana has been accompanied by astronomical increases in electricity prices for many years. There is no written government policy that encourages the growing transition from hydropower to heat. The growing transition from public to private generation is supported by the general public-private partnership policy for infrastructure and better public service delivery, as enshrined in the written National Public-Private Partnership Policy [15, 17, 20, 21, 26].

The choices made in Ghana today in terms of energy production and consumption will determine how stable the future energy system will be in socio-economic efforts. In order to gain universal access to affordable and reliable energy supply, the Ghana Energy Model has gone through a persistent and proactive policy with ambitious goals of achieving renewable energy, improving energy efficiency and technical support for innovation and industry development [4, 10].

To ensure a sufficient, secure, optimal and reliable energy supply, it is necessary to have a coherent, comprehensive and efficient energy sector structure. This structure eventually becomes a benchmark for supporting energy expansion, efficient use of natural resources and ensuring a reliable energy supply to citizens. The activities of previous policies developed by the Ghana Energy Commission have not assessed the environmental impact of the future path on energy production in terms of total reduction of CO2 emissions. Again, the EU study did not envisage determining the optimal cost model for the development of energy production in Ghana [7-11, 14, 31, 63].

1.2 International development project contribution to socio-economic progress

After all, development projects of different types mainly aim to reducing poverty and living standards improvement, environment protection, basic human rights protection, assistance for victims of natural or people-caused disasters, capacity building and development of basic physical and social infrastructures [8, 9]. A developmental project can generate or drive other projects and gather actors from different horizons to work towards a common objective. Development projects form a special type of projects that provide socio-economic assistance to the developing countries, and/or to some specially designated group of target beneficiaries [33-35, 76]. These projects differ from industrial or commercial projects in several important ways, the understanding of which has strong impacts on how the projects can be managed and evaluated. Even for projects involving development of physical infrastructure and facilities, the ultimate soft goals of serving sustainable social and economic development always have a priority in the project evaluation by key stakeholders, beneficiaries [8, 33, 74].

The intangibility of project objectives and deliverables raises a special challenge in managing and evaluating development projects that require adaptation of the existing project management body of knowledge [1, 9]. In such circumstances, it is assumed necessary to adopting new concepts and methods to define, monitor and measure the extent that the development projects achieve these objectives. Ignoring this important aspect of development projects usually leads to a tendency to measure only resource mobilization and effort, which does not lead to success. The projects, including development projects, are temporary [1], their ultimate goal is to make positive and significant changes that will take place after the completion of external assistance. This sustainability requirement adds a new level of intangible development outcomes [38].

For developing countries, transport and energy projects have a known impact on raising living standards and accelerating social and technical economic development. Projects are becoming the leading form of development, so the success of projects, the

elimination of rework and excessive consumption of resources leads to a significant impact on socio-economic development [2, 5-7].

However, in the scientific literature, little attention is paid to international development projects, which have significant distinctive features, especially the social and non-profit nature of projects, complex stakeholder relations and intangible development results. At the same time, the factors identified in the literature were mostly focused on either the success of the project or the overall success of the project, and it was not possible to clearly list the factors relevant to different phases of the project life cycle. As a result, they cannot be used to gradually measure project effectiveness at the beginning of a project's life in order to diagnose project problems in a timely manner [24, 38].

Most of these projects are funded through official development assistance provided by OEDC member countries through multilateral or bilateral aid agencies and are usually in the form of concessionaire loans, grants or technical assistance provided through recipient governments. Other sources of funding come from private charities and non-governmental organizations (NGOs) [6, 9]. In this master thesis, the authors use a new life cycle approach to develop a structured model to assess and predict project success, taking into account both the framework previously developed for general projects and the specific characteristics and context of international development projects. To do this, we first review the project management literature on factors and criteria for success, and then describe the key characteristics that distinguish international development projects from others. The analysis of these characteristics leads to a dynamic model that identifies different success criteria and factors for different phases of the project life cycle, and then links the success criteria of each phase to the criteria of the next phase [16, 65, 72].

Given the specifics of IDP, we can refer to the experience of the World Bank in its leading role in identifying and preparing such projects. Project analysis is common in International Development Project Management (IDPM) practice and therefore requires specific tools and techniques: The project analysis function does not replace judgment. Rather, it is to provide another tool (hopefully very effective) that can improve judgment and reduce the likelihood of error [32, 34]. Although the concept of IDP has different

meanings, the following definition is instructive: A project is a planned set of actions and investments in a selected location that are designed to achieve production, capacity or transformation goals over time using certain methods [32]. This definition emphasizes IDPM procedures, tools, and techniques, not the IDPM process, and argues that project planning is a core activity because there is a need for a systematic way to “get the job done” This is embodied in the prescriptive approach, which is most concerned with "what needs to be done" rather than the descriptive approach "what is happening", which is a mechanistically oriented basic philosophy underlying all IDP models, cycles or sequences. In fact, the general origins of the latter can be traced back to the Baum cycle (1970, 1978) and beyond to the almost integral practice of logical procedures by professionals in fields such as engineering, architecture and economics [32, 39, 78]. As a result, the traditional IDP cycle, the natural sequence of how IDPs are planned and implemented, a paradigm based on engineering traditions, processes and content, has been established, with orderly progress from identification to preparation, evaluation. , negotiation, approval, implementation, and evaluation by the board, which has greatly contributed to the professionalization of the IDPM In IDPM practice, a universal approach for all is common, similar to the PMI approach: No two projects are the same; each has its own special history, and lending must be adapted to the circumstances. On the other hand, each project goes through a cycle that, with some variation, is common to all.As the emphasis was mainly on the donors' point of view, little attention was paid to the implementation of the IDP, which was the sole responsibility of the borrowers. Therefore, the role of the project manager was peripheral, and the role of the World Bank was to "monitor the project as it is implemented" Baum [39] outlined a specific six progressive-phase life cycle of IDPs as shown in figure 1.6.

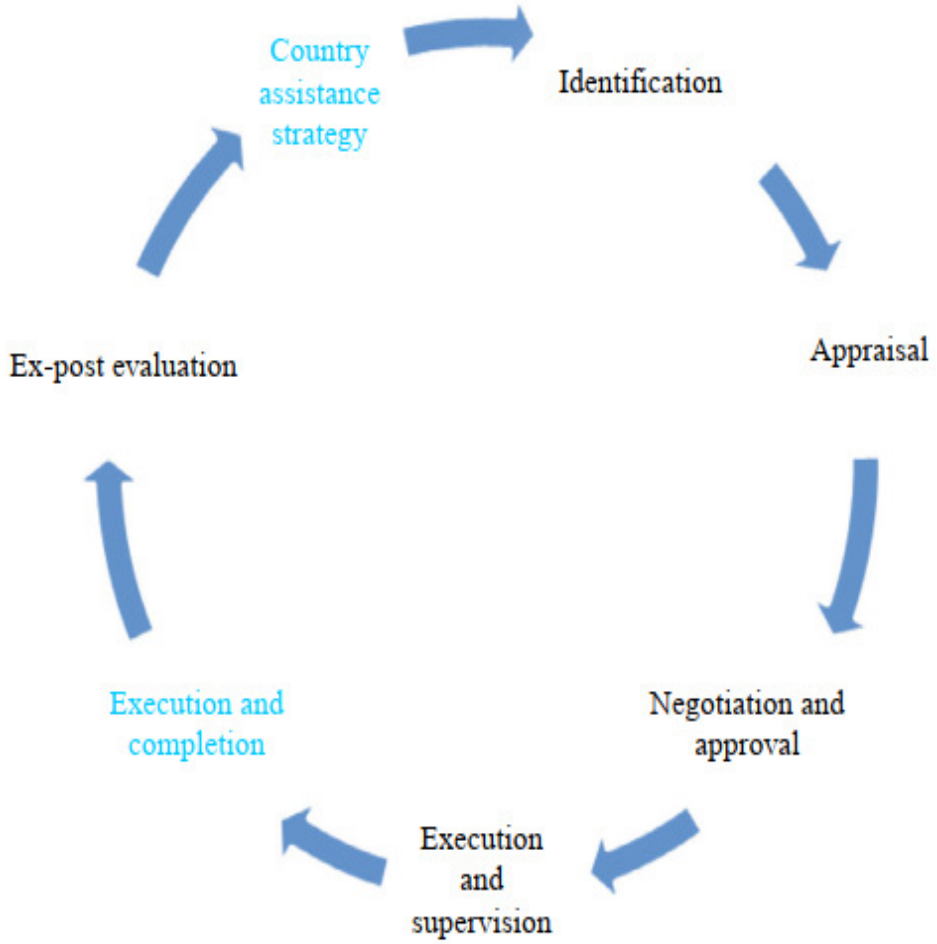

Figure 1.6 – The World Bank cycle **Note:** New phases added to Baum's (1978) cycle in colour [39]

Majority of development agencies such as European Commission (EC), Canadian International Development Agency (CIDA) and Australian Agency for International Development (AusAID) have differing project cycles usually consisting of five or six phases, which is very similar to Baum's but with differences in content and in the names of the phases [40]. For example, whilst planning, identification and assessment, preparing activity designs, appraisal and approval, activity implementation and completion and evaluation is the project cycle of the Australian Agency for International Development (AusAID), the United States Agency for International Development (USAID) has planning, achieving results and assessing and learning as its project cycle [39, 78,].

As a result, financial, economic, and technical feasibility tools were the most important and most used in project analysis. The term project will then mean an investment activity in which financial resources are expected to generate assets that bring benefits over a long period of time; and assess whether it has succeeded or is likely to succeed [32, 76]

Just like all other projects, IDPs go through a project life cycle – stages linking the start of a project to its end. This life cycle typically consists of a number of progressive phases that lead from identification of needs and objectives, through planning and implementation of activities to address those needs and objectives, to assessment of the outcomes [38, 65].

1.3 Projecting socio-economic progress based on the energy sector projects opportunities in Ghana

The developing economy ensures access to modern, a□ordable and reliable energy and transportation sources as the underpinning and a pre-requisite for poverty alleviation, proper education, good health care and economic growth prosperity [2, 6]. To do this, it is extremely important to understanding the various ways of achieving energy efficiency and sustainable growth, as well as their key benefits, in order to promote environmental improvement without compromising economic growth [2].

The contribution of infrastructure to economic growth is immeasurable and is well recognized both in academic and policy debates and circles. Development in power supply systems include services provide opportunities access to various economic and social resources and other essential services. Consequently, any disruption in the various components of the energy system (i.e. infrastructure, operations, and demand) has the potential of derailing the system's performance and enfeebling its contribution to the broader development of a society [7-9]. The energy industry sectors are critically important in Ghana's development efforts and mobility prospects. Energy sector development in Ghana is seen as a poverty reduction strategy which has a direct link to all the sectors of Ghana's economy. Also Ghana has been faced with serious electricity supply challenges in

recent times as a result of increasing population, urbanization and economic growth etc [1, 6-10]. This infrastructure branches lubricates other sectors such as tourism, mining, health, trade, education, agriculture [6]. Projected trends in climate variables and extremes are likely to introduce several risks and uncertainties over the future of the sector's contribution to the country's wider socio-economic agenda [2, 5]. Thus, the governments of most developing countries, including Ghana, face the challenge of meeting the growing demand for new and better infrastructure development projects [7-9].

Energy, in particular electricity, is one of the main factors in the economic prosperity of any country. It plays an important role in daily activities: from cooking, lighting, heating to powering machines in the industrial sector. Electricity is also needed to provide quality medical care, education, transportation, efficient communications, mineral exploration, etc .; serving as a building block on which every sector of the Ghan's economy prospers (see figure 1.7). This underscores how crucial and indispensable electricity is to human existence in the 21st century.

Energy has become one of the greatest challenges facing humanity in the twenty-first century Every developed economy provides access to modern energy sources, which is the basis of its economic prosperity. Although energy was not included in the United Nations Millennium Development Goals (MDGs), it played an important role in reducing poverty and achieving the MDGs. Former United Nations (UN) Secretary-General Pan Ki-moon said: "Development is impossible without energy, and sustainable development is impossible without sustainable energy". The importance of energy in this modern world. the era forced the UN to include energy in its Sustainable Development Goals (SDGs). In particular, the SDGs' seventh goal is to ensure universal access to affordable, reliable, sustainable and modern energy by 2030 [10, 14]

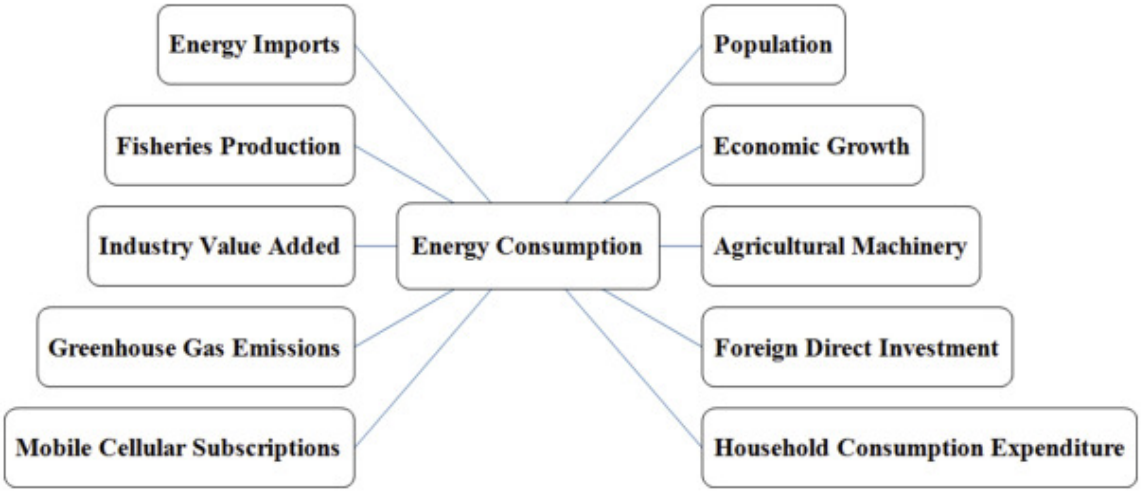

Figure 1.7 – An assessment energy consumption of Ghana's energy sector dynamics [14]

For some people, access to electricity should be a fundamental right. [79] The generally accepted fact that access to energy is indispensable for economic development is of little or no doubt. In fact, each dollar's investment in energy potentially leads to 15 times greater economic growth [81]. Energy consumption increases productivity, economic growth and global networks [64, 71, 81]. Despite this, almost 1.3 billion people around the world do not have access to electricity. [41, 81] Increasing energy demand, security of energy supply and mitigation of climate change are the most serious environmental challenges for sustainable development worldwide [85]. How to meet energy needs without harming both the economy and the environment remains a pressing issue for every country [2].

Ghana, a country on the west coast of Africa, is facing these problems of electricity shortages, which otherwise hamper its brilliant level of access to electricity. As the electricity grid covered more than 70% of the country in 2013, Ghana's level of access exceeds that of its West African neighbors as shown on figure 1.8.

