

The Socialist Republic of Vietnam
Vietnam National University Ho Chi Minh City

The Socialist Republic of Vietnam
Preparatory Survey On
LOMT International Hospital Construction and
Operation Project
(Private Sector Investment Finance)
Final Report

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- For the purpose of this report, an exchange rate of 1 USD to 23,500 VND (as of March 23, 2023) was used when converting between VND and USD. Similarly, an exchange rate of 1 JPY to 173.61 VND (as of March 9, 2023) was applied when converting between VND and JPY.
- The figures and tables that do not have a source citation were created by our survey team.

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Acronym List

AIDS	Acquired Immunodeficiency Syndrome
BLF	Business License Fee
BOT	Build Transfer Operate (A private company takes responsibility for construction and financing of a project, operates it for a certain period of time, and then transfers ownership to the public sector.
CIT	Corporate Income Tax
CM	Construction Management
CO	Carbon monoxide
CO ₂	Carbon dioxide
COVID-19	Coronavirus Disease 2019
CT	Computed Tomography
DF/R	Draft Final Report
ECG	Electrocardiogram
EIA	Environmental Impact Assessment
EPC	Engineering, Procurement and Construction
FCT	Foreign Contractor Tax
FDI	Foreign Direct Investment
F/R	Final Report
F/S	Feasibility Study
FV Hospital	French-Vietnamese Hospital
GDP	Gross Domestic Product
GRDP	Gross Regional Domestic Product
HCU	High Care Unit
HIV	Human Immunodeficiency Virus
ICU	Intensive Care Unit
IDCJ	International Development Center of Japan
IEE	Initial Environmental Examination
JCI	Joint Commission International Accreditation
LOMT	Lotus Omotenashi Medical Town
LPG	Liquefied Petroleum Gas
MOET	Ministry of Education and Training
MOH	Ministry of Health
MOIT	Ministry of Industry and Trade
MPI	Ministry of Planning and Investment
MRI	Magnetic Resonance Imaging
ND	No data
NO _x	Nitrogen oxides
OECD	Organization for Economic Co-operation and Development
PET	Positron Emission Tomography
PIT	Personal Income Tax
PJT	Project
PM	Project Management
PPP	Public Private Partnership
RI	Radio Isotope
SO ₂	Sulfur dioxide
SPC	Special Purpose Company
SPECT	Single Photon Emission Computed Tomography
sqm	Square meter
USD	United States dollar
VAT	Value Added Tax

VIP	Very Important Person
VND	Vietnamese đồng
VNU-HCM	Vietnam National University Ho Chi Minh City
VOC	Volatile Organic Compounds
VSS	Vietnam Social Security

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Summary

Vietnam National University-Ho Chi Minh (VNU-HCM) was considering building an affiliated hospital on its campus and attracting an international hospital that would provide advanced medical care, focusing on diseases and treatments not covered by the affiliated hospital. A consortium of companies, including a Japanese hospital, was formed to study the project. The international hospital will be expanded in stages, starting with 120 beds and multiple departments, and will employ Japanese medical personnel to meet the growing medical needs in Vietnam and provide medical services that existing hospitals cannot provide. The company also aims to provide medical services that are not available in existing hospitals.

Therefore, the objectives of the preliminary study are to (1) confirm whether there are any bottlenecks (confirm whether there are any bottlenecks in terms of legal and environmental aspects in the launch and operation of the project). (2) Confirm the business concept and profitability of the project (through initial market analysis, etc., consider how to develop the business while differentiating it from the competition, and confirm the profitability of the business). (3) Concretizing the business structure (making initial judgments and decisions regarding the feasibility of the currently envisioned scheme, as well as the likelihood of participation in the project by candidate companies and companies to be considered, and the expected investment ratio). As a result of the preliminary investigation, it was confirmed through legal, tax and environmental investigations that (1) there are no bottlenecks to be addressed in promoting the project. Regarding (2) confirmation of the project concept and profitability, we confirmed that while there is a lack of medical resources and infrastructure in the region, the area is characterized by a high income level with many people working in industrial parks, making the establishment of a hospital both meaningful and profitable. In addition, (3) with regard to the specifics of the project structure, the project was reviewed in accordance with the newly enacted PPP Law. Through discussions with VNU-HCM, the direction of role sharing with affiliated hospitals and synergy effects were also clarified. In addition, additional potential investors in Japan and abroad were identified.

The following is a summary of the contents and results of each of the studies in the preliminary study.

Chapter 2: Initial Market Analysis

Initial research was conducted on the environment, market and competition in Vietnam, Binh Duong Province and Ho Chi Minh City. From a market perspective, the study confirmed that Binh Duong Province has significant medical needs and that these needs will continue to grow. Although the region is developing rapidly, it became clear that medical resources and infrastructure have not been developed in a timely manner. In addition, it became clear that most of the working population in Binh Duong Province works in industrial parks, etc., and their income levels are higher than those in Ho Chi Minh City and other cities. Although the specific willingness of residents to pay for private hospitals needs to be clarified in future detailed surveys, the existence of private and international hospitals in the area confirmed the existence of a customer base that uses these hospitals. In terms of competition, although there are private and international hospitals, there is a lack of hospitals in the region in absolute terms. The functions offered are also limited, and no hospitals offering advanced medical care were found in the province. Although there are plans to establish new hospitals, they do not meet the potential needs, and it was confirmed that the medical care that the international hospitals seek to provide would be meaningful for the region.

Chapter 3: Legal Review

With respect to the legal review, we confirmed that a private hospital project on the campus of a national university is feasible if certain procedures are followed. However, we confirmed the need to establish a joint venture company (PPP project company) instead of an SPC and the approval process under the PPP Law.

Regarding the approval of hospital projects, we confirmed that there are no bottlenecks due to foreign investment restrictions, etc., and that there are facility standards similar to those in Japan.

Regarding the licensing of foreign medical personnel, we confirmed that foreign medical personnel can practice medicine in Vietnam without having to retake the qualification examination in Vietnam, and that many foreign medical personnel are working in foreign-invested hospitals and Japanese-affiliated clinics in Vietnam.

Future studies will include a detailed examination of regulations and licensing for medical institutions, land acquisition, PPP projects, and consolidation of related contracts.

Chapter 4: Tax Review

With respect to the tax investigation, we have reviewed the general tax items applicable to the project, the outline of tax compliance schedules, and the corporate income tax incentives that may be applicable, and have confirmed that there are no major concerns. The VAT and corporate income tax treatment of medical services was also clarified.

For further study, it was identified that there is a need to understand the applicability of preferential measures and their impact on income and expenses based on the nature of the business, as well as detailed tax issues (risks, control measures, points to note, etc.) related to investment and fundraising schemes.

Chapter 5: Initial Environmental Impact Study

For the environmental study, we confirmed the natural conditions of the project site, reviewed laws and regulations related to environmental aspects, identified potential project risks and risk control measures during the construction and operation of the hospital, and confirmed that no major concerns were found. In addition, based on the survey results, we identified the measures to be taken or considered for wastewater treatment, dust, fume and odor control, and waste management to minimize environmental impacts.

In the future, specific implementation methods for various environmental measures will be discussed.

Chapter 6: Formulating the Business and Operation Plan

After clarifying the outline and plan of VNU-HCM's affiliated hospital, the initial concept and services to be provided by the international hospital, implementation system, staffing plan, etc. were formulated. At the time of proposal of this survey, a hospital concept specializing in some medical departments was considered, but based on market research, surveys of similar projects in the past, and discussions with VNU-HCM, the concept was revised to a concept with comprehensive medical functions that could be considered within the limited size of 120 beds at the initial stage.

Chapter 7: Procurement Plan for Medical Equipment, etc.

The medical equipment needed for the hospital operation, its procurement method, estimated cost, and maintenance points were summarized, and it was confirmed that there were no major concerns regarding the procurement of medical equipment. As long as the hospital does not stick to a particular manufacturer, it is possible to procure medical equipment with the necessary specifications, and there is no need to import or go through procedures for new registration. In terms of price, we have also confirmed that, with the exception of products manufactured in Japan, prices are lower than those distributed in Japan, and cost is unlikely to be a problem in the maintenance and operation of equipment.

Chapter 8: Initial Design and Engineering Planning

Based on the main function and layout plans, architectural and electrical facility plans, image perspective, schematic design drawings, etc. were prepared, and the estimated construction costs based on these plans were also determined. The outline of the hospital plan (120 beds, 9 floors) at a scale commensurate with the Income and Expenditure Plan was confirmed, and it was confirmed that the construction cost based on the current plan was not a critical issue for proceeding with the project.

Chapter 9: Project Revenues and Expenses

The survey results confirmed that there are several highly profitable hospitals in Vietnam with operating margins in excess of 30%. We also confirmed that many of the benchmarked hospitals were profitable and had some level of profitability. We prepared an initial profit and loss statement for the international hospital and conducted a simple simulation using the profit and loss statements of listed and competing hospitals as a reference. Although based on a number of hypotheses and assumptions, a business income/expense table was created that showed a certain level of profitability based on existing assumed costs. However, as the hypotheses and assumptions will become more specific and precise in the future, it is necessary to continue research and study to improve the accuracy of the business.

Chapter 10: Action Plan

The survey achieved the initial objectives by clarifying (1) the absence of bottlenecks, (2) the project concept and profitability, and (3) key issues related to the project structure. On the other hand, it also became clear that more detailed surveys and studies would be required. Based on the need for an international hospital, the division of roles with the VNU-HCM affiliated hospital, and the PPP project corporate scheme clarified by the preliminary study, it is necessary to grasp the feasibility of the project more accurately and concretely. In this way, it will be possible to identify the investors and partners necessary for the success of the project. To clarify the path to commercialization and to control risks, a full-scale study will be considered.

