EDCF KOREA Economic Development Cooperation Fund

Feasibility Study for the Establishment of Joint STEM Lab in Rwanda

July, 2024

Hyundai Research Institute

ITM Engineers & Architects

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< Project Team >

Feasibility Study for the Establishment of Joint STEM Lab in Rwanda

Key Personnel

Hyundai Research Institute

- Woo Seok Jang, Senior Research Fellow & Project Manager
- Yong Jung Pak, Senior Research Fellow
- Shin Hwan Kim, Senior Research Fellow
- Jun Pyo Hong, Senior Research Fellow
- Dong Min Kim, Research Fellow

San Hae Kim, Good Consulting Group

Han Jin Lee, DK Evironmental Technology Research Institute

Advisors

Korea Electronics Technology Institute

- Gang Jeong-hun, Center Director
- Sin Hwa-seon, Team Leader

Korea Institute for Advancement of Technology

- Bak Jeong-o, Principal Researcher
- I Dong-eun, Principal Researcher

I Yu-a, Principal Researcher, Korea Institute of Energy Research

Bak Dong-il, Center Director, Korea Institute of Machinery & Materials

Jang Jong-hyeon, Center Director, Korea Institute of Science and Technology

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I. Project Overview

1. Project Background

□ **(National Policy)** The Rwanda government is making efforts to foster knowledge-based industries and enhance manufacturing competitiveness through initiatives such as 「Vision 2050」 and the 「National Strategy for Transformation (NST 1)」.

○ **(Innovation Infrastructure)** The National Industrial Research and Development Agency (NIRDA) of Rwanda is advancing the construction of a Joint STEM (Science, Technology, Engineering, Mathematics) Lab facility aimed at fostering industrial technological innovation and supporting new technology startups.

○ **(Target Sectors)** NIRDA has chosen three main industries for the Joint STEM Lab to focus on: Mechatronics, Energetics, and Industrial Software.

○ **(EDCF Support)** During the 2022 EDCF policy discussions, the governments of Korea and Rwanda agreed to prioritize support in the digital Informati on and Communication Technology (ICT) sector and selected this project as a priority.

□ **(Demand for Industrial Innovation Infrastructure)** Rwanda, striving to transition from an agriculture-based economy to industrialization, faces delays due to a lack of industrial innovation infrastructure.

○ Rwanda has made significant strides in industrial promotion and economic development since the early 2000s, following its recovery from the 1990s genocide.

○ Since joining the East African Community in 2007, Rwanda has aimed to become an ICT hub in East Africa while promoting its tourism and MICE (Meeting, Incentive, Convention, Exhibition) industries, based on a transparent and stable political and social structure.

○ However, Rwanda's industrial development history is relatively short, resulting in an absolute shortage of manufacturing enterprises and inadequate industrial innovation infrastructure and research and development capabilities.

○ In order to advance Rwanda's industrial technology, the establishment of a joint equipment utilization system and research and development (R&D) system for small to medium-sized enterprises(SMEs) is an urgent and important task.

□ **(Demand for Establishing a Start-up Ecosystem)** Rwanda has a young workforce and strong enthusiasm for education, but there is a shortage of companies that can employ graduates, making support for entrepreneurship essential.

○ NIRDA has consistently implemented entrepreneurship support policies that provide prototyping, education and consulting, and spaces for aspiring entrepreneurs, with some notable successes.

○ It is also crucial to provide young entrepreneurs with equipment and space to commercialize ideas into prototypes, alongside consulting services for business modeling, marketing, and attracting investment to ensure the success of startups.

2. Project Objectives

□ Establish the Joint STEM Lab to support R&D and technological innovation for SMEs, thereby enhancing the technological competitiveness of promising industries and invigorating the startup ecosystem.

○ **(Joint Use of Equipment)** Facilitate innovation activities by providing equipment that can be jointly used by Rwandan SMEs.

○ **(R&D of Industrial Technology)** Promote promising industries and enhance export competitiveness (Made in Rwanda) through R&D, technology transfer, and technology commercialization.

○ **(Support for Start-ups)** Develop the Joint STEM Lab into a hub for nurturing startups, providing incubating services, and enhancing the competitiveness of startups.

3. Project Scope

□ Construct the Joint STEM Lab, provide equipment, supplies and ICT systems, and provide consulting services such as operational support.

Table 1 Project Scope

Category			Description
Project Location			University of Rwanda, Campus of the College of Science and Technology (Kigali)
Project Scope	I. Consulting Services	Operational Support	Development and operational strategies, R&D planning, Performance management
		Design and Supervision	Basic design, Bidding process support, Construction Management and Supervision
		Equipment	Detailed design for equipment, Bidding process support, Supervision
		ICT	Detailed design for , Bidding process support, Supervision
	II. Procurement	Construction	Detailed design, Building construction
		Equipment	Provision of joint-use equipment, R&D equipment and supplies
		ICT	Establishment of ICT systems for Joint Use of Equipment, Access control, etc.
		Capacity Building	Equipment utilization, R&D, Startup support training
Project Period			48 months after Loan Agreement (L/A) (Employment of Consultant 4 months, Detailed Design 4 months, Bidding 6 months, Construction 22 months, Operational Support 12 months)

II. Current Status Analysis

1. Overview of Industrial Infrastructure

□ **(Industrial Structure)** Although agriculture still accounts for a significant part of the economy, Rwanda is gradually moving away from an agriculture-centered economic structure thanks to the government's efforts to transform the industrial structure and improve overall societal efficiency through ICT.

2. Related Plans and Policies

□ The project is assessed to be closely aligned with the above-mentioned major development plans, indicating that it is well tailored to the country's development priorities.

○ Vision 2050 focuses on ① human resource development, ② competitive enhancement and integration, ③ wealth creation through agriculture, ④ urbanization and densification, and ⑤ the establishment of responsible governance.