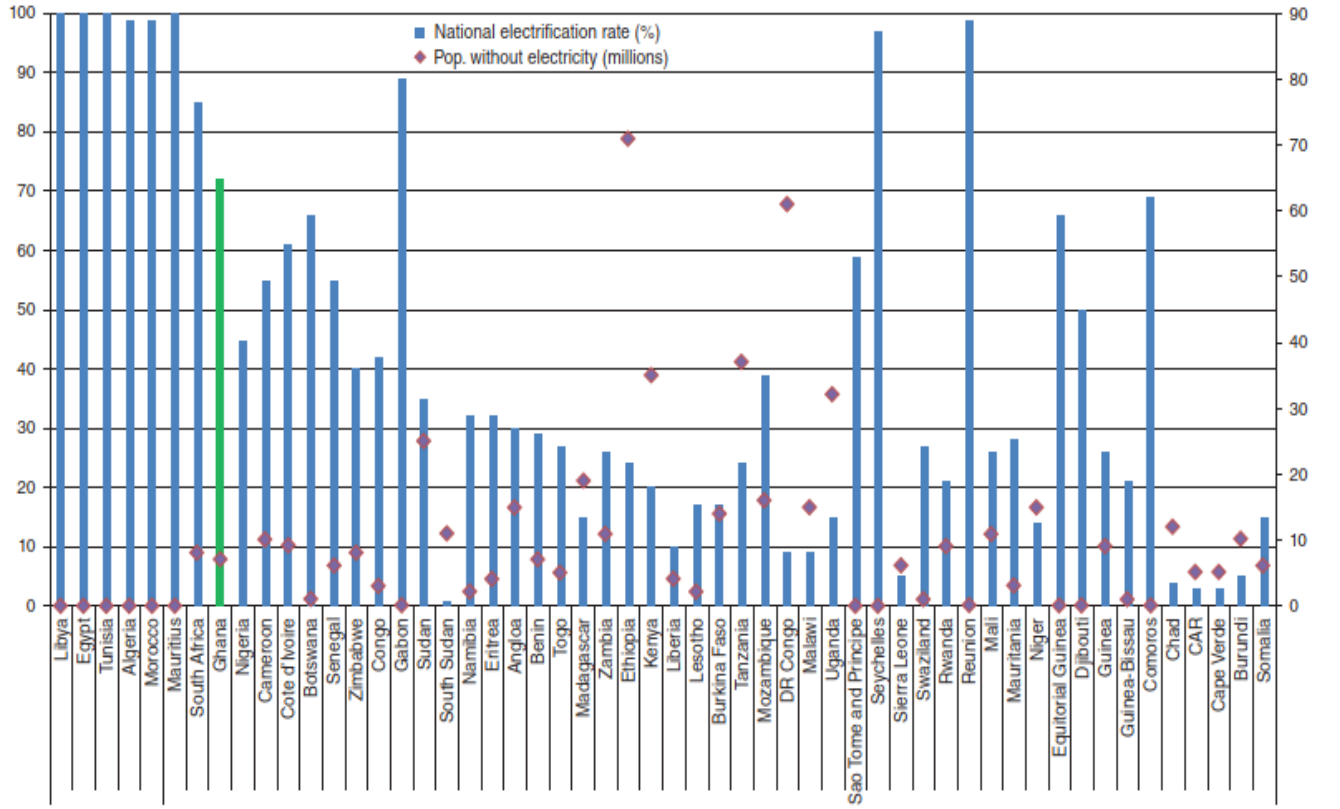

Figure 1.8 – Electrification rates and populations without electricity in Africa. Source: [41].

High levels of access to electricity are the result of a roadmap that began in 1989 with the establishment of the National Electrification Scheme (NES). As part of the NES, the government has developed a plan to expand access to electricity to cover the entire country by 2020. The ambitious goal of the NES was to provide access to electricity for 30 years in all settlements where the adult population lives. more than 500. Impressive impacts of the NES were evident in the electrification of 2,350 communities within 10 years of launch, approximately 56% of the initial 4,200 target communities [56, 61]. The scheme, which at first seemed overly ambitious, was a significant driver of access to electricity through discrete programs such as the Self-Help Electrification Scheme (SHEP). Non-electrified households mobilized resources to provide low-voltage power supplies and meters after at least 30% of households in the community connected their households ready to receive electricity, as shown in figure 1.9. Others asked for help from their respective local authorities, usually in the form of low-voltage pylons and other electrification logistics. Thanks to the contribution of communities to the expansion of

electricity to participating communities, this has happened earlier than if only governments had provided 100% funding [26, 41, 56].

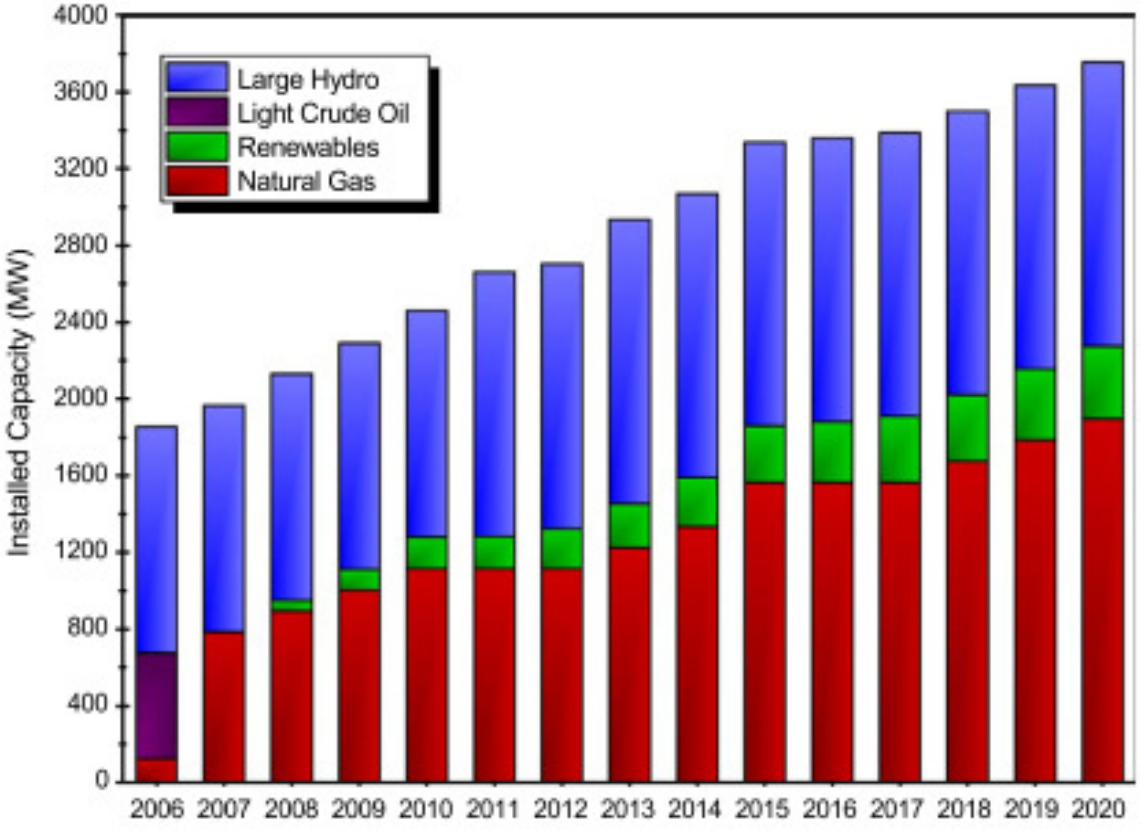

Figure 1.9 – SHEP: Electricity capacity development with 10% renewable energy by 2020 [26]

Low generation capacity, details of which are given in the following sections of this article. Unreliable electricity supply is estimated to have cost the country between $ 320 and $ 924 million annually, or 2-6% of gross domestic product (GDP) .11 Ref 20 also states that Ghana lost 1.8% of GDP during the 2007 electricity crisis. Again in 2014, the energy crisis is said to have cost Ghana $ 680 million, or 2% of GDP, with many companies losing sales of 37% to 48 %.21 It is estimated that companies spend $ 62 million a month. , or about $ 744 million per year, for additional electricity generation, about 6% of Ghana's total economic output during severe power outages.18 A Ref 22 study found that about 50% of Ghana's micro and small industries often spend several hours a month did not work due to lack of reliable electricity supply, and the rest relied on

expensive alternative energy from diesel generators, which increased their cost. [41, 80]. Ghana has recently faced serious problems with electricity supply. In 2014/2015, a supply shortage of 25% of peak capacity was reported [3, 81]. Existing power plants have not been able to reach full generating capacity due to limited fuel supply. Perennial rivers, along with inadequate and unreliable rainfall due to climate variability, especially in northern Ghana, have significantly reduced hydropower inflows. Heat power now dominates Ghana's energy production portfolio (figure 1.10). Approximately 51% of the country's electricity is generated from imported fossil fuels [10, 26, 67, 70,75].

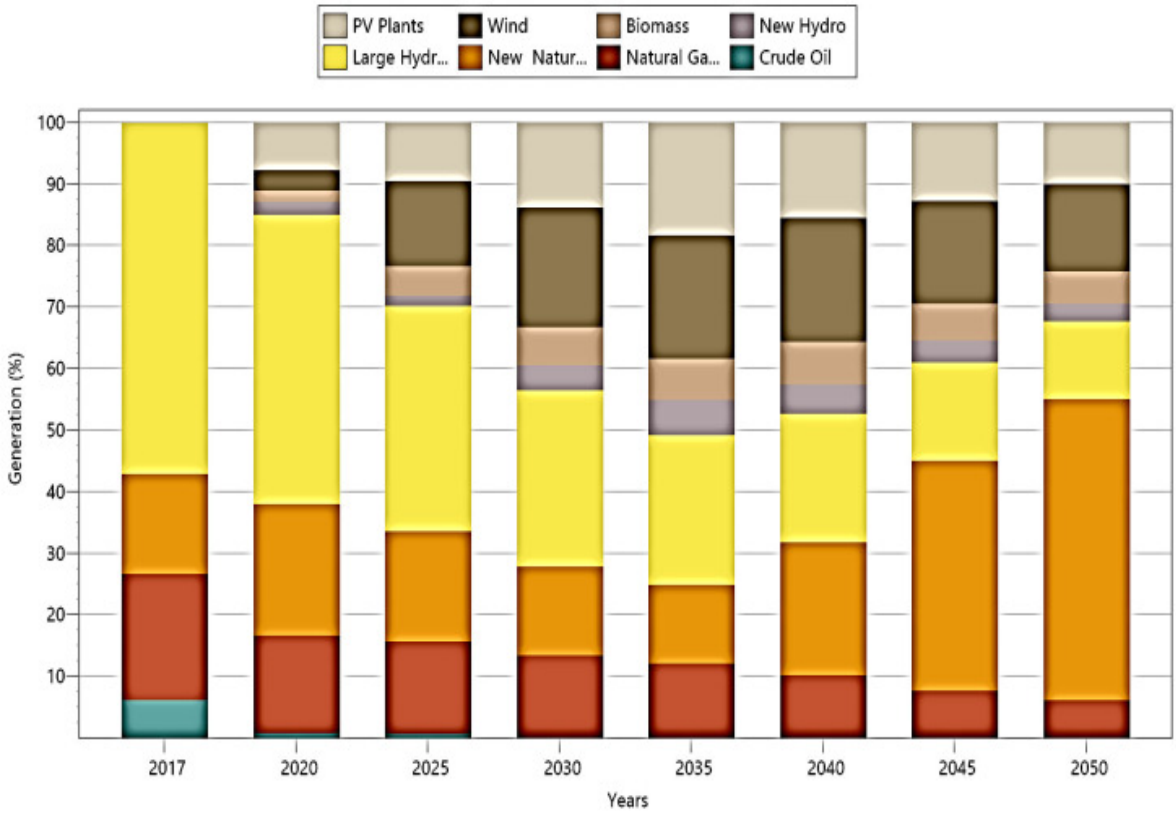

Figure 1.10 – Energy generation by plant type [10]

The country's energy system is likely to be burdened by growing demand for energy fueled by population growth, rapid urbanization and economic development. Therefore, the security of future energy supply is under threat, especially in light of the government's commitment to achieve 100% access to electricity by 2020 [7, 10]. Given the positive correlation between access to energy and human development, access to modern energy

services is crucial for sustainable socio-economic development. Ghana therefore needs to integrate a wide range of unconventional energy technologies into its production portfolio in order to improve energy security and isolation from external shocks such as fossil fuel bursts. Sustainable energy systems provide this opportunity [63, 64, 70].

In 2011, Ghana adopted the Renewable Energy Act, Act 832, to ensure the development, management, use and adequate supply of renewable energy for heat and electricity generation and related issues [11, 12, 51]. Its goal (figure 1.11) is to increase the share of sustainable electricity in the national production structure to 10% by 2020 [7].

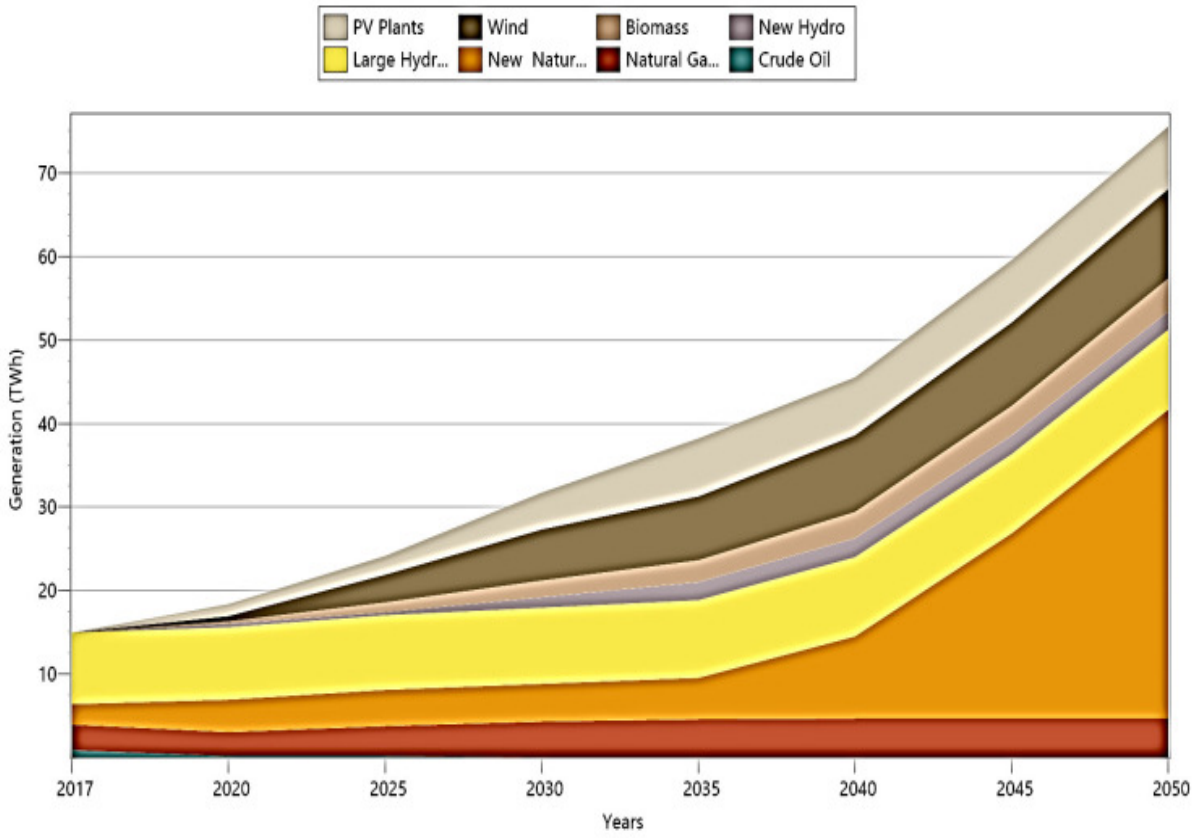

Figure 1.10 – Renewable energy development [10]

Ghana is one of the leading countries on the African continent with a significant regulatory and fiscal policy on renewable energy. However, the right policy mix, which can address unique internal issues to help achieve its specific development goals, remains insufficient. For example, despite significant renewable energy policies supporting

development in the electricity subsector, the deployment of non-traditional renewable energy has slowed, especially for grid-connected electricity, where the share is less than 1% [14]. Ghana's energy sector faces two main challenges: the inability to provide adequate electricity generation capacity to ensure a secure electricity supply [41] and the increased use of wood fuel as the main fuel for cooking for almost 80% of households without access to modern fuels for cooking [22]. The country's electricity generation infrastructure, which in the past relied mainly on cheaper hydropower, is increasingly shifting towards more expensive heat production. Low water inflows to the dams and rising crude oil prices have led to intermittent power supplies as the government tries to purchase fuel for thermal power plants. Meanwhile, despite the recent decline, the general trend in crude oil prices over the past few decades indicates a further rise in prices, especially as fossil fuel reserves are gradually depleted with fewer new discoveries [53]. This has led to the extraction of crude oil and natural gas from "unconventional" reserves, such as bitumen and shale formations, which were previously untouched for environmental reasons [7, 10, 61]. Other factors, such as supply and distribution disruptions, problems with access to and procurement of unconventional fuels, and occasional political instability in key supply regions, have led to general uncertainty about the global reliability of fossil fuels in the coming decades [30, 40, 46].