1 Overview of the survey

1.1 About this survey

Vietnam has a population of 100 million, which is the third largest in ASEAN after Indonesia (270 million) and the Philippines (110 million). In terms of the economy, although there was a temporary contraction due to COVID-19, there has been an increasing trend of direct investment from overseas, and the economy is steadily growing.

On the other hand, it is difficult to say that the quantity and quality of medical care in Vietnam are suffice. Japan has provided various forms of support to the medical field in Vietnam thus far, but much of this assistance has been limited to donations of medical equipment and has been focused on specific areas for limited periods of time. As a result, this support has been somewhat limited in scope. Therefore, there is a possibility that the contribution to "improving healthcare standards and increasing trust in healthcare providers," "quantitative and qualitative improvement of medical practitioners," "contribution to clinical, educational, and research aspects," and "support for the impoverished who have difficulty accessing medical care" was not sufficient.

Vietnam is expected to become even more prosperous in the future, and it is considered that the demand for medical care will also increase. In order to improve the quantity and quality of medical care, a comprehensive approach over time is necessary. To this end, this project aims to provide a package (operation of the international hospital) that organically combines facilities, equipment, personnel, and management systems (various committees, etc.) to ensure and manage the quality of medical services for patients.

Table 1: Contribution goals to healthcare in Vietnam through the project

Goals	Description
Improving healthcare standards and increasing trust in healthcare providers	<ul style="list-style-type: none">• Provide advanced medical services by introducing highly skilled Japanese doctors, nurses, and medical equipment in certain medical departments and technological areas with particularly low medical standards, as well as establishing diagnostic and treatment techniques, hospital management, and mechanisms that support medical technology (such as maintenance and management of medical equipment).
Quantitative and qualitative improvement of medical practitioners	<ul style="list-style-type: none">• Through collaboration with VNU-HCM via the operation of the international hospital, we aim to cultivate excellent local talent who will be responsible for advanced medical care in Vietnam in the future.• We provide on-site and off-site education related to technical skills and language to employees working at the international hospital, contributing to the individual growth of each employee.• Understand the local educational needs and contribute to improving the quality of education through various approaches such as practical training in Japan and training with instructors invited from Japan.• Through various types of education, contribute to the growth of healthcare professionals and become a supply base of healthcare professionals in terms of both quantity and quality.
Contribution to clinical, educational, and research aspects	<ul style="list-style-type: none">• Unlike other private hospitals, the international hospital is a unique medical institution that is jointly operated with the national university, which represents Vietnam. Therefore, in addition to clinical and educational aspects, it will contribute to medical research in Vietnam, including research cooperation between Japanese and Vietnamese universities in the future.

Goals	Description
Support for the impoverished who have difficulty accessing medical care	<ul style="list-style-type: none"> Accept patients, including the impoverished, at certain inpatient facilities. Additionally, provide regular medical services to low-income individuals who do not have easy access to medical care, such as conducting mobile medical examinations and health checkups in regions where low-income individuals are scattered, establishing simple satellite clinics in those regions, and holding medical courses and seminars for citizens in cooperation with universities.

1.2 Background of the survey

Hospital management is a business with strong local characteristics rooted in the community, and regulations and medical insurance systems vary from country to country. In addition, stakeholders are diverse, ranging from government to private businesses and individuals, and regulations, permits, licenses, and foreign investment restrictions are more complex than those of typical businesses. Furthermore, to implement the business, it is necessary to arrange assets such as land, buildings, and medical equipment, and to hire medical professionals with expertise, requiring a significant investment and a lot of effort to launch the business. Moreover, hospital businesses have the characteristic of being difficult to withdraw once launched, as they play an important role as a vital infrastructure in the community.

Based on the characteristics of the hospital business described above, considering the business nature of the hospital business involves a wide range of considerations, such as funding, income and expenses, business structure, and risk assessment. While it is not realistic to comprehensively understand all of these considerations in detail due to the enormous burden it would place, it is important to have a good understanding of the particularly important items to advance the business investigation. Therefore, as an initial survey, it is necessary to understand the current situation and needs, as well as identify key risks and challenges for the success of the business.

1.3 Purpose of the survey

In this survey, we conducted an initial examination of the feasibility of the project, confirmed the presence/absence of bottlenecks in the establishment and operation, and organized the business concept and structure options suitable for promoting the project, and conducted investigations towards its realization.

Table 2: Survey objectives and survey contents for achieving these objectives

Objective	Description	Survey contents
Confirmation of the presence/absence of bottlenecks	In the establishment and operation of the business, it should be confirmed that there are no bottlenecks in terms of legal and environmental aspects	<ul style="list-style-type: none"> ✓ Consideration of legal matters ✓ Initial evaluation of environmental impact
Confirmation of the business concept and profitability	Through initial market analysis and other means, consideration will be given to how to develop the business while differentiating it from competitors. It should be confirmed that the profitability of the business can be achieved.	<ul style="list-style-type: none"> ✓ Initial market analysis ✓ Development of business and operational plans ✓ Development of procurement plans ✓ Initial design and technical planning ✓ Development of income and expenses plans for the business ✓ Development of action plans
Concrete	Initial judgments and decisions are already	<ul style="list-style-type: none"> ✓ Consideration of tax matters

Objective	Description	Survey contents
realization of the business structure	made regarding the participation in the project and expected investment ratios of the companies or business operators who are currently being considered or will be considered in the future as investment candidates for this project.	✓ Formulation of business structure

1.4 Overall picture of the survey

To achieve the survey objectives, we worked on ten tasks. The overall picture of this survey and the relationships between the survey tasks are as follows. In order to effectively and efficiently use the limited time and budget for the preliminary survey, we clarified the particularly important issues and the contents that need to be investigated in depth by overviewing the entire survey.

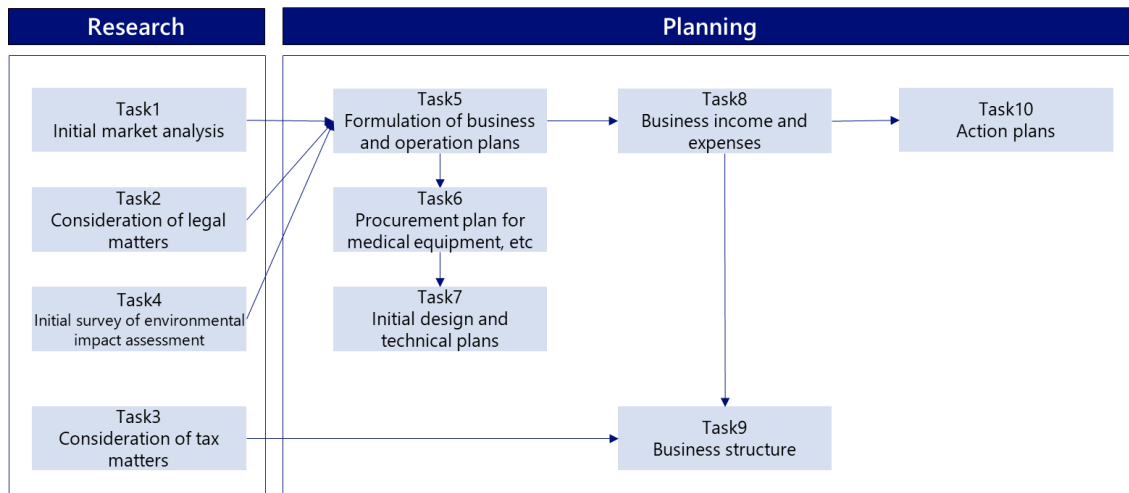


Figure 1: Overall picture of the survey

The methods and outputs for implementing each survey task are as follows.

Table 3: Survey tasks, survey methods and outputs

Survey task	Survey method	Output
1 Initial market analysis	<ul style="list-style-type: none"> • Desktop research • Analysis of various reports from the government, industry, external organizations, etc. • Conducting surveys through interviews 	<ul style="list-style-type: none"> • Macro research • Medical-related research • Competitive trend analysis • Simplified forecasting of target demand •
2 Consideration of legal matters	<ul style="list-style-type: none"> • Preliminary survey by a law firm 	<ul style="list-style-type: none"> • Summary of regulations and permits • Identification of risk factors • Organization of countermeasures for various risks

3	Survey task	Survey method	Output
	Consideration of tax matters	<ul style="list-style-type: none"> • Preliminary survey by an accounting firm 	<ul style="list-style-type: none"> • Overview of tax system (including preferential treatment system) • Identification of initial tax-related risk factors related to investment and fundraising schemes
	Initial survey for environmental impact assessment	<ul style="list-style-type: none"> • Implementation of a survey by an environmental consultant 	<ul style="list-style-type: none"> • Identification of risk factors • Clarification of the roles and responsibilities of related agencies and specific considerations for creating EIA or IEE in the full-scale survey • Prediction and evaluation of important environmental and social impact factors
	Formulation of business and operation plans	<ul style="list-style-type: none"> • Input from initial market analysis • Medical-related survey (market structure of medical facilities in Vietnam, diagnostic needs, etc.), competitive trend analysis (patient composition, strengths and weaknesses, etc.) • Input from legal considerations • Summary of regulations and permits (feasibility of providing services mainly by foreign doctors) • Input from initial environmental impact assessment survey • Discussions with each investor • Insights from Ishiikai FS in Myanmar 	<ul style="list-style-type: none"> • Business concepts and services offered • Ensuring operational structure • Formulation of initial staffing plan
	Formulation of procurement plans	<ul style="list-style-type: none"> • Input from initial market analysis • Competitive trends (procurement sources and costs of medical equipment, etc.) • Input from formulation of business and operational plan • Business concept and services offered • Interviews with local distributors 	<ul style="list-style-type: none"> • List of procurement items (pharmaceuticals and medical equipment) • Verification of local procurement feasibility and procurement costs • List of local suppliers
	Formulation of initial design and technical plans	<ul style="list-style-type: none"> • Input from formulation of business and operational plans • Input from formulation of procurement plan • List of procurement items • Discussions with each investor • Rough construction estimate by PM/CM company 	<ul style="list-style-type: none"> • Initial basic design specifications and perspectives • Rough construction estimate