○ NST1 focuses on ① economic transformation toward a competitive knowledge-based economy and the promotion of industrialization, ② social transformation, and ③ governance transformation.

○ The Republic of Korea's Country Partnership Strategy for Rwanda, established by the government of the Republic of Korea, National Cooperation Strategyfocuses on ① agriculture, ② education through improved access to vocational and technical education and expanded industry collaboration, and ③ ICT through strengthened human resource capacity, improved access to digital technology, and support for ICT-based startups.

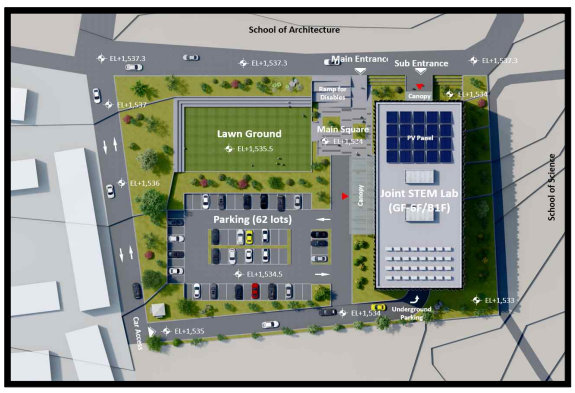
3. Project Site

☐ The project site is a vacant land within the campus of the University of Rwanda, College of Science & Technology (UR CST) and is located in the city of Kigali.

☐ Construction is planned for one building with a floor area of 1,377.8m^2, a total floor area of 11,782.8m^2, and a structure consisting of 7 above-ground floors and 1 basement level, accessible from the ground and 2nd floors.

Figure 1 Project Site Layout

Project Site Layout



Bird's-eye View of the Site Layout

4. Project Executing Agency and Project Implementation System

☐ The Project Executing Agency (PEA) for this project is the NIRDA, which was established by the Rwanda government in 2013 and falls under the Ministry of Trade and Industry (MINICOM).

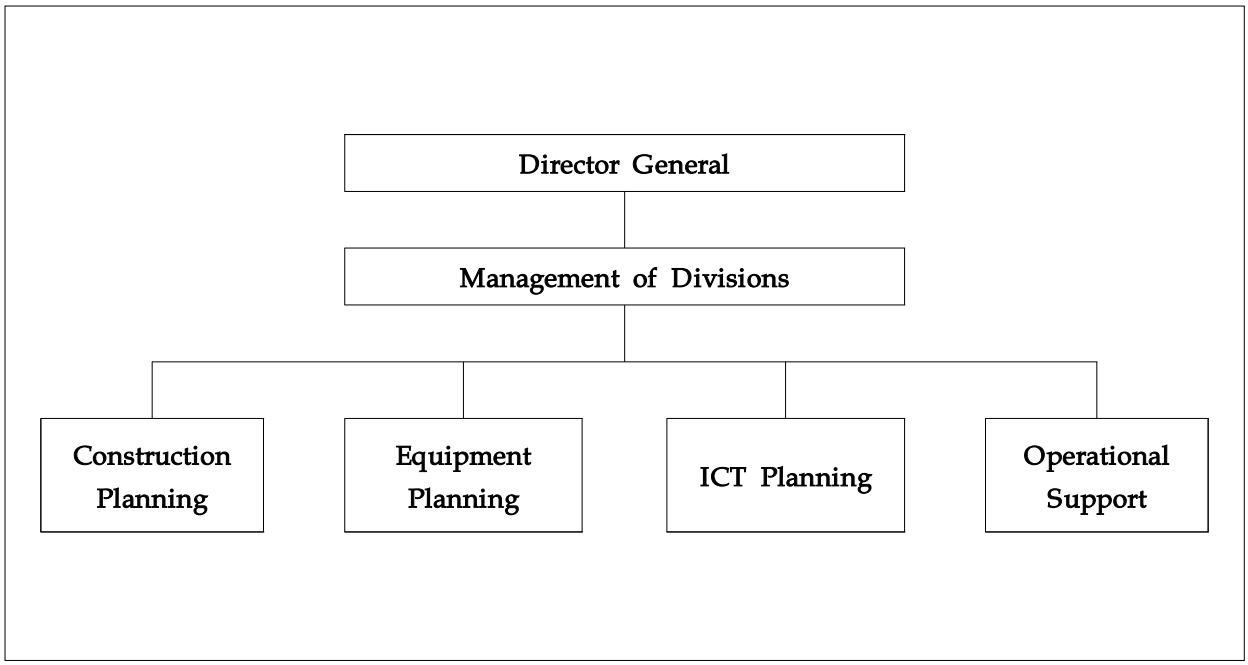
○ NIRDA was founded to drive innovation and industrial competitiveness through technology and research, and is organized into 3 main departments: Knowledge Management & Operational Monitoring, Technology Acquisition, Transfer & Commercialization, and Applied Research & Development & Foresight Incubation.

○ Since 2019, NIRDA has significantly expanded its workforce to strengthen institutional capacity.

□ The Project Management Unit(PMU) will be composed of NIRDA members, but may include other relevant organizations such as the Rwanda Housing Authority (RHA) and MINICOM to ensure smooth implementation of the project.

○ The roles that personnel in each field within PMU should play are as follows:

Figure 2 PMU organizational structure plan



5. Case Study of Similar Projects

□ **(Korean Reference Cases)** The case study broadly covered development projects of institutions such as Korea Institute of Machinery and Materials(KIMM), Korea Institute of Energy Research(KIER), and Korea Electronics Technology Institute(KETI), as well as start-up and makerspace cases including Daejeon Start-Up Hub, the KAIST Idea Factory, Seoul National University Haedong Idea Factory, the SeoulTech Start-up Support Foundation, and D·Camp.