Conclusion to 1-st chapter

1. Like all other projects, development projects go through the project life cycle - the stages that link the start of a project to its completion. This life cycle usually consists of a series of progressive phases, leading from the identification of needs and goals, through the planning and implementation of measures to address these needs and goals to the evaluation of results.

2. Public sector development projects or programs specifically designed for the economic and social needs of developing countries are usually donor-funded, known as international development (ID) projects. These projects are implemented either by the recipient governments under a bilateral agreement with the donor country, or through the

donor's "implementing partner" - often a non-governmental organization or a professional contractor.

3. International development projects are different from industrial or commercial projects. The goals of ID projects, by definition, are to eradicate poverty and improve living standards, protect the environment and fundamental human rights, help victims of natural or man-made disasters, build capacity and develop basic physical and social infrastructure. Although there are some hard elements in ID projects, these projects often address soft issues such as social or human development.

4. “Soft goals” of ID projects are usually much less visible and measurable compared to industrial or commercial projects. The lack of tangibility of the goals and results of the project ID creates a special problem in the management and evaluation of projects that require adaptation of existing knowledge of project management.

5. One of the important characteristics of most ID projects is the complex network of many stakeholders. Most ID projects are not profitable and do not have a business focus. The operating environment and culture of the host country also distinguish ID projects from traditional business projects.

2. INTERNATIONAL DEVELOPMENT PROJECT MANAGEMENT TOOLS AND TECHNIQUES

2.3. Characteristics of international development (ID) projects management

International Development (ID) projects have significant roles to play in developing countries. Projects remain the instruments of choice for policy makers and vehicles for international development assistance, in particular still relevant in countries where institutional capacity is minimal [33, 37].

It is common for development for developing countries to be carried out or financed by international organizations through projects designed for international development, known as ID projects. ID projects are also known as assistance projects and are a subfield of project management, as are other areas such as information technology, education, construction and engineering, telecommunications, manufacturing and services, such as legal, insurance and finance [16]. The success of the ID project, which is its long-term impact on the prosperity and development of the local population, depends on how well prepared it is and the policy underlying its development [8, 2 4].

In Ghana and in many other African countries governments' budgetary constraints and insufficient tax collections are impacting on the governments' ability to fund large projects beyond the stimulus packages, which have placed further strain on national finances. Basic infrastructure and affordable services are indispensable in Africa so as to provide the populations with effective access to social services and in order to unlock the continent's investment potential [9-11]. From 1964 to 2003, World Bank infrastructure projects generated a higher social rate of return in transport than in any other sector [6]. For instance, nearly 100 percent of the operations of the International Finance Corporation (part of the World Bank) consist of projects [6, 37]. In terms of poverty reduction, this impact distinguishes ID projects from other projects. Thus, ID projects are not driven by market pressure, and their "end product" results are often intangible and often difficult to measure. However, according to [8], project management ID differs from conventional

project management, in which a triangle of cost and time factors is considered crucial [8, 18]. The project management literature is rich in scientific articles published for projects in the construction and manufacturing sectors, but the international development is less represented in the project management literature [1, 8-10]. Current publications show that most ID projects face excess time and costs, and they require special management methods, taking into account the interests of stakeholders, about 75% of the completion of all projects was delayed, but the final costs were lower than planned [37].

However, paradoxically, the poor performance of projects and the frustration of project stakeholders and beneficiaries seem to have become the rule rather than the exception in today's reality. The failure rate of projects in the World Bank and the International Finance Corporation was over 39%. Too often, World Bank projects fail to achieve their goals due to a number of problems: imperfect project design, poor stakeholder management, delays between project identification and launch, and delays in implementation project, overspending, failure of coordination, cannot provide much-needed impact for beneficiaries [6, 33-35]. Project leaders or coordinators of international development projects deal with complexity, resistance to change, competing programs of a large number of stakeholders and diverse and even conflicting expectations, which make it very difficult to reach compromises [24, 33, 37,]. Too often, projects succeed in one place and then partially or completely fail elsewhere, emphasizing the strength of context in the success of an ID project. From this point of view [24] outlined the unique characteristics of ID-projects and identified the impact of interpersonal relationships, trust and communication on the success of the project. International development projects typically involve three separate key stakeholders, namely the funding agency, which pays for but does not directly use the project results, the executive unit, and the target beneficiaries, who actually benefit from the project results but often do not pay for the projects. Another characteristic of most international development projects is the complex web of the many stakeholders involved [9, 38].

As discussed in the review of the scientific literature of the first section of this thesis development projects form a special type of projects that provide socio-economic

assistance to the developing countries, or to some specially designated group of target beneficiaries. These projects differ from industrial or commercial projects in several important ways, the understanding of which has strong impacts on how the projects can be managed and evaluated [37].

Projects remain the main means of implementation for international development stakeholders. However, paradoxically, the poor performance of projects and the frustration of stakeholders and project beneficiaries seem to have become the rule rather than the exception in today's reality. Dissatisfaction with the results of the project and its implementation dates back to the 1950s (see, for example, the speech of John F. Kennedy before Congress in 1961). The World Bank's project failure rate was over 50% in Africa before 2000 (see Meltzer Commission 2000) [38].

World Bank projects very often fail to achieve their goals due to a number of problems that can be called "managerial" and "organizational" [45]: imperfect project design, poor stakeholder management, delays in project identification. and start-up, project delays, overspending, incoordination, etc. [9, 80, 84].

However, most international development research to date has been very narrow, looking at projects and project management in general, despite the large size of the industry , project proliferation and questionable project results.). In addition, the project management literature has little focus on international development projects or, most importantly, World Bank projects [21, 34]. Thus, the success of an international development project, success criteria and critical success factors have not been sufficiently studied by scientists [24, 35, 80].

It is worth noting, according to the findings of the literature review in Chapter 1, that one of the important characteristics of most ID projects is the complex network of many stakeholders. General projects usually have two key stakeholders: the client who pays for the project and, as a result, benefits from its results, and the contractor or executive who is paid to manage the project to achieve the desired results. Instead, ID projects typically involve three separate key stakeholders, namely the paying agency that pays but does not use the project results, the executive contractor, and the target beneficiaries who benefit

from the project results but usually do not pay for the project. Most ID projects are not profitable and do not have a business focus. The operating environment and culture of the host country also distinguish ID projects from traditional business projects and make traditional project management tools less relevant [8, 9].

The problems faced by international development projects convince us of the need to clarify the existing system of evaluating the effectiveness of project implementation. A more objective and consistent way of assessing the success of projects can be achieved, in our opinion, given the duration of the project cycle, and then assess the success of each phase based on the results produced by the activity phase. These partial successes can then be integrated into an assessment of the overall success of the whole project.

The life cycle of most projects is divided into successive phases, which differ in the technical work performed, the key actors involved, the results to be achieved, and the ways in which they can be controlled and managed [1]. Although the number and names of life cycle phases and precise milestones can vary greatly from one project to another, international development projects go through a typical life cycle that includes four relatively different stages. Table 2.1 summarizes the most common volumes of work to be performed, the final products outputs to be delivered, and the parties involved in these four phases of the life cycle. [38] As we can see, ID projects are different from industrial or commercial projects. The goals of ID projects are by definition to eradicate poverty and improve living standards, protect the environment and fundamental human rights, help victims of natural or man-made disasters, build capacity and develop basic physical and social infrastructure, including in our energy sector. [23, 24,29].

Based on the above, it can be stated that the management processes of the ID-project are complex, because it involves many parties. This usually includes the lender or donor, the financial institutions of the project beneficiary country, the client, stakeholders, the project management or coordination unit, and the many contractors who physically implement most of the project's components and components. these parties, who are from different cultures and have different goals within the project. The customer or official

representatives of all beneficiaries participate in the project evaluation phase and must closely monitor the project implementation process.

Table 2.1 – The work need to be performed by Life –Cycle Phases

Life-Cycle Phases	Key Activities	Key Players	End Products
Conceptualizing	• Identify the potential target beneficiaries and assess their development needs. • Align the development priorities of donors, the capacities of potential implementing agencies, and the development needs. • Develop and evaluate project alternatives. • Generate interest and support of key stakeholders.	• Funding agencies (or their representative) • Consultants • Implementing agencies • Representatives of target beneficiaries and local governments	• Needs assessment report • Project proposal or concept paper

Planning	• Develop the project scope and LOGFRAME.
	• Estimate resources required.
	• Mobilize support and commitment.
	• Plan for project schedule and organization setup.
	• Negotiate for final approval.
		• Funding agency (representative)
		• Government (representative)
		• Consultants
		• Implementing agencies
			• Project documents including
			  • Project scope and LOGFRAME
			  • Budget
			  • Organizational setup
			  • Schedule
			  • Risk management plan
			• Project agreement with resource and support commitment

Implementing	• Set up project management team. • Review and revise project plan and kick off the project. • Carry out the project activities as planned. • Control the project budget and expenses. • Monitor, evaluate, and report project progress and performance. • Manage relationships with stakeholders.	• Project management team • Subcontractors, suppliers, partners • Target beneficiaries	• Resources mobilized • Activities carried out • Outputs produced and delivered • Inception report and M&E reports
Closing/ completing	• Final test the project outputs. • Complete the project final report. • Settle all financial transactions with subcontractors, suppliers, consultants, etc. • Hand over the project output and asset. • Bring into public notice the project results and lessons. • Dissolve or transform the project team.	• Project management team • Funding agency (representative) • Government (representative) • Implementing agencies	• Project completion report • Final settlement of all pending financial dues • Project outputs and assets transferred • Dissolution or transformation of the project team into an ongoing operation

The customer or official representatives of all beneficiaries participate in the project evaluation phase and must closely monitor the project implementation process. Taking into account several stakeholders and the processes of initiation, planning, implementation, monitoring of projects and final evaluation of implementation success, presented a network model of the project ID in figure 2.1. Solid arrows represent normal communication between the parties involved, and dotted arrows represent probable communication between the parties. The donor is often involved exclusively in the project identification and development process, which makes local stakeholders feel abandoned [84]. Confirmation of donor funding is vital for ID projects, and once the funding is approved, the project implementation team starts working with the project manager [39, 45, 54].

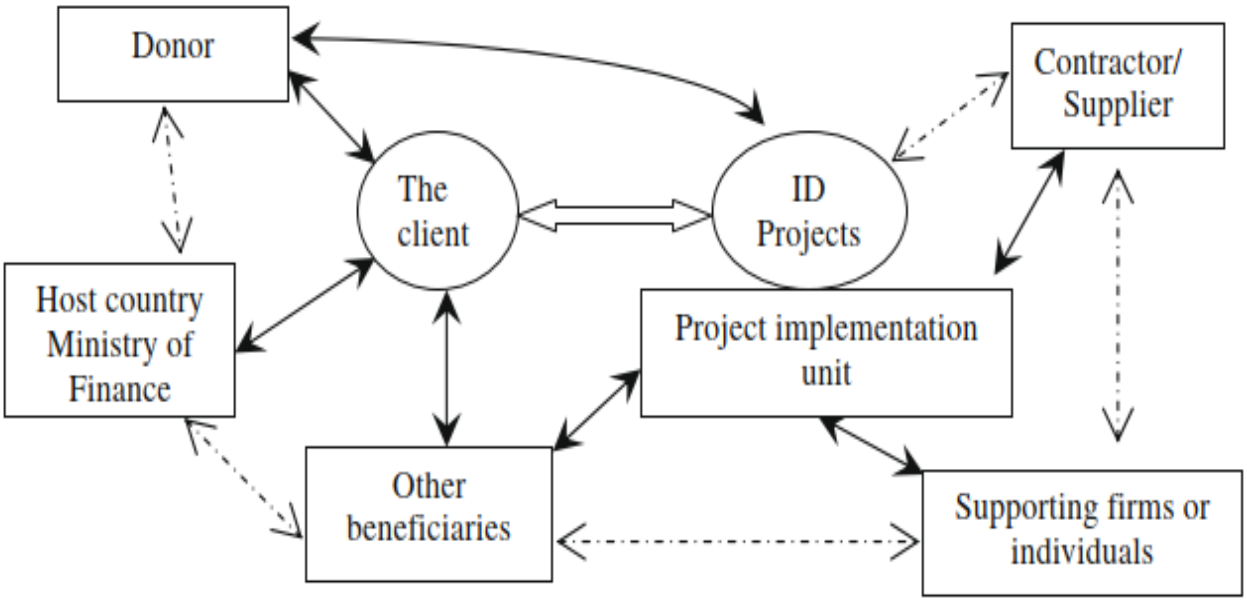

Figure 2.1 – ID project network model, adapted for: [8, 9]

Like other projects, ID projects have a project life cycle. The ID project cycle is the best means of delivering foreign aid to developing countries or countries with emerging economies [37]. R. Youker [84] identified two general project life cycles for ID projects; one from the point of view of the host country and the other from the point of view of donors. The key difference in life cycles is the "funding" phase in terms of host countries. The host country should attract project funding from donor agencies. According to the general life cycle models of the R. Youker approach, both parties (donor and host country) have a project identification phase to be carried out together. The host country is upset that the choice of donor, rather than the priority of the host country, often dominates the project definition [12, 47]. K. Ahsan & I. Gunawan [8] emphasizes the: "integrated project cycle and suggests 10 steps that a well-planned project should go through. These are (1) identification and definition; (2) formulation, preparation and design; (3) evaluation; (4) selection, approval and approval; (5) activation and organization; (6) implementation and operation; (7) supervision, coordination and control; (8) termination and termination; (9)

dissemination of results and transition to normal administration; and (10) post-evaluation and follow-up".

In practice, donor organizations follow their style of project phases to explain the project life cycle of the ID. However, it is clear that most organizations have five common life cycle stages, which include project identification, preparation, evaluation and approval, implementation and evaluation. Aware of the existing phases of the project life cycle, this study proposes a project life cycle (figure 2.2) that will suit both the donor country and the host country [8].