Survey task		Survey method	Output
8	Formulation of business income and expense plans	<ul style="list-style-type: none"> • Input from formulation of business and operational plans • Business concept, service offered, and initial staffing plan • Input from formulation of procurement plan • Procurement costs • Input from formulation of initial design and technical plan • Rough construction cost estimate • Input from initial market analysis • Simple forecast of target demand • Consideration of tax matters • Overview of tax system 	<ul style="list-style-type: none"> • Equipment investment plan • Simplified business income and expense plan by scenario
9	Examination of business structure	<ul style="list-style-type: none"> • Monitoring of the new PPP law's developments (including consideration of its applicability) and investigation of past PPP/FDI cases in the hospital sector in Vietnam • Credit investigation of potential local partner companies • Input from formulation of business and operation plans • Input from formulation of business income and expense plans • Input from consideration of tax matters • Discussions with each investor • Discussions with financing providers 	<ul style="list-style-type: none"> • Business structure diagram • Initial analysis of key players • Roles and responsibilities of public and private sectors in implementing the project • Discussion and agreement status regarding organizational structure
10	Formulation of action plans	<ul style="list-style-type: none"> • Inputs from each survey item 	<ul style="list-style-type: none"> • Action plans

2 Initial market analysis

The planned location for the international hospital is in Di An City, which is in Binh Duong Province but borders with Ho Chi Minh City's Thu Duc District. Binh Duong Province is actively attracting industrial parks, taking advantage of its good access from Ho Chi Minh City, and its population and economy are rapidly expanding. Against this backdrop, the middle-income group working in factories and other places is increasing. However, because it is a developing region, the medical facilities are not sufficient, and the province has plans to double the existing number of hospital beds by 2030. Currently, it is believed that patients in need of medical care flow to Ho Chi Minh City, which has well-equipped medical facilities in the south, and the international hospital to be established in Di An City, which is located at the border with Ho Chi Minh City, could respond to the one-stop medical service needs in Binh Duong Province. Additionally, while there are foreign-owned hospitals and public central hospitals in Ho Chi Minh City, the advanced medical services provided by the international hospital may be able to meet the unmet needs of patients in Ho Chi Minh City.

In the initial market analysis, we grasped the macroeconomic trends in Vietnam, Dian City, where the international hospital will be established, and its neighboring city of Ho Chi Minh, as well as basic information related to healthcare and the trends of potential competitor hospitals. Through these factors, we gathered and organized fundamental information necessary for assessing the viability of the project, such as the necessity of establishing the hospital business and the attractiveness of the target market.

2.1 Macro research

In addition to basic information such as population and economic scale, we collect and organize information on foreign residents and Japanese residents, who are considered to be one of the main target customer groups.

2.1.1 Future growth potential of population

In 2021, the population of Vietnam was approximately 97.5 million, with a population of about 9.2 million in Ho Chi Minh City, which accounts for about 10% of the total population. The population is increasing annually, and according to the United Nations World Population Prospects, the domestic population is expected to exceed 100 million in 2023 and peak at around 110 million in 2050.

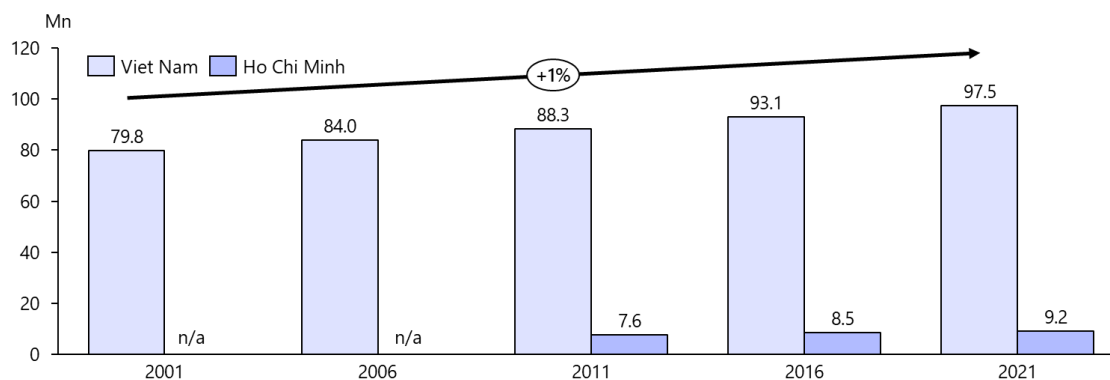


Figure 2: Population trends in Vietnam and Ho Chi Minh City

Source: Compiled from the Vietnamese government and Ho Chi Minh City statistics

On the other hand, the population of Di An City, where the international hospital is planned to be established, is about 500,000, and the population of Binh Duong Province to which the city belongs is about 2.7 million. This is a rapidly developing area with a growth rate of 5%, compared to Vietnam's population growth rate of about 1%.

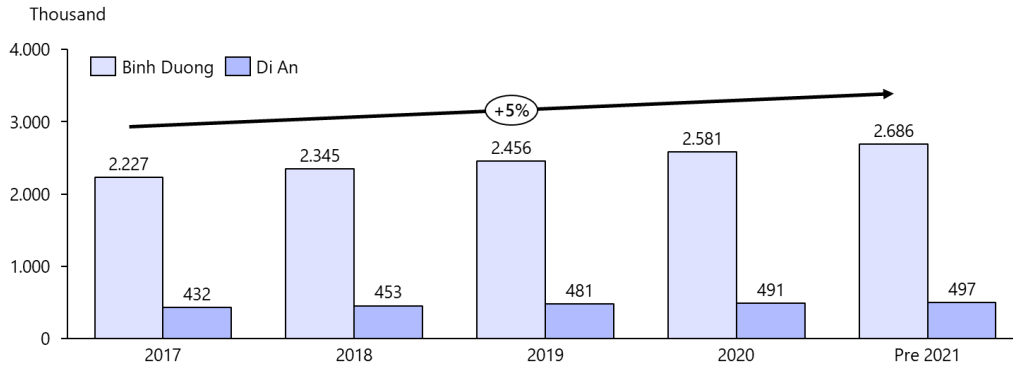


Figure 3: Population trends in Binh Duong Province and Di An City

Source: Compiled from Binh Duong City statistics

Looking at Vietnam's population composition by age, the working-age population between the ages of 15 and 64 accounts for approximately 70%, while the population aged 65 and over accounts for less than 10%, making the population young as a whole. However, compared to 20 years ago (2001), the population aged 0 to 14 has decreased from 30% to 23%, indicating a change in the composition of the population.

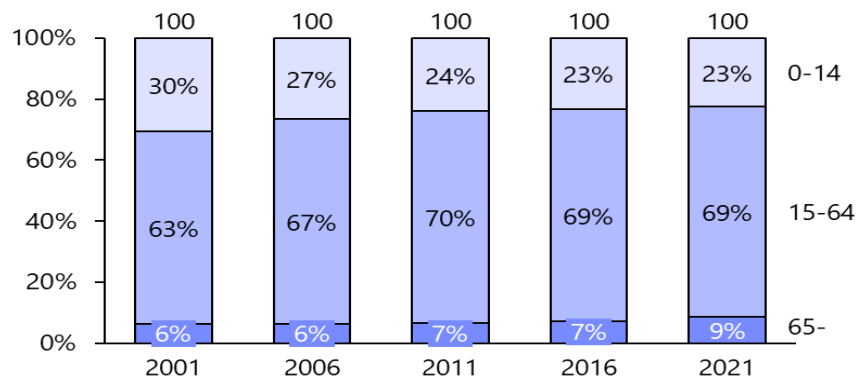


Figure 4: Demographic changes in Vietnam by age group (0-14 years, 15-64 years, 65 years and over)

Source: Compiled from the World Bank, "World Development Indicator"

Looking at the age distribution of the population in Ho Chi Minh City in 2021, the proportion of children and elderly people is lower compared to the overall population of Vietnam, while the proportion of working-age people is higher. This is assumed to be due to the migration of people from rural areas to Ho Chi Minh City for employment purposes. It is predicted that the proportion of elderly people in Ho

Chi Minh City will increase over time, but it is expected to remain at around 10% by 2031. This suggests that the city will still have a younger population structure compared to Japan¹, where the proportion of elderly people is predicted to exceed 30%. Although there is no official population data available for Binh Duong Province, its development as an industrial park suggests that its population structure may be similar to that of Ho Chi Minh City.