○ The study suggests that the proposed center should not be limited to the construction of a single building, but should be designed as a comprehensive industrial innovation hub integrating joint-use equipment, R&D functions, start-up support, operational systems, and linkages with the private sector.

□ **(Reference Case from a Neighboring African Country)** The Ethiopia Textile Technopark case further indicates that the success of such projects depends not only on external support but also on the partner country's timely provision of counterpart funding and infrastructure, which are critical to avoiding implementation delays and ensuring integrated operation of the center.

III. Field Survey

1. Construction Site Conditions

□ **(Project Site)** The project site is undeveloped land within the campus of the UR CST located in the city of Kigali. (8,576.8m^2)

○ Since the site is located within the existing university campus, the overall construction conditions for educational and research facilities, such as ground conditions, infrastructure, and regulations, are excellent.

□ **(Location)** The site is strategically located adjacent to Kigali's Central Business District (CBD), in an area with strong future development potential, and offers convenient access by both private and public transportation to the airport, bus terminal, convention centers, and major government offices.

□ **(Surrounding Area)** The site is undeveloped land of southern sector of the UR CST campus, and surrounded by buildings such as the School of Architecture and the School of Sciences.

2. Existing Facility Status

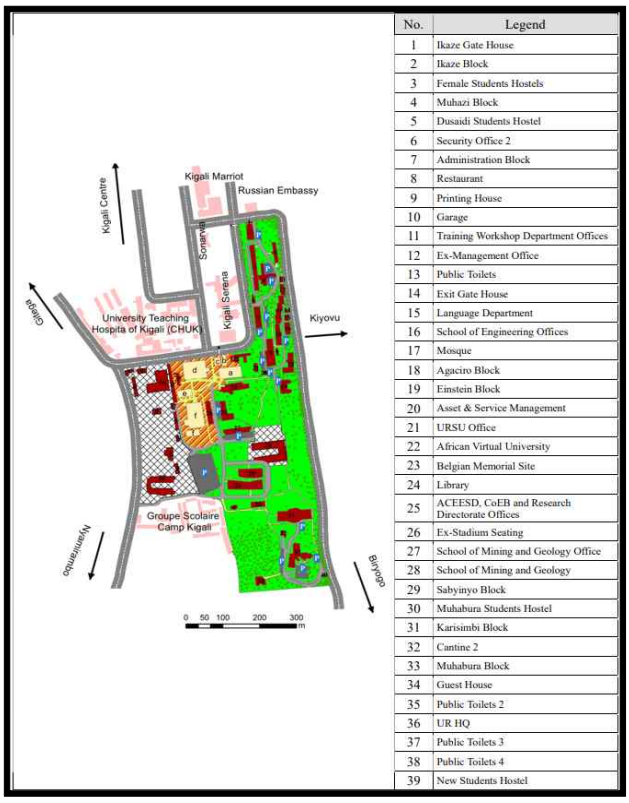
☐ The total area of the UR-CST campus is approximately 280,568m^2 (approximately 28 ha), with most major buildings and facilities located on the eastern side.

☐ To the east, major buildings and facilities such as the administration building, School of ICT, School of Engineering, and student cafeteria are concentrated, while buildings like the School of Architecture and Built Environment, Research Directorate, and School of Sciences are more sparsely arranged to the south.

☐ To the west, 2 new buildings, the university headquarters and dormitory, are under construction on the vacant lot.

☐ Some existing facilities within the project site boundary are subject to relocation or redevelopment as part of pre-construction activities, in coordination with UR-CST.

Figure 3 UR-CST Campus Layout



No.	Legend
1	Ikaze Gate House
2	Ikaze Block
3	Female Students Hostels
4	Muhazi Block
5	Dusaidi Students Hostel
6	Security Office 2
7	Administration Block
8	Restaurant
9	Printing House
10	Garage
11	Training Workshop Department Offices
12	Ex-Management Office
13	Public Toilets
14	Exit Gate House
15	Language Department
16	School of Engineering Offices
17	Mosque
18	Agaciro Block
19	Einstein Block
20	Asset & Service Management
21	URSU Office
22	African Virtual University
23	Belgian Memorial Site
24	Library
25	ACEESD, CoEB and Research Directorate Offices
26	Ex-Stadium Seating
27	School of Mining and Geology Office
28	School of Mining and Geology
29	Sabyinyo Block
30	Muhabura Students Hostel
31	Karisimbi Block
32	Cantine 2
33	Muhabura Block
34	Guest House
35	Public Toilets 2
36	UR HQ
37	Public Toilets 3
38	Public Toilets 4
39	New Students Hostel

3. Infrastructure Conditions

□ Since the project site is undeveloped area within the existing university campus, the basic infrastructure is in good condition, making the site suitable for new construction projects.

○ Power supply and expansion, as well as telecommunication connections to the new facilities, must be carried out by the PEA.

○ Access Road: There is a paved campus road leading from the western entrance.

○ Electrical Power: Power lines can be brought in from the northern and eastern sides of the project site.

○ Telecommunication: Telephone lines and Wi-Fi facilities are installed.

○ Water Supply Facilities: Water pipelines are installed to the north of the project site, supplied by the Water and Sanitation Corporation (WASAC).

○ Sewage: Sewage facilities to be established per project design; each building has its own septic tank for natural drainage.

○ Drainage: Drainage ditches and culverts are partially installed around major campus facilities, and improvements to drainage infrastructure are incorporated in the project design.