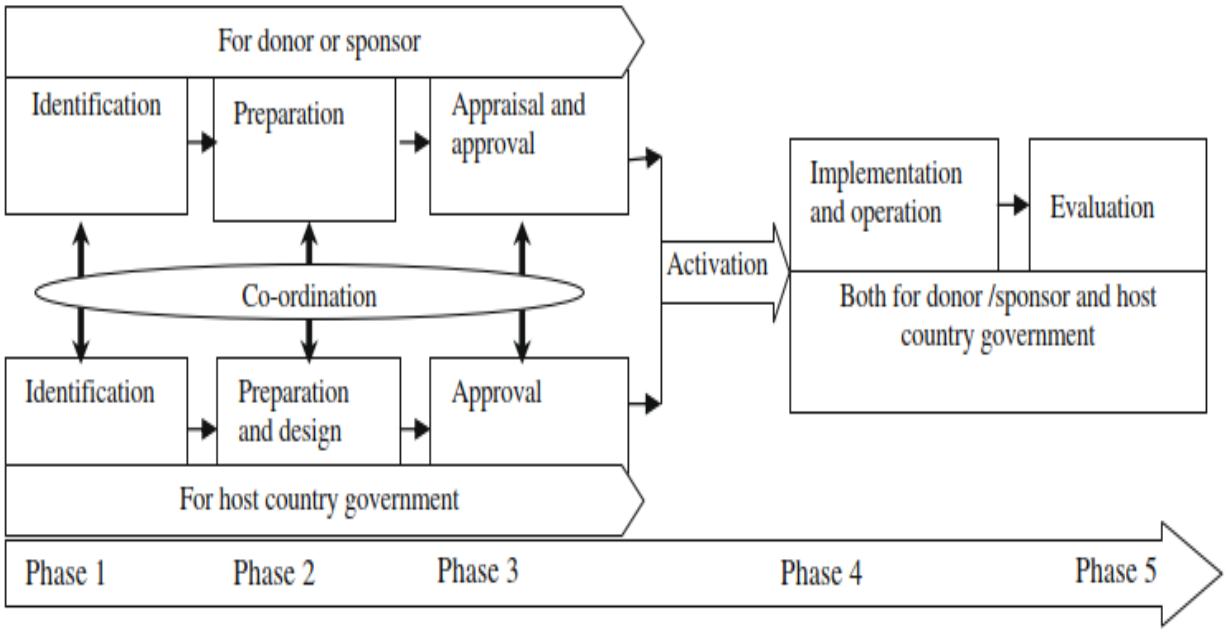

Figure – 2.2 Proposed ID project life cycle [8]

For the donor country and the host country, the first three stages are very similar in name; however, the purpose and activities of the stages largely depend on the parties. During these three phases, it is often necessary to coordinate between the donor and the host. Donors have their own country-specific strategy, and the goals of the host country project must be consistent with the donor's strategy. With the help of donors, the sectoral ministry of the host country, the planning department or the Ministry of Finance, the project profile and initial design are prepared. At the approval stage, the host country usually seeks donor approval, and donors evaluate the project plan and provide feedback

on possible funding or support. These three phases are mainly the planning stage of the ID project and occupy about half of the total project duration [17]. Many projects are being completed at this stage. After approval, the project work begins with the activation stage. At this stage, a project manager is usually appointed and work begins through the project implementation unit.

The last phase of the cycle is evaluation, which is an endless process; however, there are standard post-project evaluations that are usually conducted by donors. To successfully complete a project, it is important to focus on all stages from identification to evaluation. A promising basis for assessing the success of the project is presented in figure 2.3.

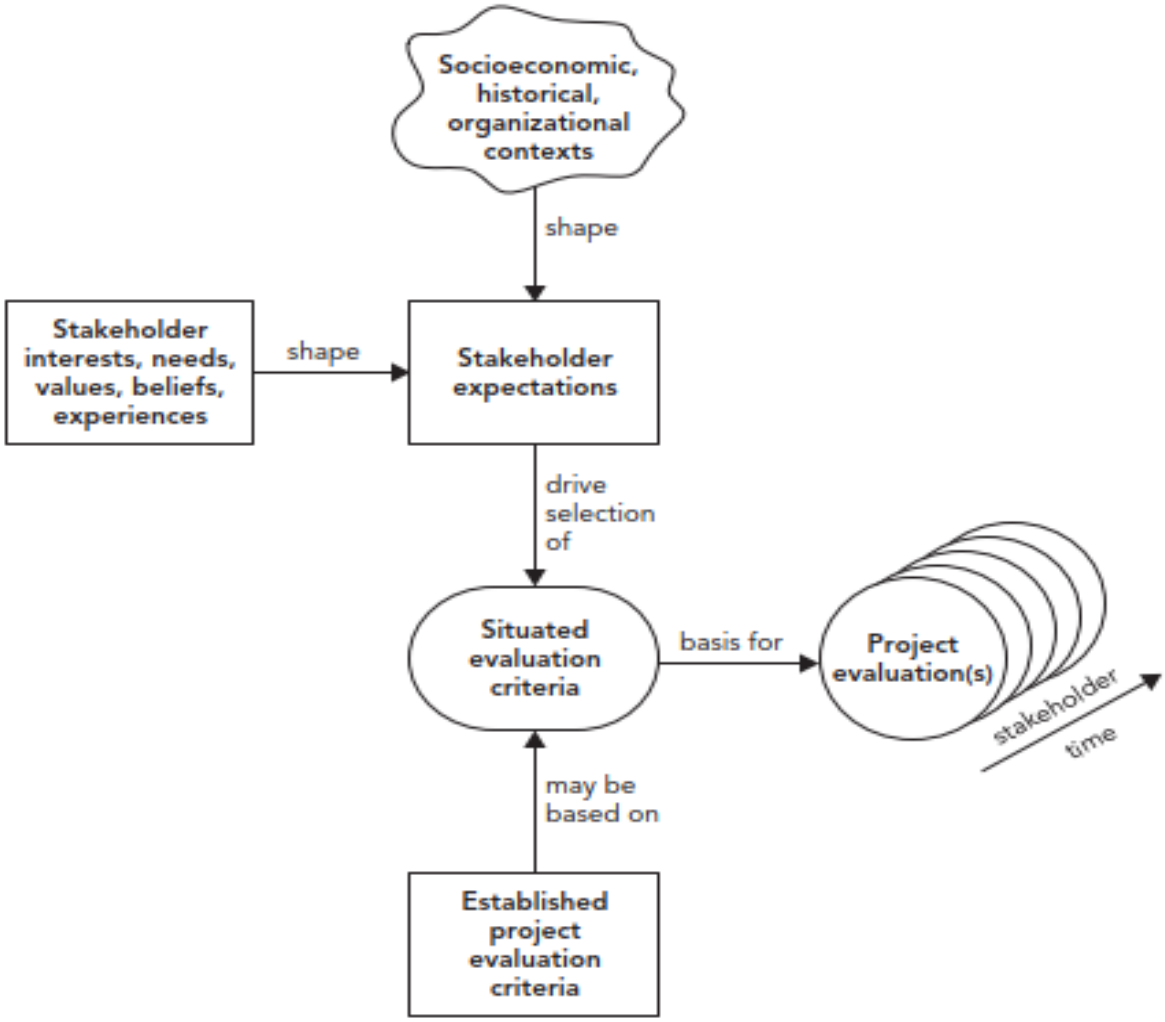

Figure 2.3 – A perspective-based framework for evaluating project success [53]

The success of the ID project, and its long-term impact on the prosperity and development of the local population, depends on how well prepared it is and the policy underlying its development. [24, 53].

Project management tools and methods alone will not ensure successful projects if they conflict with cultural and operational values. In developing countries, projects are completed much faster due to the general lack of routine maintenance. Kwak [18] identifies some risk factors of the project ID and emphasizes the risk management strategies during the project initiation and planning phase for the success of the project. Ucker [3] identifies the lessons learned from the ID project learned during the management and implementation of projects sponsored by the World Bank Group. Youker [17] further suggests that ID projects go through a typical life cycle with relatively different stages of conceptualization, planning, implementation and closure. Kwak [18] identifies several critical success factors for ID projects, covering political, legal, cultural, technical, managerial, economic, environmental, social and corruption issues. Recently, identified sets of ID project success criteria and factors in the project life cycle phases. Existing studies [72, 80, 84,] indicate a lack of empirical research to determine the current practice and effectiveness of ID projects.

2.2 International development project performance analysis, causes of time overrun and cost underrun

Project execution over time, cost and volume, and maintaining quality throughout are very common dimensions of success factors mentioned by project management professional bodies and the research community. Thus, the need to understand the reasons for delays and overspending in international development projects has become more important. Significant overspending is realized not only as a result of changes to the order and processing, but also due to security incidents that may occur as a result of these events. For example, in papers [47-49] showed that when a rework event occurred during projects

implementation, the susceptibility to safety incidents increased significantly, as did the cost of the project. As a rule, the percentage of overrun of planned costs and reduction of costs exceeds the excess of costs and unplanned projects. As for the schedule, on average 84% of projects are late, and over fulfillment of the schedule is almost two years. Late projects take about 39% more time than planned for the average duration [37].

Combining the time and cost of all ID projects, you can see that most projects (73%) are delayed (schedule overruns) and save project cost (cost under estimation). In contrast, only a few projects (13%) are implemented both on schedule (non-compliance with the schedule) and due to savings on budget expenditures (cost reduction) [8]. In Ghana, the duration of development projects from start to finish has recently become a major concern, especially among clients and beneficiaries, due to rising interest rates, inflation, development plan goals, among other factors. Thus, the need to understand the reasons for delays and overrun in the development projects management has become more important than ever [27-29]. The scientific publication on the mentioned topics study facilitates a debate on the factors that cause project overruns and costs in the construction sector, especially from a developing country perspective [26]. In essence, Love et al [47-49]. conclude from their research that overspending is not really a case of "projects that do not go according to plan (budget)" but "plans that do not go according to the project". So let's summarize delays in project completion have become a major challenge worldwide and lead to increased costs invested in the project, which is divided into phrases of long-term, employee productivity, downtime, loss of income and complete abandonment of the project. The duration of project completion has a detrimental effect on customers, contractors, and prospective beneficiaries [48].

However, good planning and implementation with key stakeholders and consultation involvement is needed to prevent project delays and failures. Project planning as defined by PMI [1] refers to the formulation of a project guide that will provide direction on the project implementation and project control towards achieving the success of the project. According to PMI [1], it is seen as a process that is oriented towards bringing desired output, to be recognized as successful [28-29].

Project completion time, cost and volume, and quality maintenance throughout implementation are very common dimensions of success factors mentioned by professional project management organizations and the research community. It is gratifying that the research focus on project evaluation is growing [9], and research interest in productivity / value management has grown by more than 100% in the 2000s [21]. Time and cost-effectiveness studies have been conducted for several developing countries and for different types of projects. The literature identifies development projects as well-known for exceeding costs and budget schedules [22, 23].

Researchers are trying to build an empirical relationship between time and cost productivity and predict project duration as a function of cost. It was investigated that the escalation of costs strongly depends on the duration of the implementation phase. For example, [68, 69] identified an excess of the average cost for Norwegian road construction projects of 7.88% and an overrun that predominates among smaller projects (worth less than NOK 15 million) compared to larger ones. For Ghana, we investigated the reasons for overspending and spending on groundwater construction projects, financial processes and difficulties on the part of contractors and customers, changing contracts, economic problems, purchasing materials, changes in drawings, staffing problems, unavailability of equipment, poor supervision, construction errors, poor on-site coordination, changes in specifications, labor disputes and strikes [8].

Recently, ID projects have become increasingly important among project professionals due to their nature and contribution to developing countries. The Project Management Institute (www.PMI.org) determines that most ID projects are time and costly and require radical and costly reengineering. Evaluating the effectiveness of ID projects is just as important as for other projects. However, the effectiveness of the ID project is insufficiently studied in the project management literature. The evaluation criteria are somewhat different from other projects. Diallo A, Thuillier D. [24] for the first time outlined a comprehensive set of evaluation criteria, which includes: "satisfaction of beneficiaries, compliance of goods and services, achievement of project objectives,

completion of the project on time and within budget, obtaining a high national rating. profile and good reputation among major donors".

Although the study is based on African countries, the results may be useful in identifying projects from other continents. For example, 63% of the 1,778 projects of various types financed by the World Bank between 1974 and 1988 were significantly overspent [34-36]. The literature on project effectiveness focuses on the time and cost of specific local or international development projects. As far as we know, there is no study that evaluates ID projects for several countries in terms of time and cost-effectiveness. The purpose of this study is to examine unexplored issues regarding the timing and effectiveness of a project ID by examining the size of the project in terms of budget and duration, project performance in terms of time and cost, and the main reasons for poor performance.

Table 2.2 provides the different measures that were used in contemporary project management methodology. First, it can be seen that the degree of application of different tools varies greatly. Some tools are widely used (eg logical structure and progress report), while others are almost neglected (eg cost management system, problem log). Project managers grouped in the first cluster seem to use only a very limited set of key tools (eg, logical structure and progress report). In cluster 2, the use of these basic tools is growing significantly, as are other well-known tools (such as Gantt charts, cost accounting, analysis and risk management). However, more structured and complex tools still go unnoticed. In contrast, project managers in the third cluster begin to manage their projects using a wider range of tools, including all resource management tools (volume management, organizational structure, allocation structure, responsibility allocation matrix, stakeholder matrix), although they are all still missing some important time/cost control and planning tools. Project managers grouped in the fourth cluster use the widest range of tools.

Excess costs are often referred to as "budget increases", "cost increases" or "cost increases". However, excess expenditures should be distinguished from "expenditure escalation", which is used to express the expected increase in budget expenditures due to

factors such as inflation, for example, defined cost overruns as the difference between projected and actual construction costs.

Table 2.2 – Project performance measures

Type of performance	Performance measures
Internal (project) performance	Comply with the budget Comply with the expected time Comply with the quality (deliver exactly the output expected)
External (project) performance	Obtain long-term project impact (outcome/goal) Stakeholder/partner involvement Ownership extension of the project to the local community Monitoring and reporting to the stake holders Economic sustainability after the end of the project Satisfaction of the local community

In this case, the budget during the "construction decision" is used as a guide to determine the overspending that may occur. Actual construction costs are defined as the accounting costs of construction at the time of completion. An alternative definition and benchmark for cost overruns suggested that this was the difference between the initial contract value (ie the contract) and the actual construction cost. moment of practical completion. The dichotomy between the presented definitions contributed to significant variability in the percentage of excess costs reported in the normative literature [47].

Although a significant amount of research has been done to quantify overspending, limited attention has been paid to overspending on a schedule and to the likelihood of overspending. Several terms are used to describe schedule overruns, such as "delays", "schedule growth" or "overtime". Overspeeding occurs when the initial contract period

specified in the award of the contract extends beyond what was agreed prior to the commencement of on-site work [49].

Reasons for overspending and scheduling in project management are well documented. . Changes in volume are a feature of construction and engineering projects and are usually taken into account when concluding a contract by using unforeseen construction conditions. This does not take into account design and construction errors and omissions that lead to the need for alterations. Recycling is generally defined as "unnecessary effort to re-perform a process or activity that was incorrectly implemented for the first time" [47]. Processing is mainly due to design errors, changes and omissions that occur during construction after a long incubation period [18, 21, 47].

According to Love et al. , the main factor in revision is strategic decisions made by senior management or key decision makers that encourage the conditions for the adoption of inappropriate structures, processes, practices and technologies for projects. Figure 2.4 shows the key factors that contribute to the recycling, which include compression of the design schedule, inefficient use of audits, reviews and verifications of the project, as well as incomplete drawings and invoices Given the extent to which variables of this nature may arise in projects, transport infrastructure projects are determined by the probability of completion in combination with the overspending costs and schedule that arise when concluding a contract. The following sections of this article discuss relevant studies that have quantified costs and schedule overruns [48].

According to Bhargrava et al. [18] Projects with a longer planned duration have higher cost overruns and exceeding the schedule. Conversely, overspending is less for those projects with a longer planned duration. It was found that a similar situation arises when checking overspending. For example, studies have shown that higher overspending has taken place in smaller projects. Thus, larger projects can be better managed, and longer completion times can provide adjustments to improve planning and scheduling. This minimizes delays that can be caused by factors such as adverse weather and change orders [47].