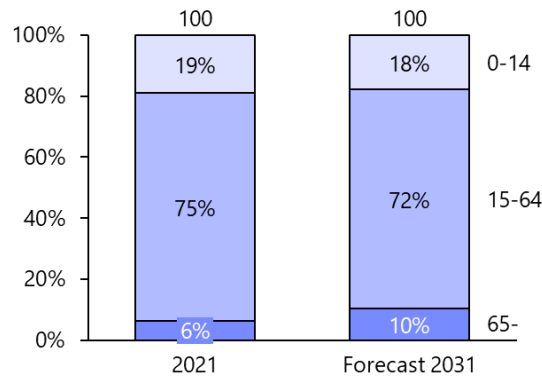


Figure 5: Demographic changes in Ho Chi Minh City by age group (0-14 years, 15-64 years, 65 years and over)

Source: Compiled from Ho Chi Minh City statistics

2.1.2 Economic scale and growth potential

The Vietnamese economy has grown rapidly, with its GDP increasing from 30 billion USD in 2001 to over 366 billion USD in 2021, more than 10 times its original size. The per capita GDP has also achieved similarly high growth, with an increase from 409 USD in 2001 to almost 10 times that amount at 3,756 USD in 2021, leading the country to move from a low-income country to a middle-income country.

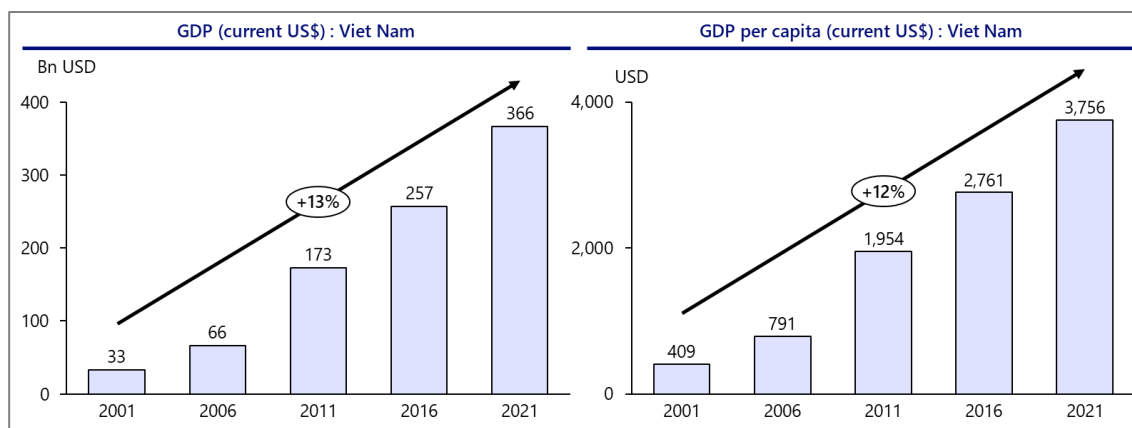


Figure 6: GDP and GDP per capita (nominal) in Vietnam

Source: Compiled from the World Bank, “World Development Indicator”

¹ Annual Health, Labour and Welfare Report 2020 Edition

In 2021, Ho Chi Minh City's GRDP (Gross Regional Domestic Product) was 57 billion USD, accounting for approximately 15% of the national GDP. When looking at GRDP per capita, it is approximately 1.6 times higher than the national average, at 6,229 USD. Note that the following graph has a short time period and the growth rate may appear low due to factors such as the impact of COVID-19 on economic growth in 2020 and 2021.

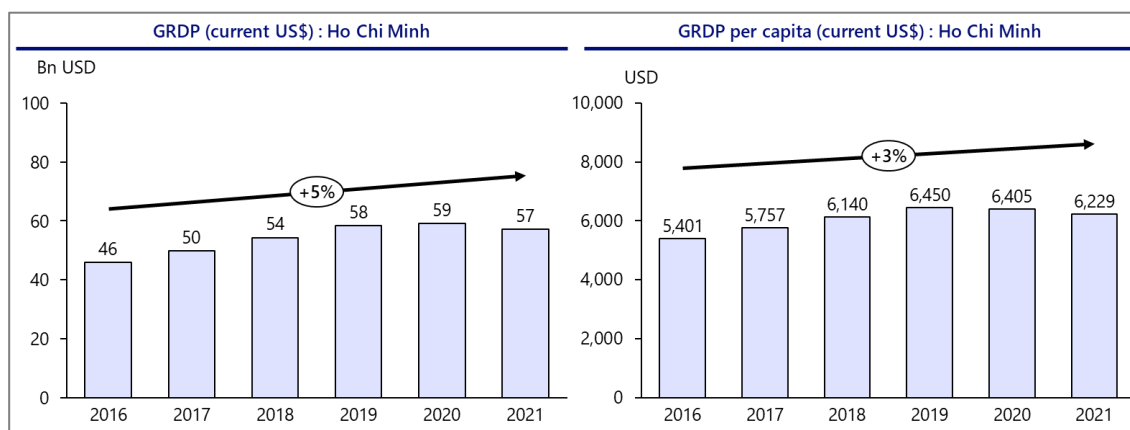


Figure 7: GRDP and GRDP per capita (nominal) in Ho Chi Minh City

Source: Compiled from Ho Chi Minh City statistics

The GRDP of Binh Duong Province in 2021 was 409 trillion VND, and the per capita GRDP was 6,578 USD, which is higher than that of Ho Chi Minh City. The presence of many companies, including foreign and local major companies in industrial parks, is believed to be pushing up the GRDP and per capita GRDP.

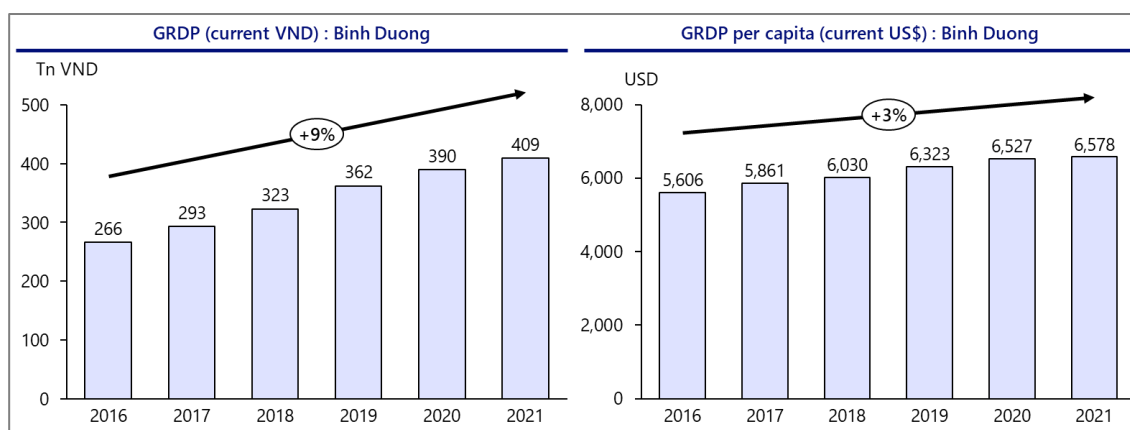


Figure 8: GRDP and GRDP per capita (nominal) in Binh Duong Province

Source: Compiled from Binh Duong Province statistics

2.1.3 Income of the residents in the area

In 2021, the average monthly income per capita in Vietnam was 4,205 thousand VND. However,

focusing only on Ho Chi Minh City, the average monthly income per capita was 6,008 thousand VND, which is 1.4 times higher than the national average. It should be noted that 2021 saw a decrease in income compared to the previous year due to the impact of COVID-19. When comparing the average monthly income per capita from 2018 to 2020, Vietnam had a growth rate of about 5%, while Ho Chi Minh City's growth rate was 3%.

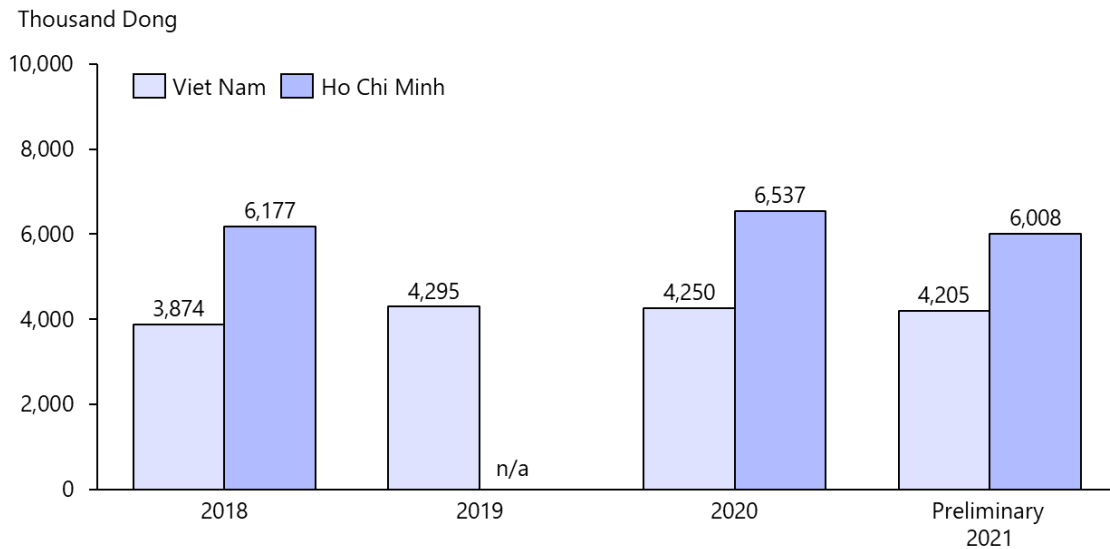


Figure 9: Per capita monthly income in Vietnam and Ho Chi Minh City (nominal)

Source: Compiled from the Vietnamese government and Ho Chi Minh City statistics

The top 20% of monthly per capita income earners in Ho Chi Minh City (Quintile 5) make 11,763 thousand VND (about 501 USD) per month, which is twice the city average. Looking at the difference between the top 20% and bottom 20% income earners, the gap has narrowed from 6.7 times in 2010 to 4.2 times in 2021.