Figure 4 Current Infrastructure of the site

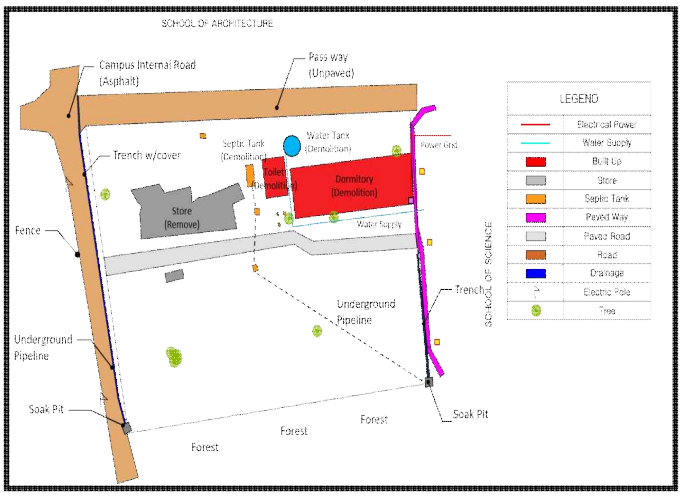


Table 2 Summary of Field Survey

Category	Item	Analysis Content	Review
Location	Accessibility	- Accessible from the western entrance of UR - 1 access road from the North	- Good Accessibility
	Surroundings	- North/East: Existing university buildings - South: Natural forest - West: Elementary school	- Good condition for Educational and Research facilities
Land	Ownership	- 1 plot - Owned by the GoR	- Land use agreement confirmed
	Topology/ Geotechnical	- Hilltop plateau with gentle slope (EL +1,533~1,539m) - Slope < 3% - Bearing Capacity 500 kPa	- Suitable topology and geotechnical condition - Raft Foundation
Existing Facilities	Buildings	- Dormitory: 1 building	- New dormitory completed
	Facilities	- Store containers	- Relocated to nearby location
Infrastructure	Access Roads	- Tarmac access road	- Paved access road reflected
	Power/Tele-Communication	- 1 power line available	- Easy power connection, capacity expansion under consideration
	Water Supply	- Available	- Installation to the site from the connection point
	Drainage	- Available	- Installation inside the site
	Sewage	- District waste water treatment system not available	- Install individual septic tanks and discharge into storm drains
Climate	Temperature	- Average 16~28°C / constant year-round	- Cooling facilities required
	Precipitation	- Annual 950.5mm / 2 rainy seasons	- Waterproofing, roofing required

IV. Demand Forecast : Demand Analysis Results by Stakeholder

Table 3 Summary of Demand Analysis

Category	Survey Target	Demand Analysis		
		Joint Use of Equipment	R&D of Industrial Technology	Support for Start-Ups
Industry	Private Sector Federation	+++	+++	+
	REMCO	+++	+++	+
	Sahasra Electronics	+++	+	+
Academia	University of Rwanda, College of Science and Technology	+++	+++	+++
	IPRC* - ICT Innovation Center	++	+	++
	IPRC* TUMBA - Mechatronics Major	++	+	++
Research (Support) Institutions	NIRDA - Mini STEM Lab	+++	++	+++
	NIRDA - Life Science Lab	+	++	+
	FAB Lab** / K-Lab***	+++	+	+++
	Rwanda Standards Board	+++	+	+

* Integrated Polytechinic Regional College
** Fabrication Laboratory
*** Knowledge Laboratory

□ **(Private Sector Federation)** Manufacturing companies have high demand for R&D in the automation of agricultural, construction, and mining machinery, as well as for energy-efficient solutions, and the equipment used by manufacturers is outdated, signaling a high demand for access to advanced equipment.

□ **(Manufacturing Companies)** Rwandan manufacturing companies, such as REMCO, a leading machinery and parts manufacturer, expect that access to advanced equipment like 3D printers, CNC machines, machining centers, laser cutters, and compression molding machines would greatly assist in the development of new products.

□ **(University of Rwanda)** The establishment of NIRDA's Joint STEM Lab nearby would create synergies through Joint Use of Equipment, R&D collaboration, and the stimulation of new technology startups.

□ **(IPRC - ICT Innovation Center)** Rwandan youth face a shortage of

equipment and space (makerspaces) to create prototypes, thus the establishment of the Joint STEM Lab would be greatly beneficial.

□ **(IPRC TUMBA)** Although some modern metalworking equipment like CNC machines are available, they are mainly for educational use, limiting IPRC Tumba's corporate R&D capabilities.

□ **(NIRDA - Mini STEM Lab)** The Mini STEM Lab is the founding institution for the Joint STEM Lab, equipped with 3D printers, laser cutters, and CNC machines to help aspiring entrepreneurs create prototypes.

□ **(NIRDA - Life Science Lab)** 15 NIRDA employees conduct research on food processing, cosmetics, and microorganisms, and their operations subject to periodic operational constraint.

□ **(FAB Lab / K-Lab)** Since the equipment currently owned is small-scale, non-specialist general-purpose and outdated, establishment of the Joint STEM Lab with advanced equipment is expected to significantly support the growth of manufacturing startups and SME product development.

□ **(Rwanda Standards Board)** The RSB is responsible for testing, evaluating, and certifying technical standards, with high demand for advanced, up-to-date testing and analysis equipment. RSB hopes to jointly use the up-to-date testing and evaluation equipment when it is established at the Joint STEM Lab.

Table 4 Demand Analysis Results

Category	Description
Industry	For SMEs to develop new products and technological innovations, there is an urgent need to establish a foundation (infrastructure) that supports R&D in mechanical and electronic engineering, energy, and industrial software fields.
Academia	Joint-use of research equipment, collaborative R&D, and startup incubation are expected to provide practical, field-focused education.
Research (Support) Institutions	There is a demand for the enhancement of testing and evaluation capabilities through the shared use of advanced research equipment.

V. Technical Feasibility

1. Construction

□ Feasibility of Project Site

○ **(Secured Land Use Rights)** The project site, under the jurisdiction of the Rwanda government's Ministry of Environment, has received necessary usage permissions and has finalized consultations with the current user, UR-CST, ensuring stable use of the land.