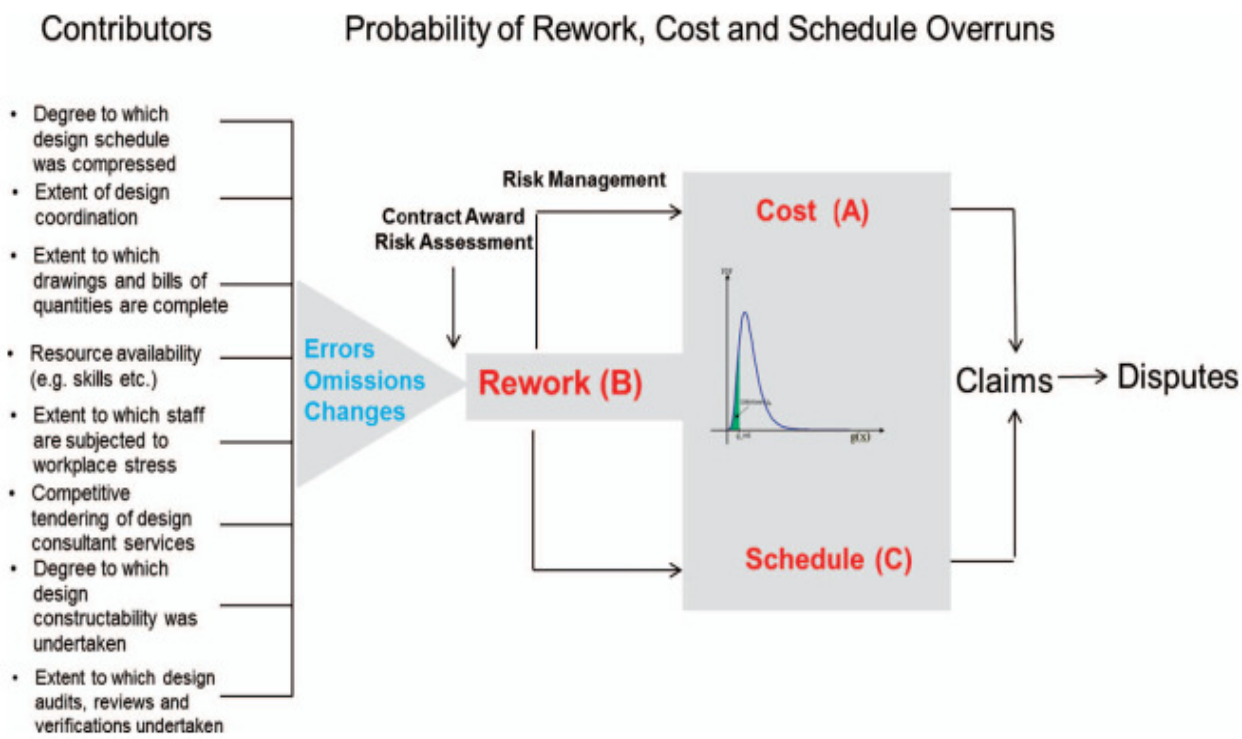

Figure 2.4 – Relationship between rework, cost and schedule overruns [48]

It was found that the amount by which the project is exceeding varies significantly. Most contractors and consultants indicated that the average schedule overrun ranged from 10% to 30% of the initial contract period. In a study conducted by [8], the average exceeding of the schedule was found to be 33.37%, although this varied from country to country. For example, the average overrun in Bangladesh was 34.41%, China 13.63%, India 55.69% and Thailand 32.71%. Projects that failed to meet the schedule averaged $ 79 million (19% of the planned cost). Of the 86% of projects completed within the budget or on the budget, 29% were exceeding by an average of 16 months.

To describe the project time parameter, we consider the planned project duration and the actual duration. There are also two common parameters for verifying budget execution: planned budget and actual cost. For each country data, we determine the mean and standard deviation of these parameters. In general, we found that most of the projects studied were long in duration and took longer than expected.

It is important to note that the actual cost of ID projects is lower than planned, and under-execution of project costs is on average 14.5% of the planned budget. If we compare the effectiveness of the ID project with other areas of project management, Chaos Chronicles [48, cited in 49] shows that project overspending on software was 189% of the initial estimate, which is generally worse than the performance of ID projects. For Indonesian construction projects, some researchers found that project managers completed 54.5% of projects on time. For Ghana groundwater construction projects, found that 75% of projects exceeded the initial schedule and project cost, while only 25% were completed within budget and on time. [9]

In general, most projects face overspending and understated costs. In fig. 2.5 shows the effectiveness of different groups of projects in the following four categories: overrun of schedule, underrun of schedule, overrun of costs and underperformance of costs. Among the projects, the total percentage of overrun and underrun projects is higher compared to overrun projects and overdue projects. The group of projects with planned overrun (first group below, figure 2.5) shows that most projects with identifiers have problems with overspending and have some understatement.

On average, 86% of projects are late, overdue for almost 2 years, and projects take about 39% more time than planned on average. On average, the cost of late projects is lower by 42 million US dollars, ie 13% of the average planned cost of the project. Although projects with understatement (the second group below, figure 2.5) are few, they have a significant underperformance. The underperforming project has an average of $ 79 million, which is 19% of the average planned cost of the project.

On the other hand, of the undervalued projects, 86% of projects were completed within or outside the budget, these projects lagged behind the schedule by 16 months with approximately 29% SV (first group above, Figure 2.5). There are few projects with overspending (second group above, Fig. 2.5) (14%), and the average amount of overspending is 73 million US dollars, ie 22% of the average planned cost of projects. [8-9, 18, 27, 39]

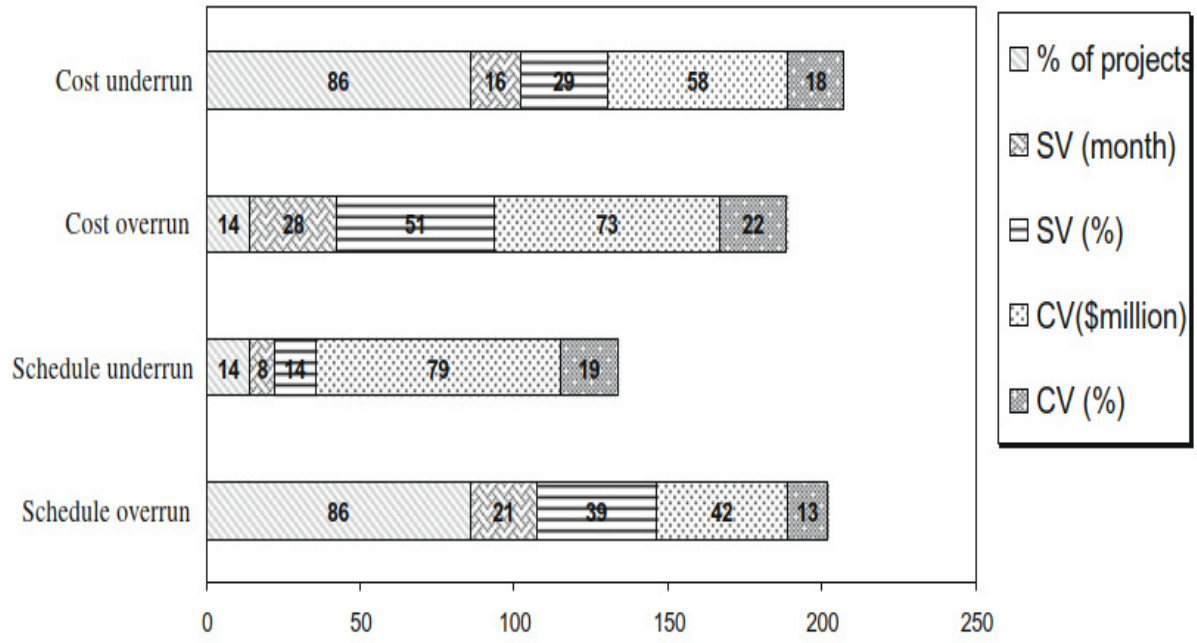

Figure 2.5 – Comparisons of project performance

Analyzing the time and cost indicators for all ID projects, it can be stated that only a few projects (13%) were completed both within the schedule (non-compliance with the schedule) and planned costs (understatement). On the contrary, most projects (73%) are late (overdue) and work with lower budget costs (20% understatement), ie most projects that are overdue have understated costs. We believe that this is the exceptional nature of ID projects. Comparing the time and cost of ID projects with other literature projects [21–23, 29–31, 36], we can conclude that our discovery is unique and that no previous study has found this unusual performance ratio.

The overall effectiveness of the project is determined by further comparing the variance of the schedule and costs in relation to the level of project success shows that the effect of project success varies depending on whether the deviation of the schedule and costs is positive or negative. As for cost variance, the greater the underperformance, the higher the success rate of the project. As for deviations in the schedule, the later the schedule, the higher the success rate of the project. The difference between the marginal

averages of positive and negative graphs and cost variations represents the interaction between SV and CV, ie these factors are not independent [18, 27, 39].

From practice analysis, it is observable, that most of the ID projects are retarded and require less budgeted cost. We identify and explain the reasons for lengthy project duration and large amount of cost underrun. Project time overrun indicates an extension of project completion time from the planned duration.

Procurement is one of the biggest problems of development projects. Delays caused by procurement are often caused by unreasonably long evaluation of proposals, operational delays of project organizations and inexperience of local authorities in international procurement. International development projects can often take longer due to long-term land acquisition problems arising from local policies, land legislation and religious issues. Another factor that contributes to the delay of the project is the lack of understanding between local governments. However, for ID projects the picture is different. Underestimation of costs means that the project is completed at budget costs, in other words, the allocated money is not used and is accounted for as a surplus of the loan. When closing a loan account with the consent of both parties, the unused loan is usually canceled. Many overdue ID projects are understated. Due to the unusual nature of value for money and schedule changes, this study is of great interest to identify some of the central causes of schedule delays and underfunding. The main reasons for such a significant reduction in costs are fierce competition in the auctioning of equipment and materials, changes in market conditions and a significant reduction in interest rates due to changes in tax and interest rate policies. Although the latter is difficult to predict, other factors could be given more weight in estimating the cost of a project during the evaluation. Less use of contingencies is another important reason for lower costs in international development projects. To avoid possible funding risks, there is a tendency to maintain a high contingency budget for the ID project. According to the data, it turned out that on average the project ID saves 15% of contingencies within budget expenditures. [18, 27, 39, 47-49]. In general, the main reasons are the devaluation of the local currency and competitive bidding for imported goods and services.

2.3 The success factors and criteria of development projects management

All over the world, ongoing projects continue to fail at a significant rate, despite a growing understanding of the determinants of success in PM. Statistics of failed projects show that these failures are much more common than one would like to believe. Compared to common success rates, Ghana is no exception.

Many organizations around the world believe that considering organizational strategy as a related series of projects is the most effective and efficient approach, although there is no scientific evidence to support this. This link between projects, organizational goals and the link between the projects themselves (figure 2.6) requires significant coordinated efforts.

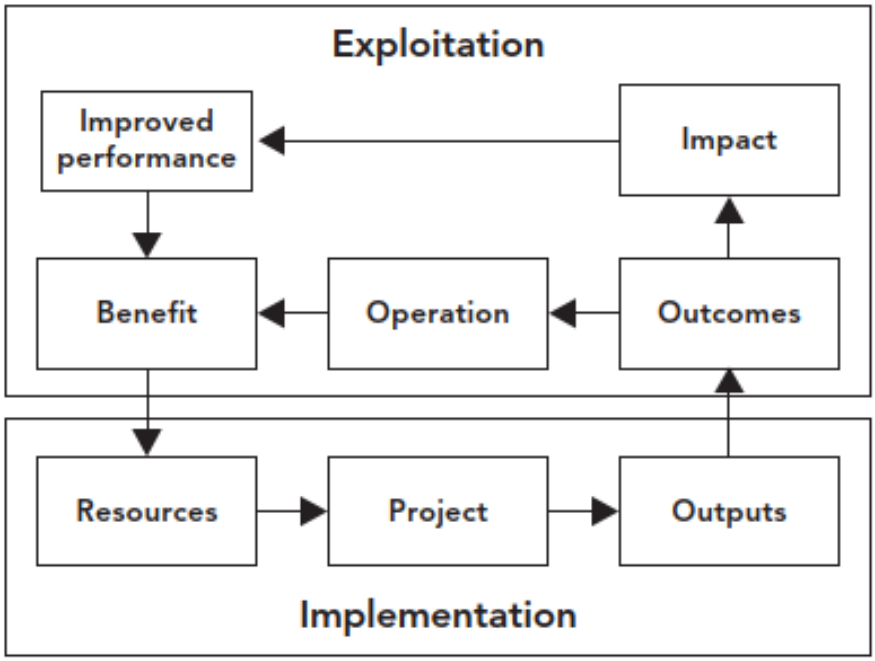

Figure 2.6 – Three levels of links in project results

For too long, the subject of project management has focused on the tactical / operational level, ignoring its role in strategy development and deployment. This has led to projects being implemented in a reactive mode, with many of the problems the project will face already in place. In addition, project managers are involved in the process too late to

make any contribution to the strategy process. This contributes to their prevention of problems or the use of their operational knowledge to maximize project effectiveness.
This is the ultimate bilateral problem.

The first part of this is that project managers do not have the necessary structure to discuss these issues. However, there is no known empirical study of the reasons for the failure and / or success of projects in Ghana. One of the goals of this study is to determine the success / failure factors of the project. This section discusses what other authors say is the cause of the project's success and / or failure [6, 43, 62].

The success of the project is increasingly discussed in the scientific literature on project management. Project success can be classified according to management and investment criteria, which are expanded to reveal conceptual principles such as project effectiveness, organizational benefits, impact, stakeholder satisfaction and future potential [55]. Another model of MacLeod and others [53] classified project success into process success (project management success), product success (project satisfaction) and organizational success (organizational satisfaction), can be formulated project success as the result of three interacting criteria of success: (i) successful project management in delivering project results; (ii) successful communication and understanding of stakeholder needs; and (iii) the successful implementation of the benefits of the project by the organization.

In addition, according to Ika [33-35] and [55], the success of a project consists of two elements: (i) success criteria; and (ii) success factors. Success criteria are indicators by which the success of a project is assessed. Success factors are important elements that contribute to the success of a project. Specifically, Ika [35] defined success criteria as “a set of principles or standards used to determine or evaluate the success of a project”. As defined earlier, success factors contribute to the likelihood of project success. Experts classify success factors as independent variables, and success criteria as dependent variables that are used to measure project success [36]. It is interesting to note that the understanding of success criteria has changed, ie its development can be represented by two fundamental works, as demonstrated by a study [35], which identified three forms of

evolution. 1. The criteria for the success of the project are determined by the "virtue of the triangle" (iron triangle), which usually consists of time, cost and quality; 2. Success criteria are perceived as a "virtual square", which consists of time, cost, quality and customer satisfaction. Success criteria are expanding to include time, cost and quality, as well as the implementation of a strategic organization, the satisfaction of end users and other stakeholders.

Defining the success criteria of the ID project and measuring them at the post-transfer stage. Integrate key success criteria, including how important a common understanding of these criteria is in the areas of project management, especially for ID projects. Several studies have suggested project success as a project measurement model. The five main models used to assess the success of a project after its completion are considered relevant to this thesis. Their reviews point to three categories of how the success of a project is measured in terms of the present.

When a country borrows millions of dollars from foreign institutions, the benefits should be considered far beyond the implementation phase. In other words, the results must not only meet the requirements at the time they are transmitted, but they must also provide benefits to their end users. These benefits are crucial for organizational or institutional development, such as the provision of basic infrastructure.

The review relevant approaches and model on project success and, based on that, develop a more comprehensive model of project success that indicates how different stakeholders perceive the performance of the project’s output, outcome, and impact over different timescales by combining the work of several authors [80].

Consider appropriate approaches and a model of project success and, based on this, develop a more complete model of project success (figure 2.6), which shows how different stakeholders perceive the results, outcomes and impact of the project over different time frames, combining the work of several authors [80].