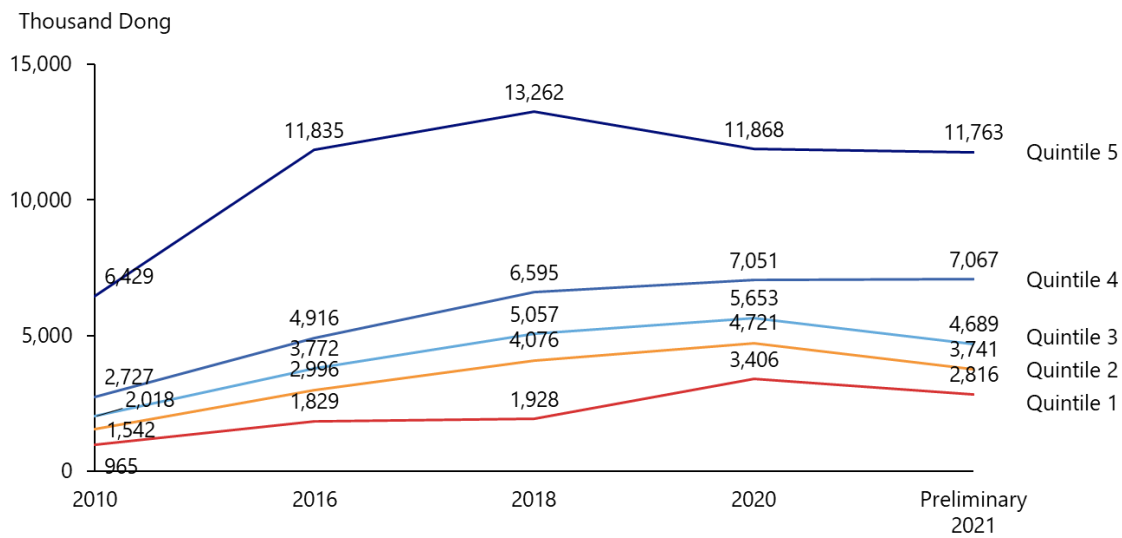


Figure 10: Per capita monthly income by quintile in Ho Chi Minh City (nominal)

Source: Compiled from Ho Chi Minh City statistics

According to the data, the average monthly income per capita in Binh Duong Province has exceeded 7 million VND (about 298 USD) in both 2020 and 2021, surpassing that of Ho Chi Minh City. Although there are not many affluent people like those in Ho Chi Minh City, many workers are employed in the industrial parks where foreign and major local companies are located, and they tend to have relatively high incomes.

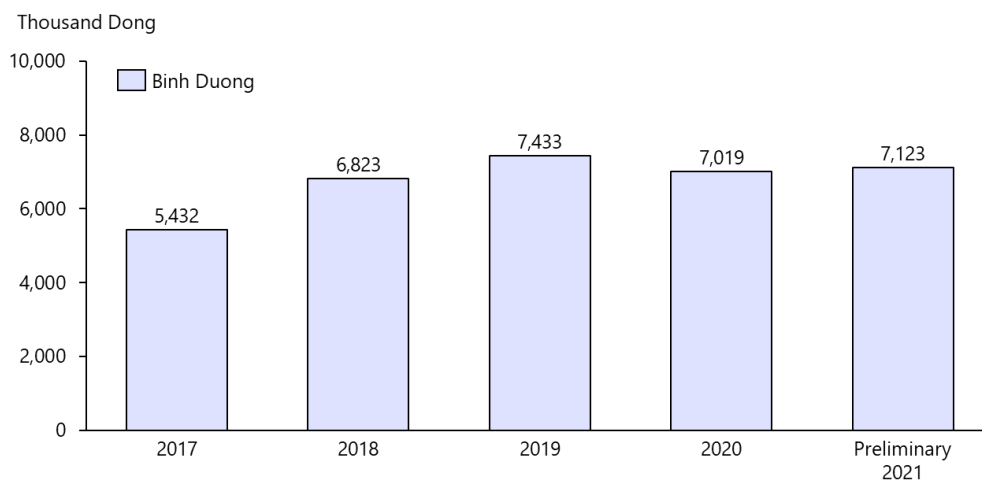


Figure 11: Per capita monthly income in Binh Duong Province (nominal)

Source: Compiled from Binh Duong Province statistics

2.1.4 Scale of Foreign residents and population of neighboring areas

Ho Chi Minh City is also a large city, and the area that can be covered by the international hospital

as its medical service area is limited. It is estimated that patients are flowing towards the center of Ho Chi Minh City, and the main target areas would be around the Thu Duc District and District 12.

The population of Ho Chi Minh City has been growing at an annual rate of 1.7% from 2015 to 2021, but when focusing on the urban areas where almost 70% of the population lives, the growth rate is limited to 0.8%. Looking at changes by district, the population of Thu Duc District, which is located near the area where the Hospital is planned to be built, has grown at an annual rate of 2.9%, resulting in an almost 20% increase. District 12 (+25.6%) and District 7 (+11.8%) have also seen population growth of more than 10%. On the other hand, there are districts such as District 1 (-10.3%) and District 5 (-18.2%) where the population has decreased by more than 10%.

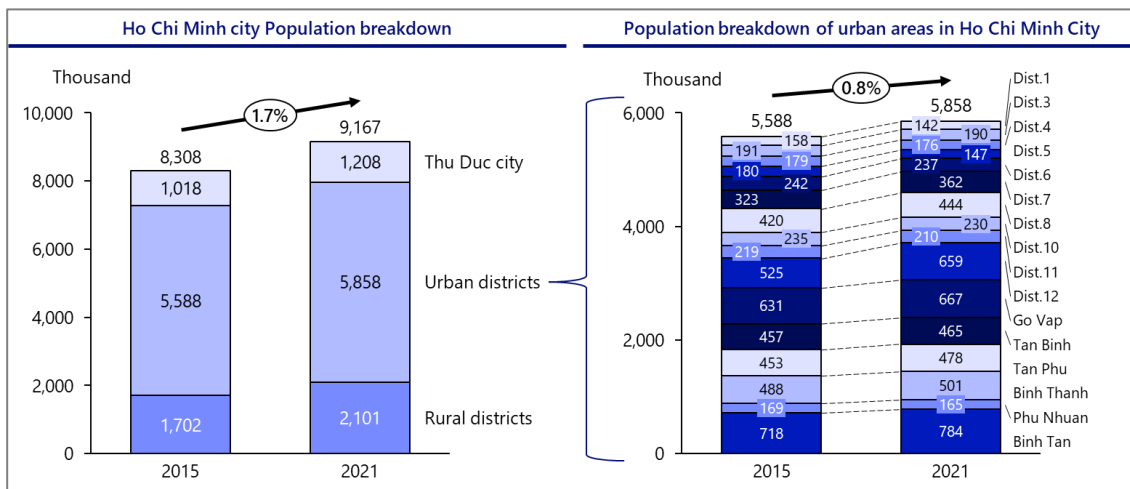


Figure 12: Breakdown of population in Ho Chi Minh City and urban areas

Source: Compiled from Ho Chi Minh City statistics

Foreign residents tend to prefer foreign-owned hospitals, and there is a potential to expand the medical service area if the hospital can effectively promote its level of medical and service quality. According to the announcement from the General Statistics Office of Vietnam, the number of foreign workers in the country is rapidly increasing, with nearly 120,000 foreign workers employed in Vietnam in 2019. There are approximately 16,000 foreign workers employed in Ho Chi Minh City.

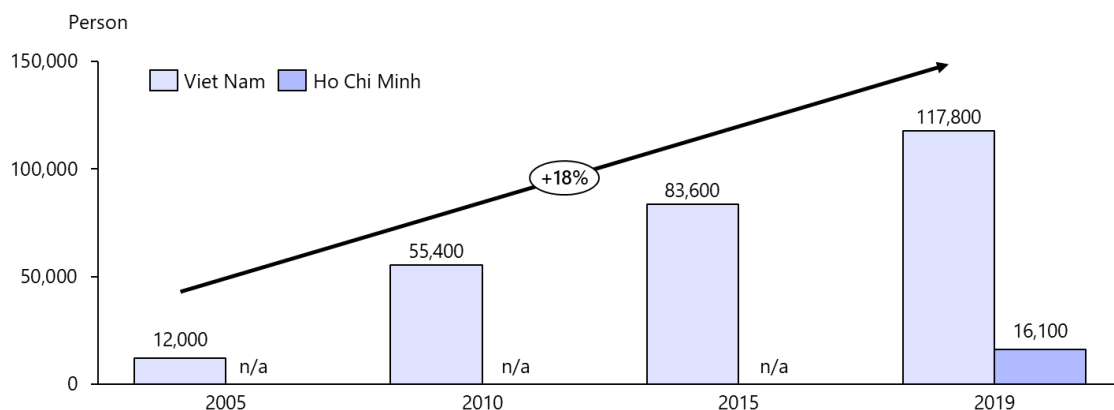


Figure 13: Number of foreign workers in Vietnam and Ho Chi Minh City

Source: Compiled from an article² of the General Statistics Office of Vietnam

The number of Japanese residents in Vietnam had been increasing and exceeded 23,000 by 2020, but due to the impact of COVID-19, it decreased in 2021 and there are now around 22,000 Japanese residents in Vietnam. Almost half of the Japanese residents in Vietnam (slightly over 10,000 people) live in Ho Chi Minh City, followed by Hanoi, where there are slightly over 8,000 Japanese residents. Approximately 90% of Japanese residents in Vietnam reside in these two cities.