○ **(Excellent Conditions for Construction of Research Facilities)** The site is an empty area within the existing UR-CST campus, offering favorable topography and ground conditions for the construction of research facilities. Additionally, the use of existing infrastructure within the campus allows for minimizing site development costs, making it an economically favorable project location.

□ Feasibility of Location Conditions

○ **(Good Accessibility)** Located within a 10km radius of the project area, there are an international airport and intercity bus terminals, providing excellent transportation accessibility via Kigali's regional transport facilities.

○ **(Connectivity with CBD)** The project site, located at the UR-CST campus, is near Kigali's CBD, which is helpful for the Joint STEM Lab and related business operations.

□ Feasibility of Construction Plan

○ **(Localization of Construction Plan)** The size of the building has been determined considering the local context of Rwanda and based on the Rwanda Urban Planning Code, Rwanda Building Control, and Rwanda Building Code.

○ The construction implementation plan, including construction methods, duration and costs, has been prepared with feasible and appropriate plans through data research and review by local consultants.

Figure 5 Layout Plan

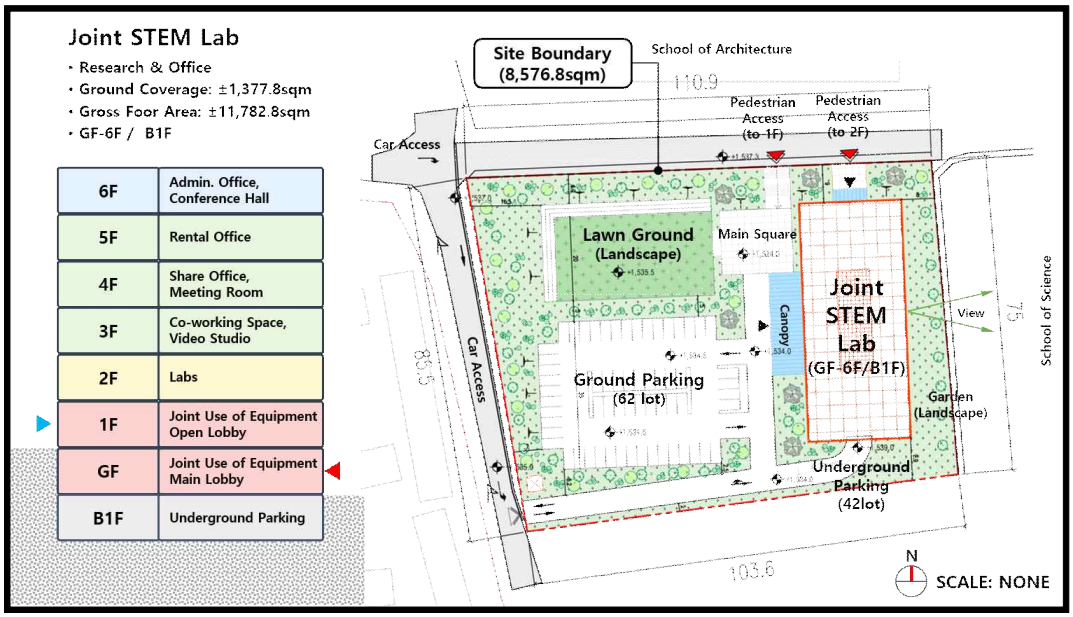


Table 5 Layout Plan by Floor

Floor	Category	Room	Unit Area	Quan-tity	Area (㎡)	Remarks
6F	Support for Start-ups	Conference Hall	393.7 m^2	1	393.7 m^2	
	O&M	Administrative Office	262.4 m^2	1	262.4 m^2	
		Server Room	243.0 m^2	1	243.0 m^2	
	Common	Toilet, Corridors, Stairs			478.7 m^2	
	Total				1,377.8 m^2	
5F	Support for Start-ups	Rental Office	98.4 m^2	10	984.0 m^2	
	Common	Toilet, Corridors, Stairs			393.8 m^2	
	Total				1,377.8 m^2	
4F	Support for Start-ups	Shared Office	98.4 m^2	6	590.4 m^2	
		Meeting Room	72.9 m^2	4	291.6 m^2	
	O&M	Shop	48.6 m^2	2	97.2 m^2	
	Common	Toilet, Corridors, Stairs			398.6 m^2	
	Total				1,377.8 m^2	
3F	Support for Start-ups	Video Studio	262.4 m^2	1	262.4 m^2	
		Co-working Space	196.8 m^2	2	393.6 m^2	
		Seminar Room	72.9 m^2	4	291.6 m^2	
	O&M	Coffee Shop	131.2 m^2	1	131.2 m^2	
	Common	Toilet, Corridors, Stairs			298.9 m^2	
	Total				1,377.8 m^2	
2F	R&D of Industrial	Mechatronics Lab	328.1 m^2	1	328.1 m^2	

Floor	Category	Room	Unit Area	Quan-tity	Area (㎡)	Remarks
	Technology	Energetics Lab	328.1 m^2	1	328.1 m^2	
		Industrial Software Lab	328.1 m^2	1	328.1 m^2	
		Lab Office	131.2 m^2	1	131.2 m^2	
	Common	Toilet, Corridors, Stairs			262.3 m^2	
	Total				1,377.8 m^2	
1F	Joint Use of Equipment	3D Printer	196.8 m^2	1	196.8 m^2	
		ICT Room	196.8 m^2	1	196.8 m^2	
		Operating Office	97.2 m^2	1	97.2 m^2	
	O&M	Cafeteria	145.8 m^2	1	145.8 m^2	
		Janitor	48.6 m^2	1	48.6 m^2	
	Common	Open Lobby	393.7 m^2	1	393.7 m^2	
		Toilet, Corridors, Stairs			298.9 m^2	
	Total				1,377.8 m^2	Sub entrance
GF	Joint Use of Equipment	Laser Cutter	196.8 m^2	1	196.8 m^2	
		Metal Work	262.4 m^2	1	262.4 m^2	
		Wood Work	262.4 m^2	1	262.4 m^2	
		Assembly Room	196.8 m^2	1	196.8 m^2	
	O&M	Exhibition Hall	196.8 m^2	1	196.8 m^2	
	Common	Toilet, Corridors, Stairs			262.6 m^2	
	Total				1,377.8 m^2	Main entrance
Above Ground Total					9,644.6 m^2	
B1F	Common	MEP*	291.6 m^2	1	291.6 m^2	
		Underground Parking			1,570.0 m^2	42 lots
		Toilet, Corridors, Stairs			196.6 m^2	
	Total				2,058.2 m^2	
Under Ground Total					2,058.2 m^2	
Total					11,702.8 m^2	