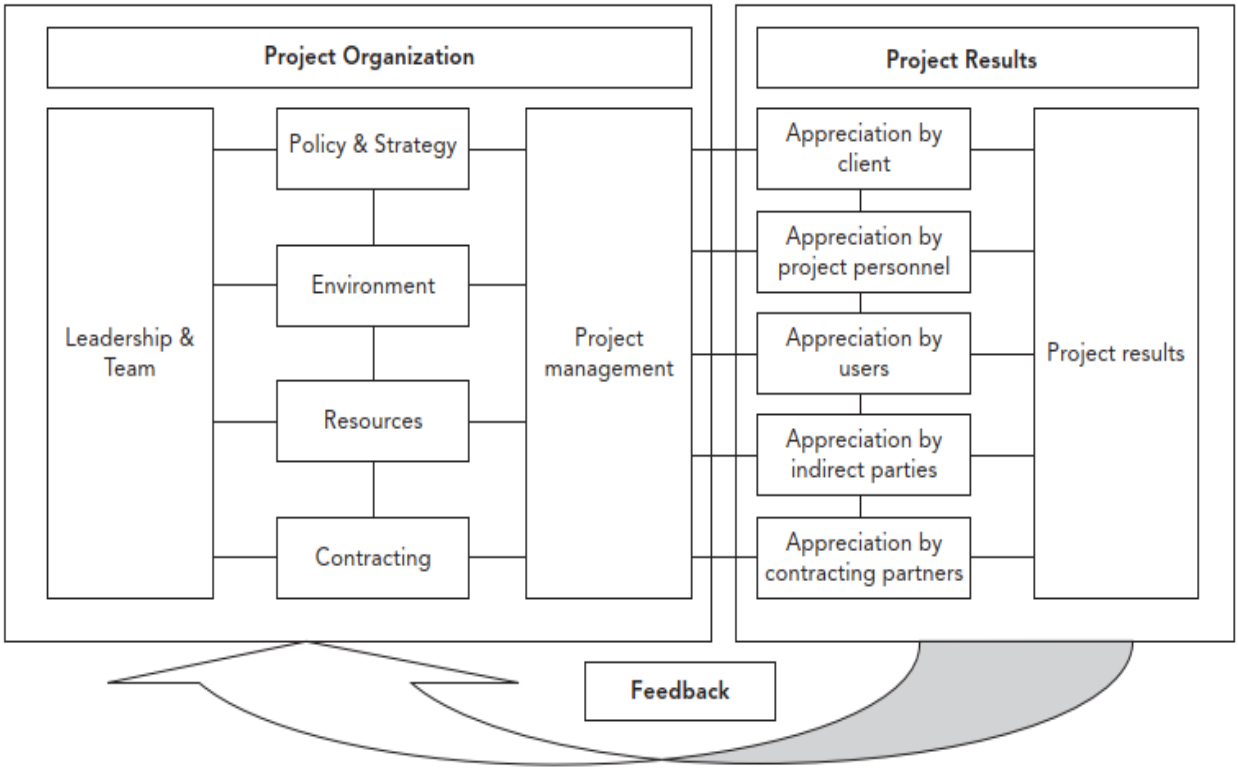

Figure 2.6 – Project Success Model, after [80]

Each project depends on the unique environment in which it is implemented, and that it has a broader environment that includes external factors that we cannot influence; however, these external factors may be influenced by the results of the project later. The purpose of the author's substantiation of the concept of project success analysis is to indicate the steps that allow to perform effective and consistent monitoring and evaluation of project success throughout the life cycle, and made project understandable for stakeholders by completion time frame and development project outcomes (table 2.3)

Systematic analysis of the success of the whole project improves knowledge management in the project environment. The concept is based on CSF, project performance, KPIs and models and methods developed so far. [43]

At this stage, it is necessary to consider the broader project environment, ie to look at all environmental factors for the organization where the project is implemented. In addition, it is important to analyze the project-specific environment, i.e. the organization where the project is implemented.

Table 2.3 – Project success understood by timeframe

Stakeholder	Output at completion	Outcome months after completion	Impact years after completion
Investor or owner	Time Cost Features Performance	Performance Profit Reputation Consumer loyalty	Whole life value New technology New capability New competence New class
Project executive or project sponsor	Features Performance Time and cost	Performance Benefits Reputation Relationships Investor loyalty	Future projects New technology New capability New class Value creation Reputation
Consumers	Time Price of benefit Features	Benefit Price of product Features Developments	Competitive advantage Price of product Features Developments
Operators/users	Features Performance Documentation Training	Usability Convenience Availability Reliability Maintainability Cost reduction: Operating Maintaining Training , Staff	New technology New capability New competence New class

It is necessary to take into account all the events in the organization related to the project, processes, procedures, rules and specifications that form the basis for project documentation, the availability of human and other resources, technologies, necessary support.

At the project level, the focus remains on developing the main idea, creating plans, organizing and leading the team, organizing implementation, monitoring project activities, achieving results, making decisions, resolving conflicts, managing risks, and more. An overview of project management elements, i.e. areas [1], clearly identifies the key success factors of a project. Analysis of these elements generates an integrated CSF list for the project.

Creating a CSF creates a basis for determining the knowledge needed to implement the project, as well as to determine the parameters of control. As not all CSFs appear and are implemented in all phases of a project, it is necessary to establish a method of effective monitoring and measurement of success, thus covering all critical success factors . That is why at this stage the project can be presented through the stages of the life cycle, after which the previously defined CSFs can be related to the phases in which they appear. By linking critical success factors to the relevant phases of the project life cycle, we facilitate the identification of measures that can be used to assess project effectiveness and to analyze project success [77].

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By measuring the success of a project according to defined KPIs, we can achieve a more comprehensive assessment of the project. However, according to a study that included 27 interviews (in Hewlett-Packard, DaimlerChrysler, SAP, Unisys, US Army), training based on post-project audit is considered a rarity, even in large organizations. This is often due to a lack of time, will, organizational or individual ability to prepare a report. However, it will also show us whether there have been deviations in the project, in which areas, processes and / or end results, and whether these deviations show signs of a constant trend. Since the results achieved are measured during the project implementation, these data can lead us to corrective measures that would reduce deviations at the end of the project implementation. In other words, the data collected in the previous step will indicate whether performance and / or processes need to be improved, and whether the defined KPIs are valid for this particular case. It is necessary to keep documented records of each step according to a predefined template [6, 23, 77].

Prerequisites for the above steps are: streamlined project management process, pre-established reporting system and project reporting templates, defined division of responsibilities, as well as previously established method of data collection, analysis and distribution. The presented project success analysis process contains the steps used to gather the information needed to evaluate the effectiveness of the project in accordance with the defined KPIs. Based on this, we can conclude that the analysis of project success should be related to knowledge management in the project environment to ensure more efficient collection of relevant information that can be transferred and increase the knowledge base.

"The importance of people as creators and bearers of knowledge makes organizations realize that knowledge lies not in their databases, but in people." While processes and systems are important tools for accomplishing tasks, people with the right skills need to manage those processes and systems to succeed [6]. A study [23] found the significant correlation between the adequacy of certain project management practices and effectiveness, and on this basis argues that project management success is not the same as

project success; "Although it is fast becoming common wisdom that projects are carried out by people, not processes and systems."

Conclusion for 2-nd chapter

1. The peculiarities of ID projects have been studied, according to which they are found to be complex and different from other projects, in particular, a large number of stakeholders involved in the physical implementation of components and activities of the project.

2. The analysis of efficiency of the project ID, the reasons of overspending of time and cost is executed and the problems connected with cost and the schedule of performance of the international development projects are established.

3. CSF and criteria to measuring the success of the project and documenting the results of measuring the success are substantiated.

4. A study of the point of view of different authors in distinguishing between project success and project management success. The factors of project success are established, the tools and methods that should be used by project management specialists in Ghana are substantiated.

5. Developed framework to manage international develop project success based on project life circle phases concept.

3. SUCCESS ORIENTED APPROACH AND MODEL FOR ENERGY SECTOR DEVELOPMENT PROJECTS MANAGEMENT IN GHANA

3.1 The success dimensions and context management tools of ID projects

Project implementation and success have been one of the most influential and important areas of project management knowledge over the last ten years. The both project effectiveness and efficiency should be considered when talking about project success. A synonym for success is effectiveness, i.e., the degree of achievement of objectives. Projects are formed to accomplish objectives and success is measured in terms of how well these objectives have been met.

Different people in different projects and in different time dimensions view the success of a project differently. This ambiguity in the meaning of "success" is due to the fact that success can be measured by any of several different sets of objectives, project objectives - i.e. what is expected from the project organization at the end of the project (volume, quality, cost, time). general project objectives - i.e. what project owners expect to receive from the use of project results after the project is transferred to them from the project organization, social and environmental objectives - i.e. what benefits the local community expects from the project both during the project and under the project time of use of project results.

As a result, project success is not a one-dimensional and static concept, but rather a multidimensional and dynamic one offer a multidimensional concept exploring success from different dimensions: 1. effectiveness; 2. impact on the client; 3. impact on the team; 4. business and direct success; 5. preparation for the future.

Distinguish between project success (measured on the basis of overall project objectives) and project management success (measured against widespread and traditional performance indicators in terms of volume, quality, cost and time, i.e. project objectives) .

The project success criteria correspond to the measures on which the project success assessment is based. Success factors, on the other hand, are the key factors on which the

success of a project will depend. In fact, success factors are a contribution to the management system that will lead to the success of the ID project [35]. Therefore, it can be argued that the criteria for assessing success must be adequately defined in advance. Therefore, outside of time and cost, the extent of a project's success or failure will depend on the project's goals and objectives. In addition, success criteria may vary or be weighed differently depending on the stakeholder conducting the evaluation. Each stakeholder will consider success according to criteria that meet their own needs. Thus, the ambiguity in the meaning of "success" is that success can be measured by any of several different sets of goals. It should be added that a good communicative and convincing vision of the project has a strong impact on the perceived success of the project. It should be noted that the importance given to project success criteria and project performance indicators varies depending on the industry, project complexity and the age and nationality of the project manager.

In the previous section (2) it was argued that projects are a means of strategic management in organizations: their benefits are multifaceted, and their goals must be set in advance to help organizations better achieve short-term and long-term goals. The structure of the project should be developed with reference to the strategic management of organizations and top-level decision-making on project selection and initiation. The strategy helps project managers and business organizations see their values from the project and focus their day-to-day operations on business-critical activities.

Today, it can be stated that projects are a powerful strategic weapon launched to create economic value and competitive advantage. This suggests that project managers are the new strategic leaders who must take full responsibility for the project's business results. Thus, identifying and evaluating project success is a strategic management concept that should help align project efforts with the organization's short-term and long-term goals. Although this concept seems simple and intuitive, there has been very little agreement in previous research on what the project's real success is. The strategic goal of most projects is based on a business perspective (strategic), which focuses on better results and organizational efficiency - more profit, additional growth and improved market position.

However, project managers and project teams are involved in the day-to-day implementation of the project. They usually do not focus on business aspects. Their attention is rather operational, and their thinking is focused on "doing the job". Such thinking can help you get the job done efficiently without wasting time and money, but it can lead to disappointing business results and even failure if the job is not done effectively. Most project managers consider their work to be successful when they complete the project on time, within budget and according to specifications. And in some cases, project managers add features that are not included in the scope of the project, but they can please the customer. This operational spirit is clearly reflected in the project management literature, which traditionally uses time, budget and performance as key indicators of project success. Any of these measures, or even all of them combined, can lead to an incomplete and misleading assessment. They can be considered successful.

The importance of indicators varies depending on the time and level of technological uncertainty of the project. The first was related to the achievement of certain project objectives, such as time, budget, efficiency and other requirements. • The second was related to customer preferences such as satisfaction, influence and loyalty. • The third was related to the benefits that the project organization receives, such as profit, market share or growth. . The criteria show how different dimensions mean different things to different stakeholders at different times and for different projects. There are four main dimensions of success: (1) project effectiveness, (2) impact on the client, (3) immediate success of the business and organization, and (4) preparation for the future. Table 3.1 lists the criteria or parameters for project success divided by four dimensions. Measurement of success 1 - project effectiveness (compliance with constraints)

This is a short-term dimension that expresses the efficiency with which the project was managed. He describes how the project met limited resources. This borders on whether the project was completed on time and within the specified budget? This is a direct dimension that can be used to evaluate a project, even during implementation. Although success in this dimension may indicate a well-managed and efficient project, it cannot guarantee that the project will be considered successful in the long run and will

benefit the organization implementing the project in the future. However, with the advent of increased competition and reduced product life cycle, time to market (time from initial concept to market) has become a critical competitive component.

Table 3.1 Emerged Four Success Dimensions

Success dimension	Measures
1.Project efficiency	Meeting schedule goal Meeting budget goal Meeting functional performance Meeting technical specifications
2.Impact on the customer	Fulfilling customer needs Solving a customer's problem The customer is using the product Customer satisfaction
3.Business success	Commercial success Creating a large market share
4.Preparing for the future	Creating a new market Creating a new product line Developing a new technology

Thus, success in this dimension will often help the company's business and thus increase project efficiency. This can lead to early product introduction and increase its competitiveness. Additional performance indicators can be considered useful. Measurement of success 2 - impact on the client. Measurement of success 3 - business and direct success Measurement of success 4 - preparation for the future The relative importance of each of these dimensions depends on time (see figure 3.1). Different sizes are more important at different times when the project is completed. In the short term, and especially during project implementation, the most important measure is project effectiveness. In fact, this is the only aspect that can be evaluated or measured at the moment

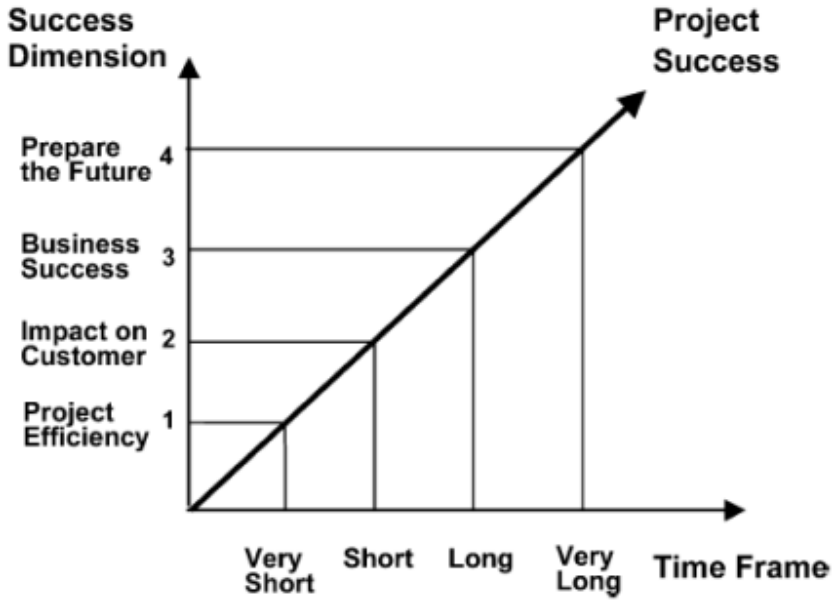


Figure 3.1 – Timeframe of Success Dimension

Respecting resource constraints, measuring deviations from plans, and reviewing various performance measures may be the best ways to monitor project progress and monitor progress. After the project is completed, the importance of this dimension begins to decline. Over time, it becomes less important whether the project met the initial resource constraints. In most cases, after about a year it becomes completely irrelevant. In contrast to the completion of the project, the second dimension - the impact on the client and his satisfaction becomes more relevant. The third dimension, business and immediate success can only be felt later. It usually takes a year or two before a new product starts to make a profit or consolidate market share. The long-term benefits of the projects will affect the organization in just three or even five years. The relative importance of the four dimensions as a function of time is described in figure 3.2.