In the industrial park of Binh Duong Province, many foreign companies, including Japanese automobile-related manufacturers, have established their business, and it is likely that both Japanese and foreign residents live in the province. However, the exact number is not clear.

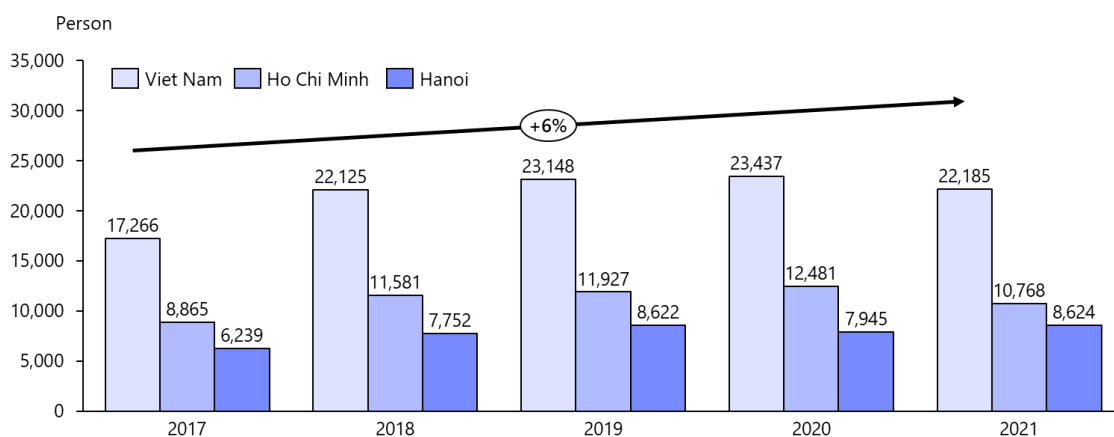


Figure 14: Japanese residents in Vietnam, Ho Chi Minh City, and Hanoi

Source: Compiled from the Ministry of Foreign Affairs, “Statistics on Japanese Residents Overseas”

2.1.5 Scale of Japanese residents in surrounding countries

The International Hospital aims to provide medical services that are particularly needed in the region at the time of its launch. Initially, the target service area may be limited, but it will gradually expand

² <https://consosukien.vn/lao-dong-nuoc-ngoai-o-viet-nam-qua-con-so-thong-k.htm>

and the hospital is ultimately to become a general hospital. Through the provision of highly specialized medical care, patients from neighboring countries such as Cambodia and Laos, where medical infrastructure is still insufficient, will also be targeted. Additionally, as Japanese-style medical care is emphasized, it is expected that Japanese residents will become a targeted clientele in particular. As of 2021, there are approximately 4,500 Japanese residents in Cambodia and approximately 800 in Laos.

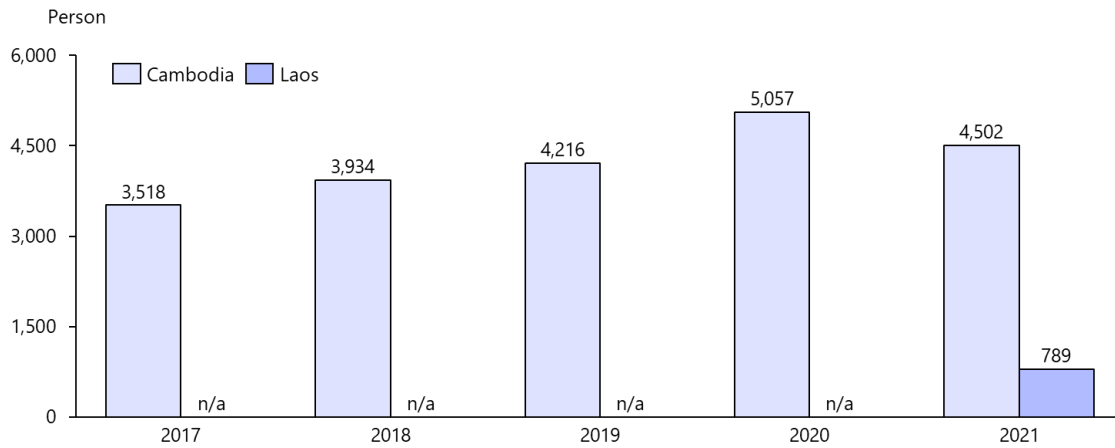


Figure 15: Japanese residents in Cambodia and Laos

Source: Compiled from the Ministry of Foreign Affairs, “Statistics on Japanese Nationals Overseas”

2.2 Medical-related research

In this section, we will organize basic information about healthcare in Vietnam and clarify the size of the healthcare market and domestic healthcare needs. We will also organize information on clients (patients) and existing hospitals and perform segmentation for each of them.

2.2.1 Trends in government and private healthcare expenditures

Medical expenditures in Vietnam have been increasing year by year, expanding by 8.5 times over 20 years from 1.8 billion USD in 2001 to 16 billion USD in 2020. Of the total medical expenditures, government spending accounted for only about a quarter in 2001 but increased to nearly half in 2020, indicating a significant rise in the proportion of government spending.

The per capita healthcare expenditure has increased by approximately 7.2 times in the 20 years from 2001, when it was 23 USD, to 166 USD in 2020. The ratio of government spending on healthcare has also increased from about a quarter in 2001 to nearly half in 2020, showing a trend similar to healthcare expenditure.

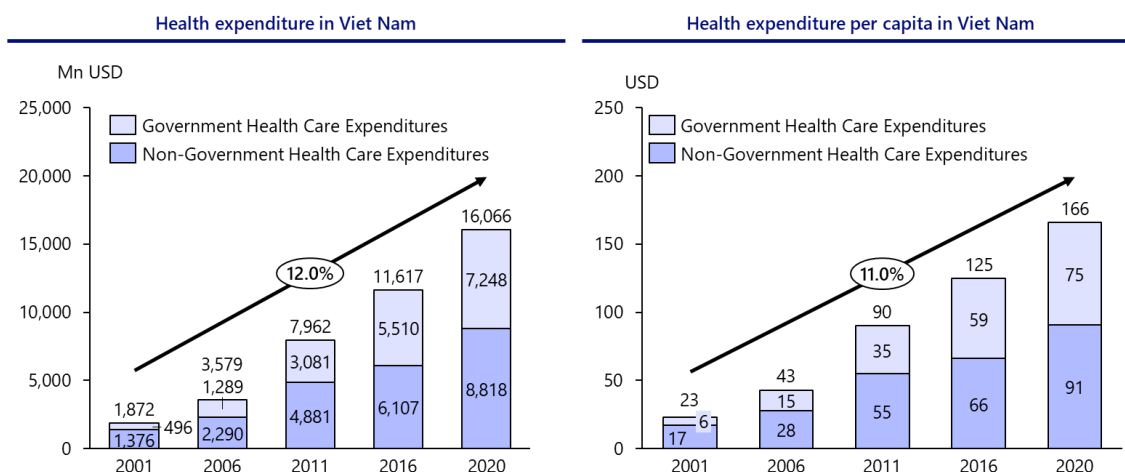


Figure 16: Vietnam's healthcare expenditure and per capita healthcare expenditure
 Source: Compiled from the World Health Organization, “Global Health Expenditure Database”

2.2.2 Medical Resources

The number of doctors in Vietnam is on the rise, with approximately 110,000 domestic doctors in 2021, resulting in a physician-to-population ratio of 11.1 per 10,000 people. Although this figure is significantly lower than the OECD38 average of around 36 and Japan's approximately 25 doctors per 10,000 people, it is still relatively high compared to neighboring countries such as Thailand, Cambodia, and Laos.

Furthermore, the number of hospital beds in Vietnam has been gradually increasing. As of 2021, there were 335,000 hospital beds in the country, with 31.2 beds per 10,000 people. Compared to Japan, which has a high number of hospital beds at around 128 beds per 10,000 people, Vietnam's number is very low, even lower than the OECD38 average of around 44 beds per 10,000 people. However, when compared to the number of doctors, the resource gap is smaller³.

Like many other countries, Vietnam also faces the issue of uneven distribution of medical resources, particularly in rural areas where there is a shortage of medical resources. In addition, like many other countries, Vietnam faces the challenge of unequal distribution of healthcare resources, particularly in rural areas where there is a shortage of medical resources.