* Mechanical, Electrical, Plumbing

※ Floor areas are indicative based on the feasibility study and remain subject to revision during detailed design.

2. Equipment and Supplies

□ The equipment and supplies for the Joint STEM Lab have been composed of items tailored to the roles of Joint Use of Equipment, R&D of Industrial Technology, and Support for Start-Ups.

- **(Joint Use of Equipment)** Designed to support the prototyping needs of small business owners and facilitate the commercialization of ideas from the pre-startup phase, this space is equipped with 3D printers, metalworking, woodworking, and ICT equipment.
- **(R&D of Industrial Technology)** This space aims to serve specialized R&D roles in key areas promoted by the Rwandan government: mechatronics, energy, and industrial software. The advanced equipment provided caters to young entrepreneurs and startups, based on local demand assessments, making the selection of R&D equipment items and quantities feasible.
- **(Support for Start-Ups)** The Support for Start-Ups space is divided into shared offices, co-working space, conference hall, video studio, meeting room, admin office with equipment tailored to each area. Aimed at providing consulting (new product development, design, business modeling, marketing) and investment support, the equipment selection for the workspace is deemed technically feasible and suitable for its intended purpose.

VI. Economic and Financial Feasibility

1. Economic Feasibility

□ **(Benefit)** Benefit refers to the sum of consumer utility as a social benefit generated by the project, and estimates the benefits of wage premiums, increased sales of existing companies, and startup creation effects due to the use of the center.

- ○ The economic feasibility analysis includes office rental revenue, equipment usage fees, and services fees.
- ○ Wage premium from human resource development measures the increase in income for trained individuals as an expected economic benefit from equipment training, etc.
- ○ Increased sales of existing companies measures the effects of R&D, technology transfer, and technology commercialization.
- ○ Estimates the benefits of startup creation effects by estimating the sales of startups supported by the Joint STEM Lab.

Table 6 Details of Economic Benefits

Category	Details
Office Rental Revenue	Income from corporate tenants at the center (Corporate space + Rent office space)
Equipment Usage Fees	Revenue from the use of high-tech equipment in the center by companies, universities, and entrepreneurs.
Service Fees	Income from outsourcing business such as government service fee, private service fee, technology fee, etc.
Wage Premium	Additional income from the use of the center by the general public, students, etc. and completion of training provided by the center
Company Sales (Existing Company)	Generated and increased sales of existing companies due to utilization of the center's infrastructure
Start-up Creation Effect	Sales generated and increased by startup companies due to the use of the center's infrastructure

□ **(Cost)** The cost of this project consists of total project costs, maintenance costs, etc.

○ The main components of the total project cost include the construction of the Joint STEM Lab building, equipment and supplies, ICT system, consulting services, capacity building, contingencies, and other project expenses.

○ Annual operating costs for the Joint STEM Lab include staff remuneration, management, and maintenance costs, which are analyzed as maintenance expenses.

□ **(Results)** The Benefit-Cost Ratio (B/C Ratio) in economic analysis is 1.29, indicating that it is greater than 1, and the Economic Net Present Value (ENPV) is calculated to be greater than 0, suggesting that the establishment of the Joint STEM Lab demonstrates economic viability.

○ The Internal Rate of Return (IRR) is analyzed to be 11.6%, which is higher than the discount rate of 9% typically applied by institutions such as the World Bank and ADB, indicating that the investment proposal is deemed viable.

2. Financial Feasibility

□ As this is a government-funded project with no expected substantial revenue, it is considered that the results of the financial feasibility study would have limited practical value.

VII. Climate Change Response Framework

1. Review of Rwanda's Status of Environmental Legislation

□ The primary legal provision regarding the environment is the Law on Environment (No. 48/2018), and specific regulations related to Environmental Impact Assessments (EIA) are established under the General Guidelines and Procedure for EIA.

Table 7 Major Environmental Legislation

Category	Related Legislation
General Environmental	LAW ON ENVIRONMENT, No.48/2018
EIA-Specific	LAW ON ENVIRONMENT, No.48/2018 General Guidelines and Procedure for EIA

○ The Law on Environment(No. 48/2018) provides the basis for conducting EIAs, while the General Guidelines and Procedure for EIA outline the EIA process and methodology.

○ The Ministerial Order(No. 001/2019) specifies the types and scales of projects subject to EIA, divided into 24 categories (including construction, industry, agriculture, petroleum, chemicals, terminals, hotels, etc.).