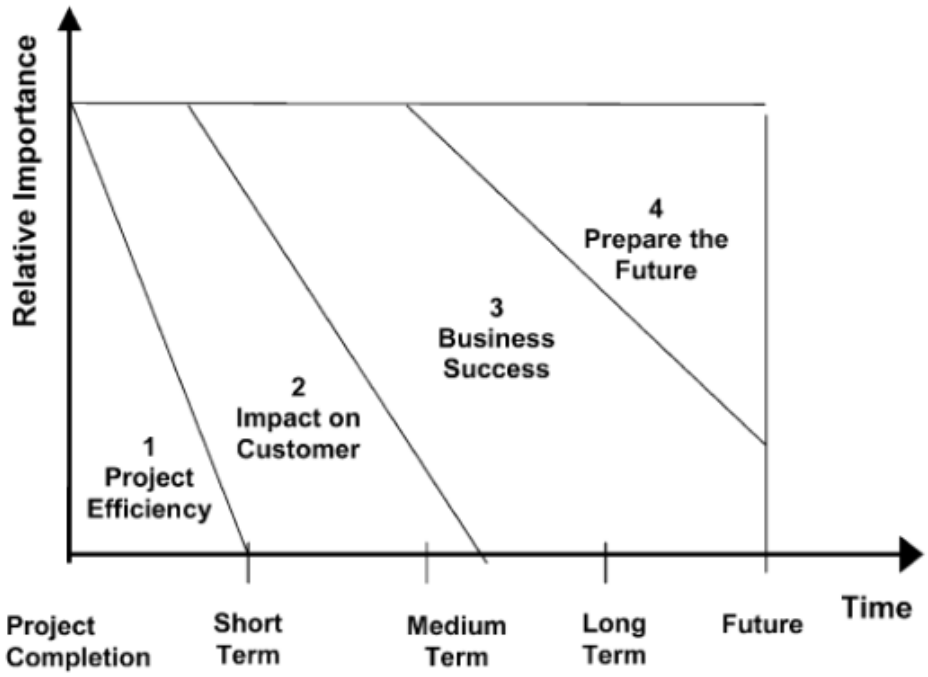


Figure 3.2 – Success dimensions as a function of time

Unlike studies that differentiated projects by purpose (eg, new product development, reorganization), they used new levels of technological uncertainty to differentiate projects. This may indicate that the level of technological uncertainty of the project affects the importance of measuring success. For projects with less uncertainty, efficiency may seem relevant and important, but such projects are not launched to create new technologies or infrastructure in the long run. Their immediate success depends on the fulfillment of goals and budget, and the expected profit is usually determined in advance. The importance of these measures changes when technological uncertainty is higher.

For ID projects, poor productivity in the short term and even limited business success can be offset by long-term benefits, such as creating new markets or experience in new technologies and preparing the infrastructure for additional products for the future. Customer satisfaction and business success are important for all types. The relative importance of the four dimensions, as they are distributed between different levels of technological uncertainty, is shown in figure 3.3.

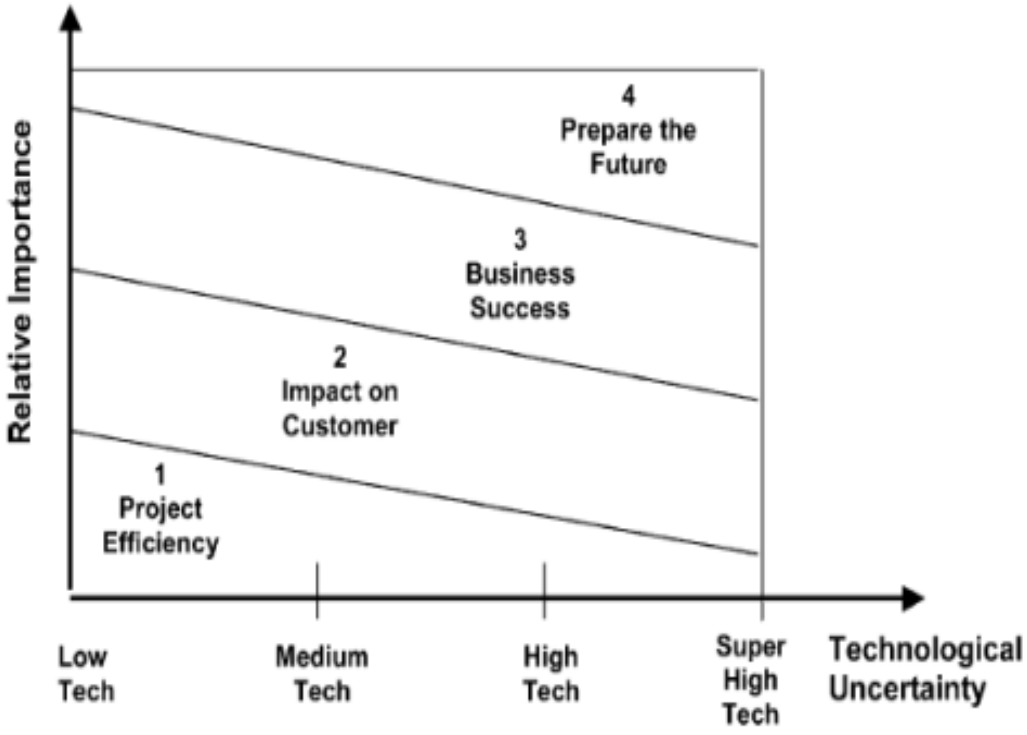


Figure 3.3 – Relative Importance of Success Dimension is Project-type dependent

On the other hand, the success of the project is multidimensional, as various stakeholders are involved. Each of these groups has different needs and interests. What may be a success for one may not necessarily be a success for another. Apart from the listed factors, there are no other external ones responsible for the success of project management, which are at least as important, if not more, for the successful implementation of projects. One of the important things that the project management team faces is growing with the number and diversity of stakeholders (both internal and external), involving more differentiated cultures and increasing the distance of communication. Thus, in parallel with the need for an analytical model of project organization, there is also a need for a way to model the external context of the project, especially in order to be able to respond to the influence of different types of stakeholders.

3.2 Development of an analytical model of stakeholder influence on project success

The challenges facing the project management team increase with the number and diversity of stakeholders (both internal and external), with the involvement of more differentiated cultures, and with increasing distance. Thus, in parallel with the need for an analytical model of project organization, there is also a need for a way to model the external context of the project, especially in order to be able to respond to the influence of different types of stakeholders.

Project stakeholder management is widely recognized as an important part of project management and as a factor contributing to project success In turn, various studies have postulated that the inability of project managers to take into account the claims and influence of project stakeholders is the cause of project failure. The importance of stakeholder management is also emphasized in the definition of project management. For example, in Project Management Institute's contemporary project management standard “Project Management Body of Knowledge” [1] the management of a project is defined as follows: "Managing a project includes adapting the specifications, plans and approaches to different concerns and expectations of the various stakeholders".

Modern standard project management documents represent the application of stakeholder management tools that have been developed and processes relevant to the project management context. For example, the PMI [1] defines project stakeholder management as “the systematic identification, analysis and planning of actions to communicate with, negotiate and influence stakeholders”. The PMI standard emphasizes the communication perspective of stakeholder management, because, according to the standard, stakeholder management is particularly concerned with the management of communications used to meet the needs and solve problems with project stakeholders. For example, the International Finance Corporation's recommendations use the concept of stakeholder engagement instead of stakeholder management as a general term covering eight activities throughout the project life cycle: stakeholder identification and analysis, information disclosure, stakeholder consultation, negotiation and partnership, management

complaints, stakeholder involvement in project monitoring, reporting to stakeholders and management functions.

The Stakeholder Perspective emphasizes the effective management of the relationship between the project and its key stakeholders in order to ensure the success of the project. The analysis shows that the key discourses considered in this perspective include stakeholders, communication, negotiation, relationships, influence and dependence. After the analysis, various main theoretical points of view were applied to the point of view of stakeholders in the field of project management. Industrial network theory, which focuses on how the network affects the actors involved and their relationships, is defined as a relevant theoretical perspective.

Stakeholders are classified in different ways to manage projects. The most commonly used are categorizations based on stakeholder participation in the project and the nature of their relationship with the project, the nature of claims and stakeholder positions on the project, the role of stakeholders in the project and the degree of stakeholder behavior. Internal stakeholders are "stakeholders who are formally members of the project coalition and therefore usually support the project". The concept of internal stakeholders is often used similarly to the concepts of primary stakeholders or business actors. Such stakeholders have a formal, formal or contractual relationship with the organization or are directly involved in the decision-making processes of the project organization. Examples of internal stakeholders are customers, sponsors, contractors and suppliers. External stakeholders are not official members of the project coalition, but may influence or influence the project. Such groups are often referred to as non-profit or secondary stakeholders. External stakeholders can be further divided into private and public actors. Examples of private actors are locals, local landowners, environmentalists and conservationists; Examples of public actors are regulators, local governments and national governments. Thus, external stakeholders may have direct legal authority over the project. However, other conceptual approaches to development project management can be used to divide between internal and external stakeholders. For example, consider internal stakeholders as those who are actively involved in the project and external stakeholders as

those who are only affected by the project. Thus, such a move by internal stakeholders also allows for the involvement of the authorities. Then, in turn, those who are significantly affected by the project activities are identified as external stakeholders.

Stakeholders of the project can also be divided into those who promote the project and those who oppose it. It is noteworthy, especially from the point of view of international development project management, to use a more detailed model with five different levels of stakeholder positions on the project: active opposition, passive opposition, impartiality, passive support and active support. These project positions ultimately determine the impact of each stakeholder on project decision-making.

Categorization of stakeholders in project management includes the division of stakeholders according to their functional role in the project, such as the client, contractor, customers, sponsors, members of the local community, NGOs, media, lobbying organizations and government agencies. The division of stakeholders into stakeholder classes reveals the hidden features of stakeholders: top (payers and end-users), downstream stakeholders (suppliers and subcontractors), external stakeholders (stakeholders (general community and independent) , invisible stakeholders who interact with the project team to ensure the ultimate benefit of the project, but whose cooperation is vital to the success of the project, as well as a group of project stakeholders (project sponsor or leader and project implementation team). Role perspective, which indicates that stakeholders can be classified based on the role (s) they play, is of increased value in the context of an innovation project.

In addition to the different frameworks and tools used to categorize stakeholders, different models of the project stakeholder management process have been proposed in the previous literature. Which) suggest that stakeholder management research focuses on two related conceptual areas: 1) identifying project stakeholders, including defining stakeholder boundaries, assessing stakeholder commitment and interests, diagnosing their potential outcomes, and 2) analyzing different types of relationships. with stakeholders, explaining how stakeholders respond to conflict, and formulating strategies based on this analysis. However, in many structures of the project stakeholder management process, the two related flows do not differ. The traditional division of the project stakeholder management

process can be into identification, classification, analysis and formulation of the management approach. In turn, for the current level of management, a six-stage process of project stakeholder management, which included initial planning, identification, analysis, communication, action and follow-up, seems more appropriate.

Existing project stakeholder studies demonstrate a lack of understanding of the contextual factors inherent in international projects that may affect the strategic activities of the main project in relation to them. Although project management scientists have identified the importance of the project life cycle phase and the structure of the stakeholder network in which the project is embedded, in the phenomena related to project stakeholders, the mechanisms by which they actually influence behavior were not studied in detail. In modern project management theory, a distinction is often made between primary and secondary stakeholders, where a dividing line is drawn between different ways of influencing a project. The main stakeholders are those who are involved in the activity in such a way that they can directly influence the decisions in the project. The main stakeholders in most cases will be the project organization itself, the project owners, the main suppliers, the parent organization and the central resource owners. In some cases, it is also important to involve certain regulators. This can be called the main environment of the project.

The secondary stakeholder group consists of actors or organizations on which the project more or less depends in the field of services, finance, permits, cooperation or goodwill. Trade unions and clients can also be added to this layer of interests. Sometimes secondary stakeholders may have some direct influence on the project, but in most cases this influence will be indirect. These stakeholders are the secondary environment of the project. Many projects will also deal with different types of internal stakeholders, including the tertiary environment. In the tertiary environment you can find local interest groups, media, competitors, criminal groups and others. While the subjects of the primary and secondary environments are often known in advance, the tertiary environment can be more or less unknown, complex or unimaginable.

The project context model with examples of different types of stakeholders is illustrated in figure 3.4.

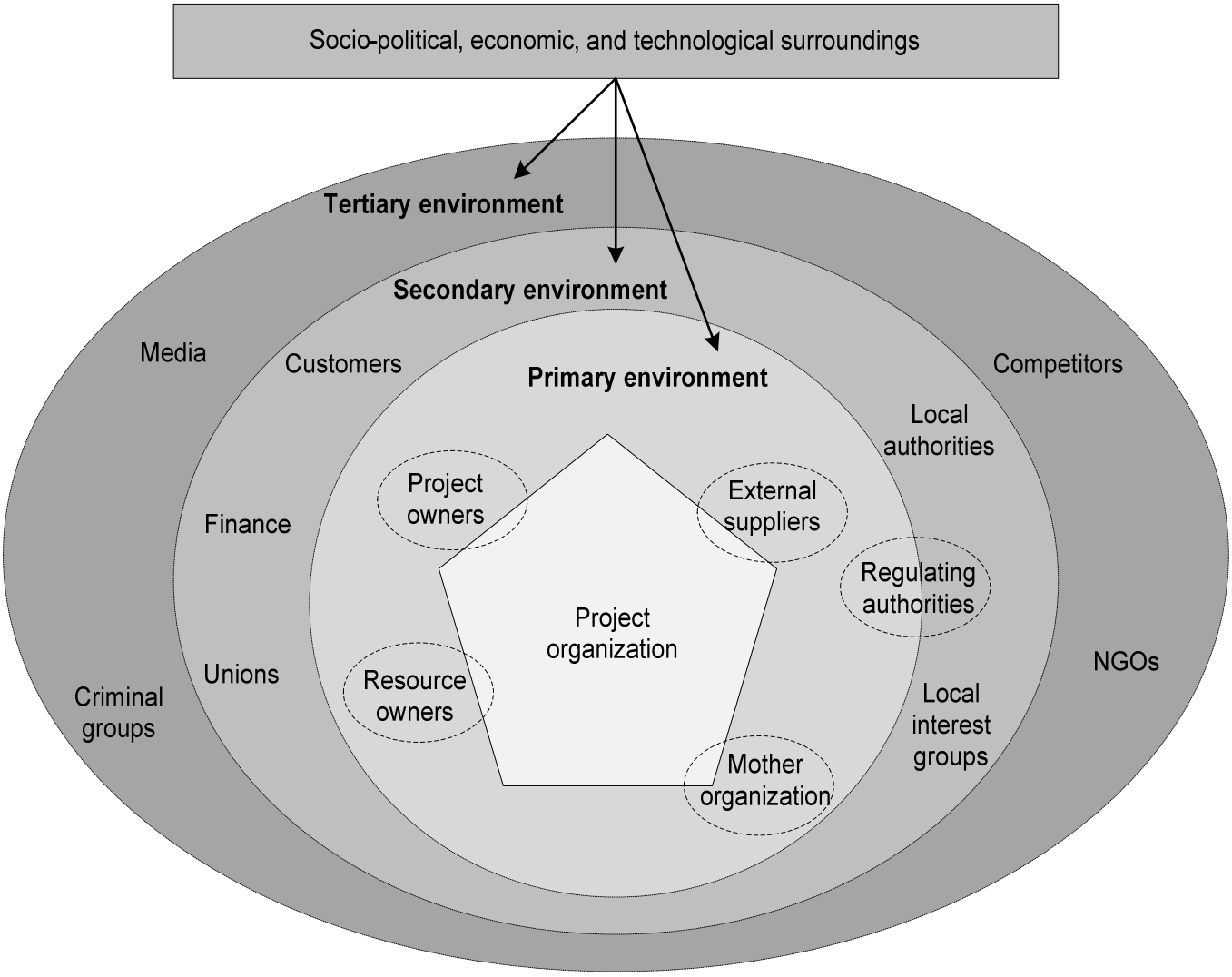


Figure 3.4 – Overall project context

Thus, stakeholders, as well as the project itself, may also be affected by forces in their overall socio-political, economic and technological environment. Examples of such forces include political change, economic trends, technological breakthroughs, cultural differences and changing public opinion.