³ OECD, “Health at a Glance 2021: Japan,” November 9, 2021

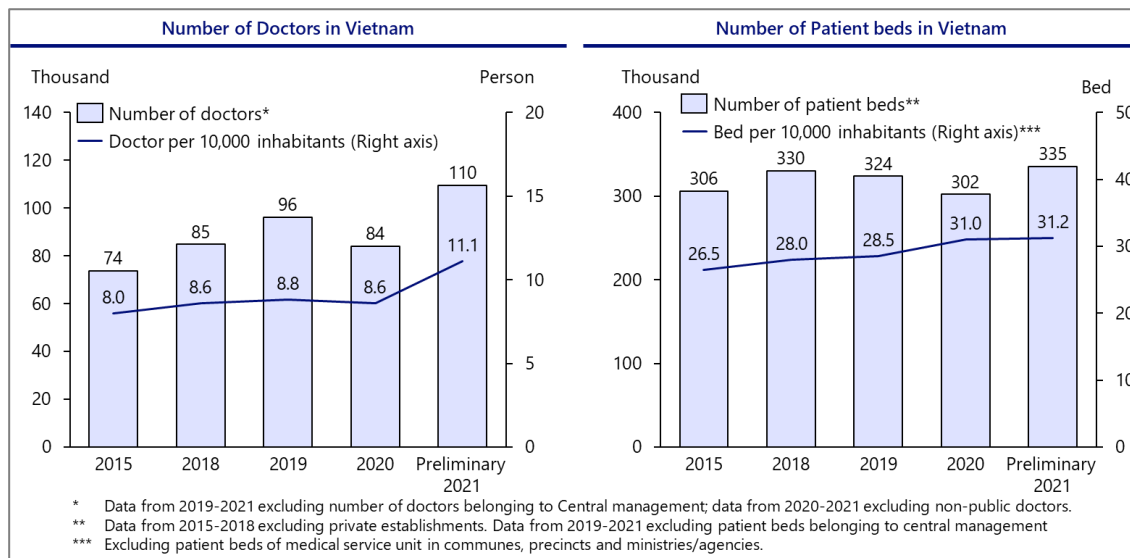


Figure 17: Number of doctors and hospital beds in Vietnam

Source: Compiled from Vietnamese government statistics

Focusing on healthcare facilities in Ho Chi Minh City, there were 468 medical facilities, including 125 hospitals, as of 2021. While the number of hospitals fluctuates every year, there has been a gradual increase compared to 2015, when there were 109 hospitals.

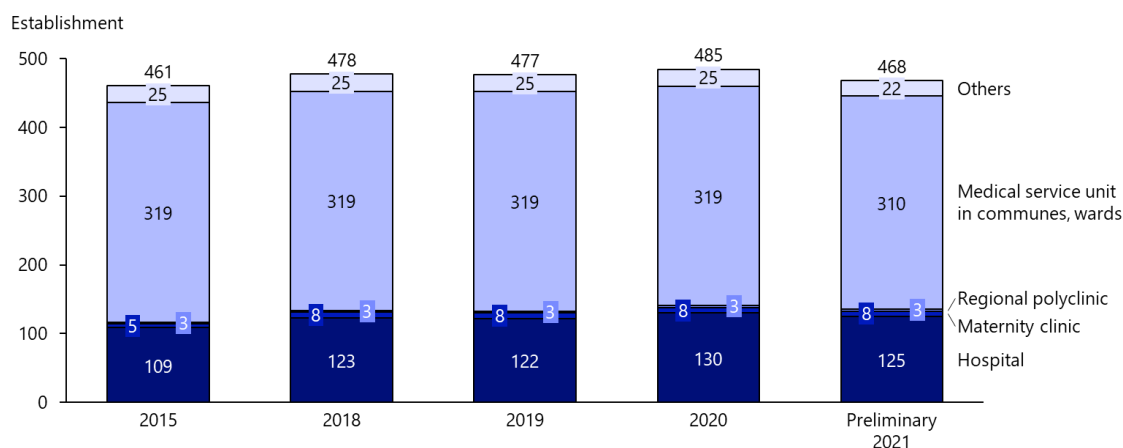


Figure 18: Healthcare facilities in Ho Chi Minh City

Source: Compiled from Ho Chi Minh City statistics

Looking at the hospitals in Ho Chi Minh City by ownership, out of the 125 hospitals, around half (63 hospitals) are public hospitals, while four out of the 62 non-public hospitals are foreign-invested⁴. In terms of hospital beds, public hospitals occupy nearly 90% of the total, and the number of beds per hospital

⁴ It is assumed that only hospitals established by foreign capital at the time of establishment are counted, as there are more than four foreign-invested hospitals in the city.

in public hospitals is overwhelmingly large, at 535.8 beds per hospital compared to 136.8 beds in foreign-invested hospitals and 77.2 beds in non-public hospitals.

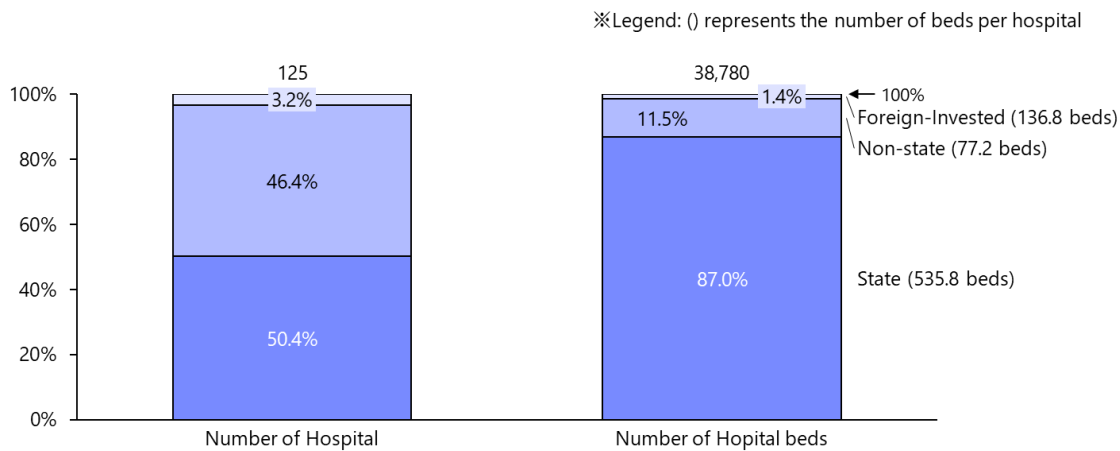


Figure 19: Breakdown of hospitals in Ho Chi Minh City by ownership (2021)

Source: Compiled from Ho Chi Minh City statistics

Looking at the breakdown by region, out of the 123 hospitals⁵, 108 hospitals (about 88%) are located in urban districts, and about 85% of the hospital beds are also located in urban districts. It can be observed that the number of hospitals and hospital beds is concentrated in urban districts considering the population size (urban population share is only about 64%).

Also, focusing on districts, hospitals and hospital beds are concentrated in three districts: District 5 (21 hospitals, 10,425 beds), District 10 (14 hospitals, 5,299 beds), and District 1 (17 hospitals, 3,797 beds), total of which accounts for 60% of the hospital beds in the urban districts as a whole. Given that the population of these three districts represents less than 10% of the total urban population, it can be inferred that medical resources are concentrated in these areas relative to the population.

If we focus on Thu Duc City, which is close to the area where hospital establishment is being considered, there are seven hospitals with 2,500 beds (6.5% share of hospital beds in Ho Chi Minh City). Considering that Thu Duc City accounts for 13% of the population of Ho Chi Minh City, there are not enough hospital beds.

⁵ The two hospitals under the jurisdiction of Ho Chi Minh City located in Binh Phuoc Province and Binh Duong Province are not included.

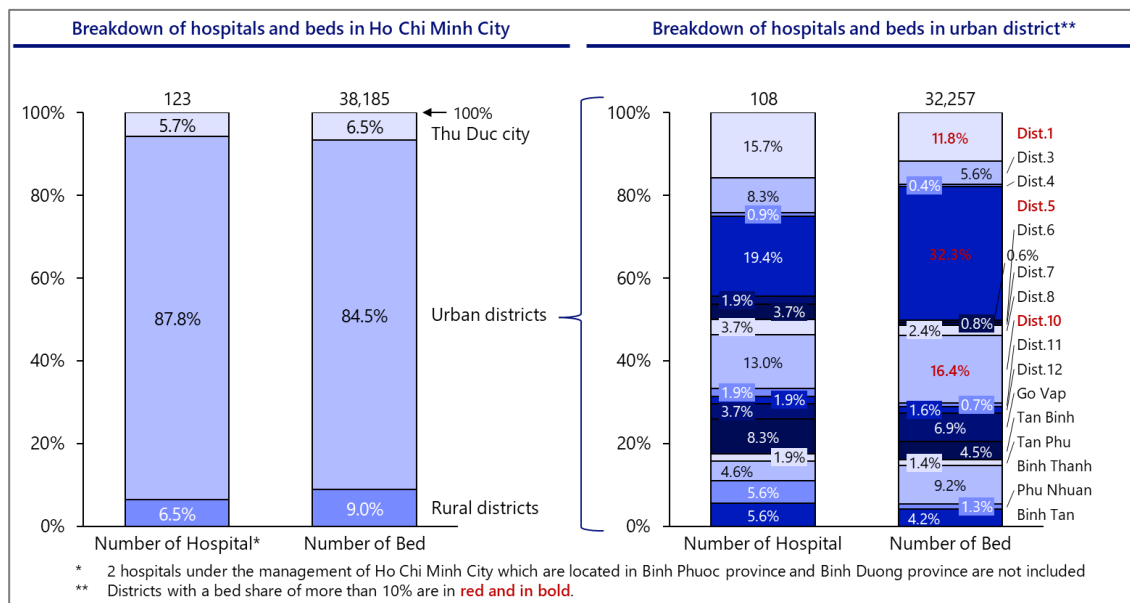


Figure 20: Breakdown of hospitals in Ho Chi Minh City by region (2021)

Source: Compiled from Ho Chi Minh City statistics

Focusing on the number of healthcare professionals in Ho Chi Minh City, in 2021 there were 18,521 doctors, 32,870 nurses, 1,723 pharmacists, and 5,788 medical technicians. Compared to 2015, the number of professionals in each category has increased.