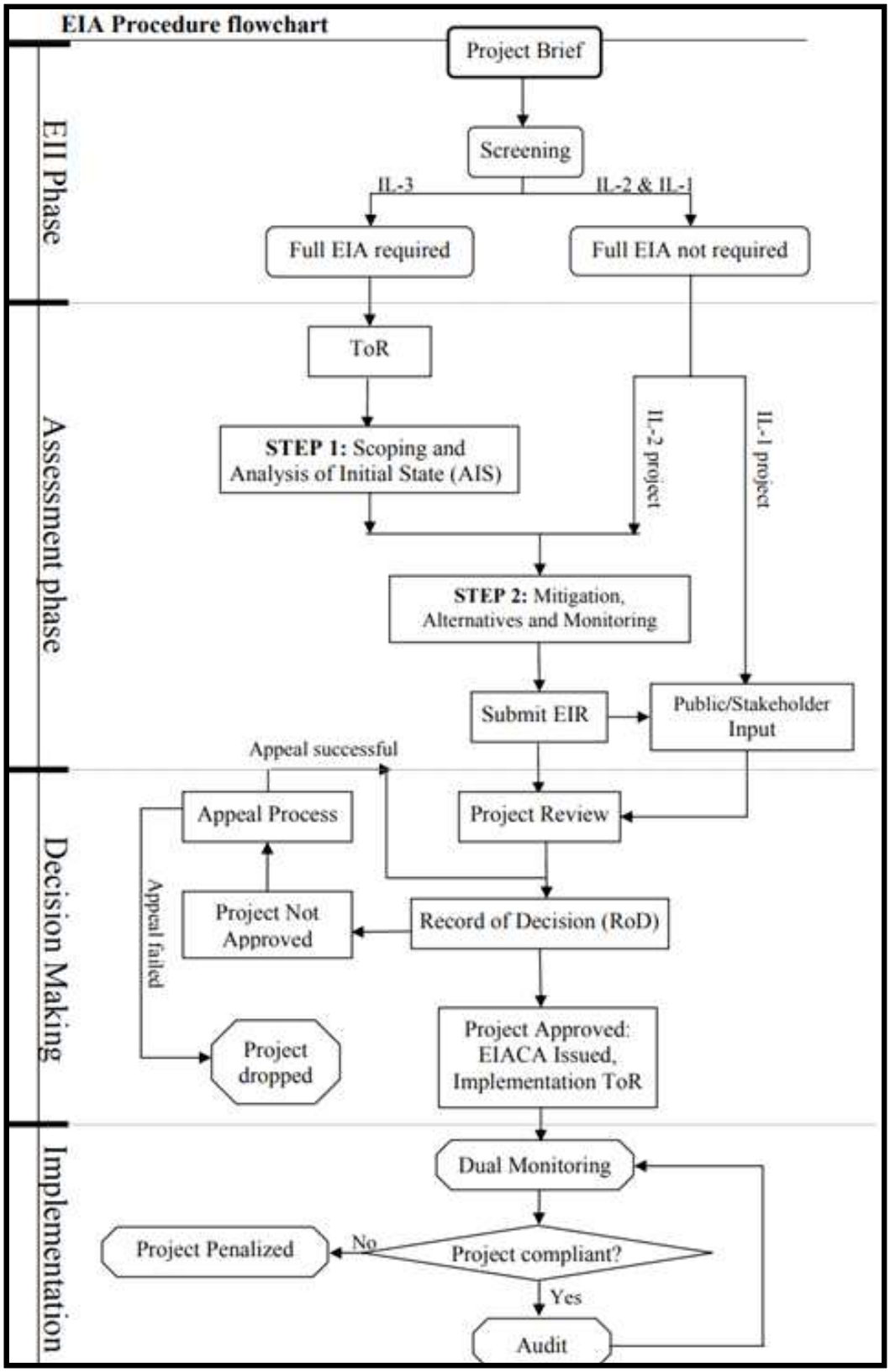
○ It has been investigated that constructions similar to this project, exceeding the standard scale (capable of accommodating more than 500 people, having a total floor area of more than 1,500 m^2, or exceeding a site area of 1,000 m^2), are subject to EIA.

□ An EIA will be required for this project, as it involves constructing a 11,782.8 m^2 Joint STEM Lab and its supporting infrastructure.

○ Therefore, it is recommended that an EIA report be prepared and related procedures be conducted through an EIA consultant during the project implementation phase.

2. EIA Procedure Diagram

Figure 6 Flowchart of Environmental Impact Assessment



3. EDCF Safeguard Policy

□ This project involves the construction of a Joint STEM Lab and its infrastructure in Rwanda, covering a total floor area of 11,782.8 m^2. It is anticipated that some environmental degradation will occur as a result of the project implementation.

□ However, the environmental negative impacts are expected to be localized to the project site. Therefore, the environmental and social risk level is expected to be assessed as Category B according to the EDCF Safeguard Policy (2020).

* Environmental and social category, based on the review of relevant documents (such as Screening Form), will be finalized upon approval of the EDCF project.

○ According to EDCF Safeguard Policy, a proposed project is classified as category B if its potential adverse environmental and social impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category B+ projects.

□ As the project progresses, it will be necessary to prepare an EIA report and follow related procedures through an EIA assessment consultant.

○ EDCF Safeguard Policythe requires the Borrower to prepare and submit to the Bank the draft or final versions of relevant safeguard documents, such as the Initial Environmental and Social Examination for category B projects.

VIII. Environmental and Social Impact Analysis

1. Environmental Impact Analysis

□ The project site is an open area within the campus of UR CST, with a total area of 8,576.8 m^2, and the overall shape of the site is rectangular, and the terrain is highly sloped, so the boundaries of the site can be seen at a glance when looking down from above.

□ Obstructions to be demolished on the project site include a male dormitory, restrooms, and warehouses, and some trees are expected to be damaged, but there are no flora or fauna worthy of environmental protection.

□ It was investigated that there is an architecture department building on the north side, an elementary school on the west side, and an existing building on the east side near the project site, and it is judged that environmental mitigation measures are necessary to prevent damage to existing facilities when the project is implemented.

□ Environmental impacts during project implementation can be categorized into short-term impacts during construction and long-term impacts during operation.

○ In the case of construction, short-term environmental impacts such as soil runoff (or soil erosion) and landslides caused by rainfall, noise and fugitive dust generation, and traffic congestion are expected.