3.3 The Success oriented life-cycle-based structured model of managing ID projects

Evaluating the success of international energy sector development projects usually involves a high degree of subjective judgment due to the lack of tangible goals, especially given the complex web of stakeholder intentions. In this thesis, more objective success criteria are developed by adopting a logical approach (LFA), a general methodology for managing development projects, which based on the results of research in Section 2 is proposed for the development, planning, management and transfer of innovative energy sector projects. With the LFA method, a development project in the energy sector can be hierarchized into five components: inputs, activities and three levels of project results - results (or results), goals (or goals, or results) and goals (or impact). Project success is determined on two levels: project management success and project success [13].

Evaluating the success of international energy sector development projects usually involves a high degree of subjective judgment due to the lack of tangible goals, especially given the complex web of stakeholder intentions. In this thesis, more objective success criteria are developed by adopting a logical approach (LFA), a general methodology for managing development projects, which based on the results of research in Section 2 is proposed for the development, planning, management and transfer of innovative energy sector projects.

With the LFA method, a development project in the energy sector can be hierarchized into five components: inputs, activities and three levels of project results - results (or results), goals (or goals, or results) and goals (or impact). According to Baccarini's approach (1999), project success is determined on two levels: project management success and project success. The success of project management, focused on the quality of project management processes, should be assessed by the input, operational and output elements of the LFA, and it can be gradually assessed at different stages of the project. It can be broken down into the success of the project life cycle stages, and then measured by assessing the quality of the final product and the achievement of the results intended for each of these phases. For example, the conceptualization phase of an energy

sector development project in Ghana is generally considered successful if the following conditions exist at this early stage:

• identify the right target beneficiaries and assess their relevant needs to meet the development priorities of sponsors;

• the relevant implementing agency has been identified and notified as a project stakeholder that is able and willing to implement the proposed project;

• Initial awareness and support of all key stakeholders has been duly raised to ensure that the project milestone enters the next phase of the project management life cycle. The success of the final phase, based on the successful completion of the project and all relevant documentation procedures, as well as the adoption of the final results and final reports of the project by key stakeholders, is the key to the success of all previous stages.

Thus, the success of the project, on the other hand, reflects the effective use of the final products of the project and the sustainable achievement of the project goal and the main goals of stakeholders. Upon completion of the energy sector development project, success is assessed according to another set of criteria, which are based mainly on impacts on development, sustainability and acceptance of project achievements by stakeholders and the international development project community in general. From the above, it is concluded that the conditions necessary for the success of international development project management in the energy sector at each stage of the life cycle include the competence and commitment of stakeholders in carrying out the work in this phase, as well as other external conditions of the development project environment. to conduct these efforts. Because these conditions can be complex and not fully defined in advance, we focus on the most influential factors, based on the need to ensure the ultimate success of the project and conduct relevant interviews with project stakeholders. In addition, since the end products of one phase of the project life cycle are the input for the next, success in each phase creates favorable conditions for the implementation of the rest of the project, projected in terms of the success of the development project at its completion. Success criteria for one stage are evaluated and perceived as part of the success factors for the next stage.

Table 3. 3 – Success criteria and factors for energy sector international development projects in Ghana

Life-Cycle Phases	Success Criteria	Critical Success Factors
Conceptualizing	• Addressing relevant needs of the right target group of beneficiaries • Identifying the right implementing agency capable and willing to deliver • Matching policy priorities and raising the interests of key stakeholders	• Clear understanding of project environment by funding and implementing agencies and consultants • Competencies of project designers • Effective consultations with primary stakeholders
Planning	• Approval of, and commitment to, the project by the key parties • Sufficient resources committed and ready to be disbursed • Core organizational capacity established for PM	• Compatibility of development priorities of the key stakeholders • Adequate resources and competencies available to support the project plan • Competencies of project planners • Effective consultation with key stakeholders
Implementing	• Resources mobilized and used as planned • Activities carried out as scheduled • Outputs produced meet the planned specifications and quality • Good accountability of resources utilization	• Compatible rules and procedures for PM • Continuing supports of stakeholders • Commitment to project goals and objectives • Competencies of project management team

	• Key stakeholders informed of and satisfied with project progress	• Effective consultation with all stakeholders
Completing	• Project assets transferred, financial settlements completed, and team dissolved to the satisfaction of key stakeholders. • Project end outputs are accepted and used by target beneficiaries. • Project completion report accepted by the key stakeholders.	• Adequate provisions for project closing in the project plan • Competencies of project manager • Effective consultation with key stakeholders
Overall Project Success	• Project has a visible impact on the beneficiaries. • Project has built institutional capacity within the country. • Project has good reputation. • Project has good chance of being extended as result of success. • Project's outcomes are likely to be sustained.	• Donors and recipient government have clear policies to sustain project's activities and results. • Adequate local capacities are available. • There is strong local ownership of the project.

Figure 3.5 shows a comprehensive presentation of our proposed structure, which combines certain criteria and factors of both project management success and project success into a dynamic structure that connects the life cycle phases of international development projects.

According to the proposed approach, we developed the success oriented project management model, based on IDEF0 formalism of life cycle phases processes. The model was designed to assist in improving the overall performance of an international development (ID) project, where predefined sets of success factors and criteria provide dynamic links between them, taking into account three dimensions of ID projects success.

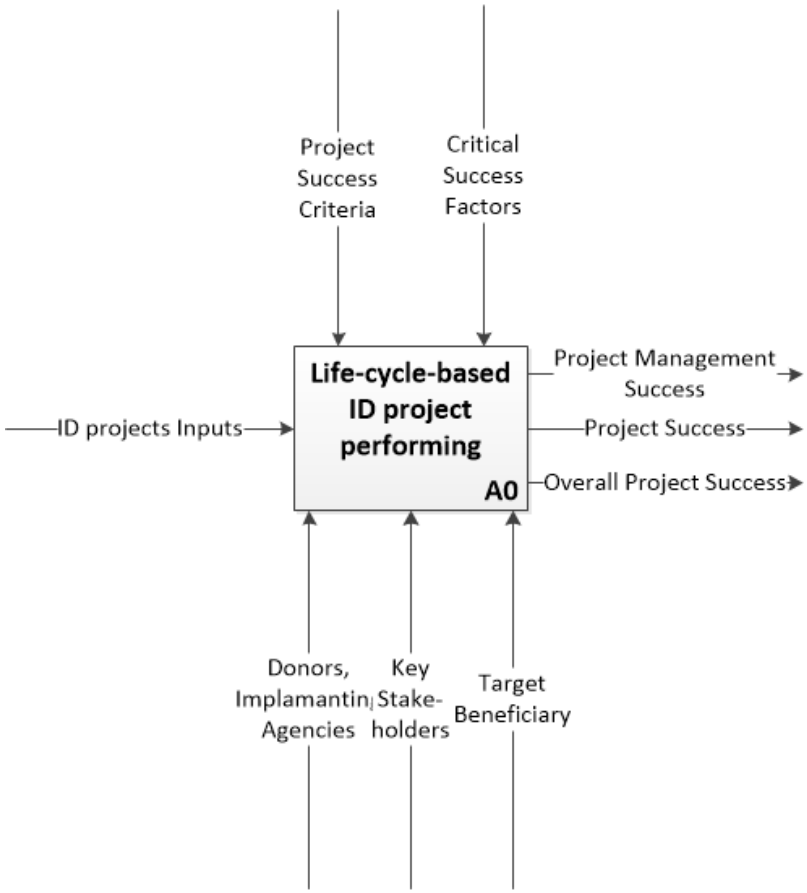
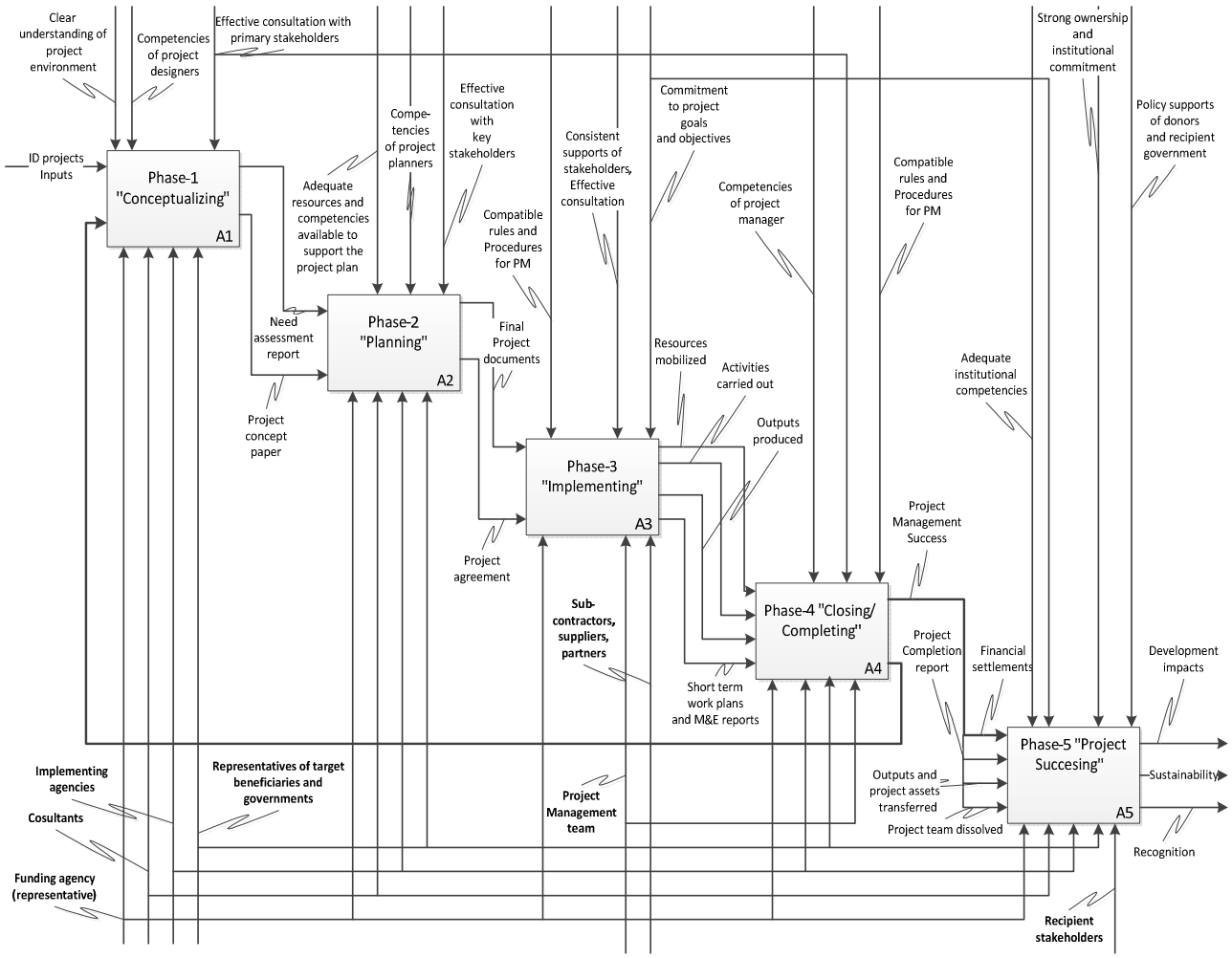


Figure 3.5 – Life-cycle-based structured model for international development projects management (IDEF0 formalism).

This subchapter illustrates the project model based on project life cycle phases, designed to assist in improving the overall performance of an international development project, where predefined sets of factors and criteria provide dynamic links between them. The proposed methodology is based on the formalism of IDEF0 activity diagrams. Therefore, achieving our aim we had to make several adaptations of the conceptual approaches and framework represented [13] to build a model. IDEF0 formalism allows

identifying processes and supporting the project management system to achieve project success, taking into account 3 dimensions of success.

Process-oriented success of project management is gradually assessed, breaking down the success of the project life cycle outgoing links (Fig.3.15), by input data, activities and output elements of the proposed model, thus measuring the production efficiency of outcomes and achieving the results for each of these phases.



Figrure. 3.6 – Life-cycle-based structured model for international development projects management (IDEF0 formalism).

The success of the penultimate phase of project management (Block"A4" on Fig.3.15), based on the management processes of project performing and all appropriate actions, as well as the adoption of final deliverables and final reports of the project by key

stakeholders, which is the cumulative effect of success of all previous stages. The developed model allows, on the other hand, reflecting the success of the project as the effective use of the final product of the project and the sustainable achievement of the project objectives and long-term goals that led to its initiation. It should be assessed at the end of the project according to different sets of criteria, which are based, in essence, on the impacts on development, sustainability and recognition of the project aims of stakeholders and the development community in general.

Success criteria for one phase are understood as part of the success factors for the next phase. The formal model we have built allows us to summarize the criteria and success factors for the life cycle phases of international development projects. Fig. 3.15 shows a comprehensive representation of the proposed model, which includes certain criteria and factors for both project management success and project success in a dynamic structure that connects the phases of the life cycle management of (ID) projects. The sets of criteria correspond to three dimensions of project success: project management success, project success, overall project success.

The future of electrification of more than 600 million people in Africa who do not have access to electricity is decentralized production using renewable energy sources. Many homeless households live in rural areas. Although many small and large PE projects have been launched, there is little evidence for their proper implementation. This study ethnographically interacts with all stakeholders. This was done in order to clearly and collectively understand the failures and mismanagement that may exist in 29 implemented projects in African countries, and to present a method of sustainable management that covers the entire process from project implementation to implementation, continuous maintenance and management. The results of our study indicate numerous reasons for the failure of implemented RES development projects in these countries. Despite differences in culture and understanding, the potential contribution to project failure was similar in different countries: (i) political agenda, (ii) project award process, (iii) stakeholder cooperation, (iv) planning and implementation, (v) support and (vi) public perception and involvement. Combining our findings with the literature and practical experience of

implementing renewable energy development projects in Ghana (), we propose the following solutions: (i) transparency, (ii) ownership, (iii) shared responsibility and (iv) community involvement.

Conclusions to 3-nd chapter

1. The concept of decisive factors of success and criteria of efficiency of development projects is substantiated.

2. The estimation of the executed volume of works of the project ID is executed.

3. Success criteria for energy sector development projects based on a logical approach are substantiated

4. A structured life cycle model for international development project management (IDEF0 formalism) has been developed, which leads to several advantages in development project management. The main ones are: reduction of time needed to develop a model for planning new project initiatives; a simple formalism that can describe all the factors and clarity of information flows, especially for interaction with stakeholders, donors, development agencies and target beneficiaries.

CONCLUSION

1. The current state of Ghana's energy sector is analyzed and the existing problems of developing countries in the energy sector are identified, in particular in ensuring viable socio-economic development.

2. The main problematic issues concerning the lack of energy resources in Ghana and as a consequence of the lack of electricity capacity with a constant significant increase in its cost have been studied.

3. The need to manage the development of renewable energy sources in Ghana based on the project approach has been identifiedю

4. The peculiarities of ID projects have been studied, according to which they are found to be complex and different from other projects, in particular, a large number of stakeholders involved.

5. The analysis of efficiency of management, the reasons of overspending of time and cost is executed and the problems connected with cost and the schedule of performance of the international development projects are established.

6. Criteria for measuring the success of international development projects and documenting the results of measuring success based on a logical approach are substantiated.

7. The success factors of the project are identified, the tools and methods that should be used by project management specialists in Ghana are substantiated.

8. Estimation of the performed volume of works of the international development projects is executed.

9. A structured life cycle model for international development project management (based on the IDEF0 formalism) has been developed, which leads to several advantages in development project management. The main ones are: reduction of time needed to develop a model for planning new project initiatives; a simple formalism that can describe all the factors and clarity of information flows, especially for interaction with Ghanaian stakeholders, donors, development agencies and target beneficiaries.

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