○ In the case of operation, long-term environmental impacts such as wastewater and waste generation are anticipated from daily facility operation.

□ The water supply and sewage system for the new building can be readily installed and the specific plans are as follows.

○ Water Supply Facility: To secure a reliable water source, an underground reservoir will be installed within the municipal water supply area.

○ Water Supply Method: An elevated water tank system has been adopted for distribution.

○ Drainage System: In the absence of a public wastewater treatment plant in the area, an individual septic tank will be installed. While effluent will be discharged into existing drainage ditches, a properly engineered diversion ditch must be constructed to prevent any adverse impact on neighboring facilities.

2. Social Impact Analysis

□ The project does not involve physical or economic displacement of indigenous people and is not expected to result in involuntary resettlement.

○ The existing dormitory to be demolished is planned to be relocated to a new dormitory in the school, so the project will not result in the forced relocation of students living in the dormitory.

□ On the other hand, the following positive social impacts are expected due to the implementation of the Project.

○ **(Joint Use of Equipment)** Facilitate innovation activities by providing equipment that can be jointly utilized by SMEss in Rwanda.

○ **(R&D for Industrial Technology)** Promote promising industries and enhance export competitiveness (Made in Rwanda) through R&D, technology transfer, and technology commercialization.

○ **(Support for Start-ups)** Providing startup incubation services and contributing to the competitiveness of startups by establishing Joint STEM Lab as a space to foster startups.

3. Environmental Impact Mitigation Measures

□ Air Quality

○ During construction, mitigation measures – including periodic watering, dust suppression screens and vehicle speed limits - will be implemented to minimize the impact of particulate matter.

○ To mitigate nitrogen dioxide (NO_2) emissions, the staggered use of equipment by task will be encouraged, while unnecessary movement or idling will be minimized through efficient equipment deployment.

□ Water Quality

○ Install diversion ditches and sedimentation areas (temporary sumps) at the construction site boundaries to prevent soil runoff during rainfall. Regular inspections and periodic dredging of the sedimentation areas will be conducted to maximize their efficiency.

○ The construction site is in an area with access to municipal water supply. Therefore, connecting to nearby water mains to secure water is necessary.

○ Install facilities to collect rainwater, which will be used for landscaping, cleaning, and other miscellaneous needs.

○ Wastewater generated from the site will be treated in a separate septic system where sediments are settled and the supernatant water is naturally drained.

□ Waste Management

○ Minimize the generation of waste and maximize the recycling of any waste produced to reduce disposal output. Prioritize recycling waste over disposal methods such as incineration or landfilling to enhance resource productivity.

□ Noise and Vibration

○ The construction site is located near educational facilities that are densely situated. To reduce noise and vibration during construction, it

is necessary to install and maintain temporary noise barrier panels along the boundaries of the construction site. (These panels should be installed at heights ranging from 4.0 to 8.0 meters).

○ Close the windows of nearby educational facilities to further mitigate noise impact while construction is ongoing.

○ Use construction equipment fitted with noise reduction devices on engines as a priority to reduce noise during operation.

□ **Eco-friendly building plan**

○ There are no regulations on eco-friendly building required by Rwanda Housing Authority (RHA) when carrying out this project, but the applicability of the eco-friendly building plan is reviewed as below.

○ **(Use of eco-friendly building materials)** In the case of building materials (paint, indoor flooring materials, windows, adhesives, waterproofing materials for construction, etc.), the use of eco-friendly building materials can reduce the environmental impact caused by material use and disposal, and reduce social costs associated with resource and energy consumption, as well as pollutant emissions.

○ **(Energy savings and greenhouse gas reduction)** Solar photovoltaic (PV) panels will be installed over the rooftop and walls to supply power to the lights, electric power equipment, etc. in the basement of the common areas of the building.

○ **(Climate change adaptation measures)** In order to minimize the impact of climate change within the project site, green space such as parking lots and landscaping sites will be arranged to alleviate the urban heat island phenomenon.

○ **(Rainwater use facilities)** Rainwater use facilities can enhance water supply stability through the decentralization of water resources.

IX. Miscellaneous : Taxes and Duties

□ According to the Agreement and Framework Arrangement between Korea and Rwanda, all taxes and fees incurred in the process of carrying out the main project are exempted or are stipulated to be borne by the Rwandan government.

□ **(Agreement of Loans from the Economic Development Cooperation Fund*)** Based on the Article 6** of the Agreement concluded between the Government of the Republic of Korea and the Government of the Republic of Rwanda, the Government of the Republic of Rwanda shall exempt the Bank from all financial levies or taxes accruing from the EDCF Loan.

□ **(Framework Arrangement of Loans from the Economic Development Cooperation Fund, 2022~2026)** In accordance with the above EDCF Framework Arrangement, an agreement has been concluded to obtain a loan from EDCF on August 12, 2023. And according to the Article 3, Paragraph 1, subparagraph j*** of the Framework Arrangement, all taxes, customs duties and other financial charges imposed within the Republic of Rwanda on goods and services provided by suppliers and consultants for the implementation of the project under the loan agreement between the Export-Import Bank of Korea and the Government of Rwanda shall either be exempted or borne by the Government of Rwanda.

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* Agreement between the Government of the Republic of Korea and the Republic of Rwanda Concerning Loans from the Economic Development Cooperation Fund entered into force in Kigali, the capital of Rwanda, on November 14, 2014

** The Government of the Republic of Rwanda shall exempt the Bank from any fiscal levy or tax imposed on, and/or in connection with, the Loans and interest accruing therefrom.

*** All taxes, customs duties and other financial charges imposed within the Republic of Rwanda on goods and services provided by the suppliers and consultants for the implementation of the project under the Loan Agreement shall either be exempted or borne by the Rwanda Government.