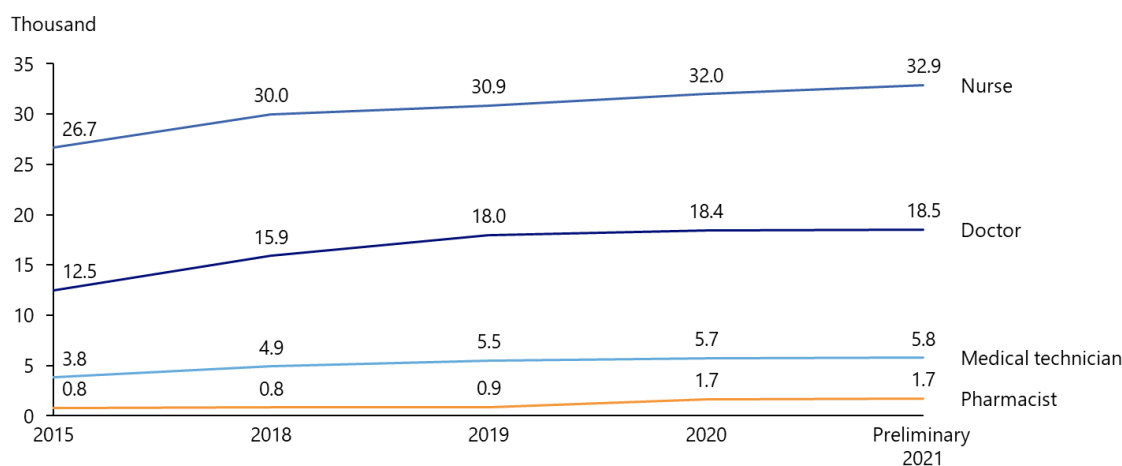


Figure 21: Major healthcare professionals in Ho Chi Minh City

Source: Compiled from Ho Chi Minh City statistics

In addition, including other medical assistants such as midwives, the total number of healthcare professionals in Ho Chi Minh City was about 86,000, which is a 33% increase compared to 2015.

Table 4: Healthcare professionals in Ho Chi Minh City

	2015	2021 (prov.)	% change from 2015 to 2021
Doctor	12,501	18,521	48%
Physician ^{※1}	2,976	2,137	-28%
Nurse	26,654	32,870	23%
Midwife	3,224	4,440	38%
Medical technician	3,805	5,788	52%
Pharmacist	799	1,723	116%
Pharmacist of middle degree	2,232	2,344	5%
Assistant pharmacist	275	168	-39%

※ Support doctors. Not qualified to open a medical clinic.

Source: Compiled from Ho Chi Minh City statistics

When looking at healthcare personnel by types of ownership, nearly 80% of healthcare personnel are employed in public hospitals. However, in comparison to the almost 90% share of hospital beds held by public hospitals, the share of healthcare personnel in these institutions is slightly lower. On the other hand, the number of healthcare personnel per bed in non-public and foreign-invested hospitals is higher than that of public hospitals for all types of personnel, including doctors, nurses, pharmacists, and medical technicians. In particular, non-public hospitals have nearly twice as many doctors and more than 70% more nurses per bed than public hospitals, indicating that a more robust healthcare personnel system is in place compared to public hospitals.

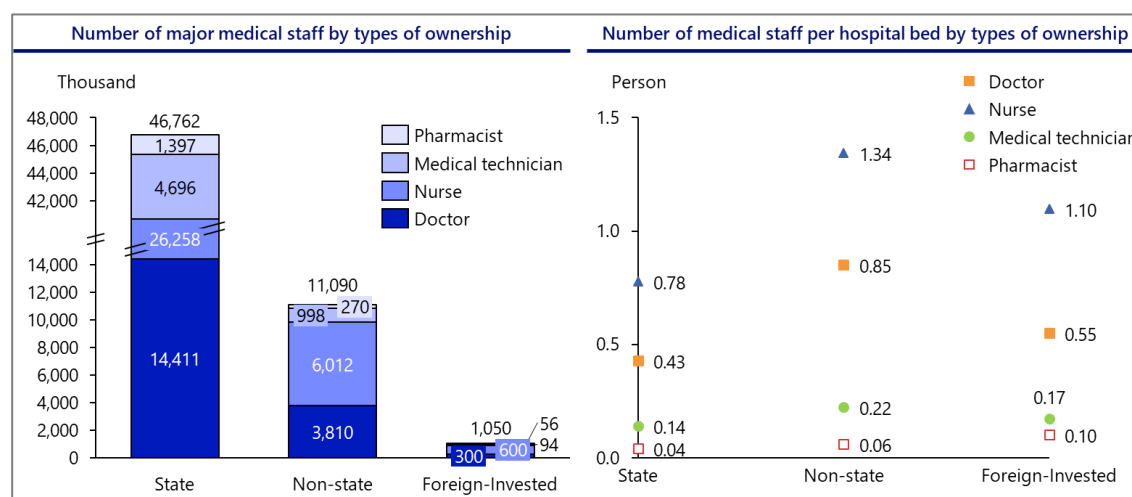


Figure 22: Number of healthcare personnel and personnel deployment per hospital bed by types of ownership (2021)

Source: Created from Ho Chi Minh City statistics

In Binh Duong province, there are 28 hospitals with 5,142 beds and 2,004 doctors as of 2021 as shown below. One characteristic of hospital resources in the area is that there are many beds in private hospitals. Local hospitals in the area include the Becamex International Hospital, the Hoan Hao Hospital

operated by the Keimeikai Medical Corporation, and Columbia Asia Hospital, a foreign-owned hospital (assumed to be foreign-owned).

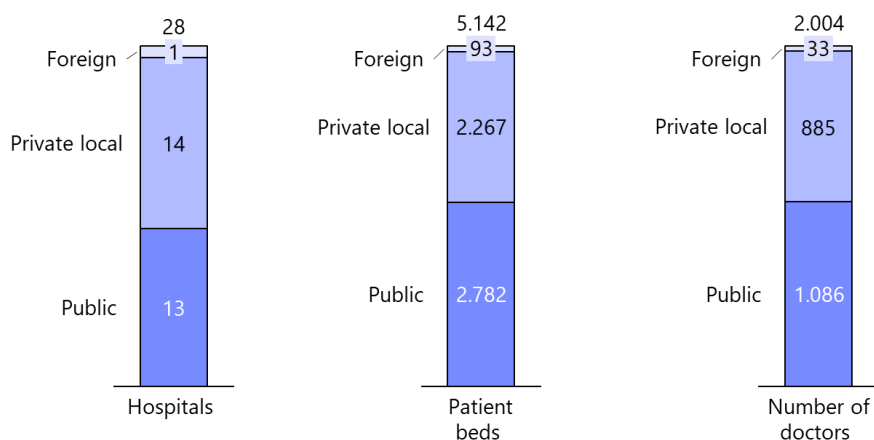


Figure 23: Medical resources of Binh Duong Province (2021)

Source: Compiled from Binh Duong Province statistics

When comparing the healthcare resources of Binh Duong Province and Ho Chi Minh City, with the number of hospital beds and doctors per 1,000 people used as indicators, Binh Duong Province has less than half the numbers of both resources of Ho Chi Minh City: 1.9 hospital beds compared to Ho Chi Minh City's 4.2 beds, and 0.7 doctors compared to Ho Chi Minh City's 2.0 doctors per 1,000 people.

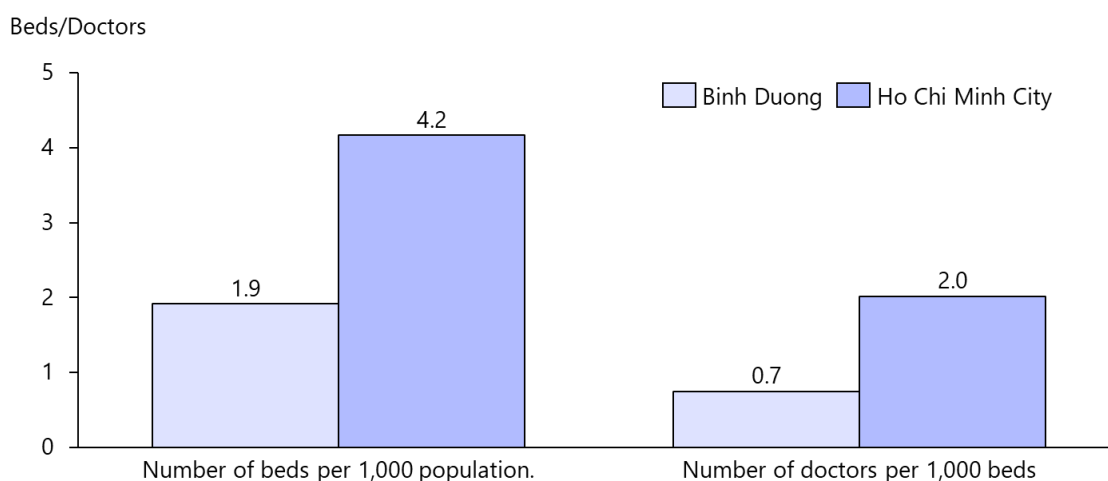


Figure 24: Comparison of healthcare resources between Binh Duong Province and Ho Chi Minh City

Source: Compiled from Binh Duong Province and Ho Chi Minh City statistics

Binh Duong Province is a rapidly developing urban area that aims to improve its healthcare infrastructure in line with the region's economic growth. By 2030, they aim to increase the population by 30%, per capita GDP by 2.3 times, and hospital beds and doctors by two times compared to 2021. Although these goals seem aggressive, as mentioned above, Binh Duong Province currently has less than half the

number of hospital beds and doctors compared to Ho Chi Minh City, and even if they were to double the number of hospital beds and doctors by 2030, the level would still be far below that of Ho Chi Minh City, given the projected population growth.

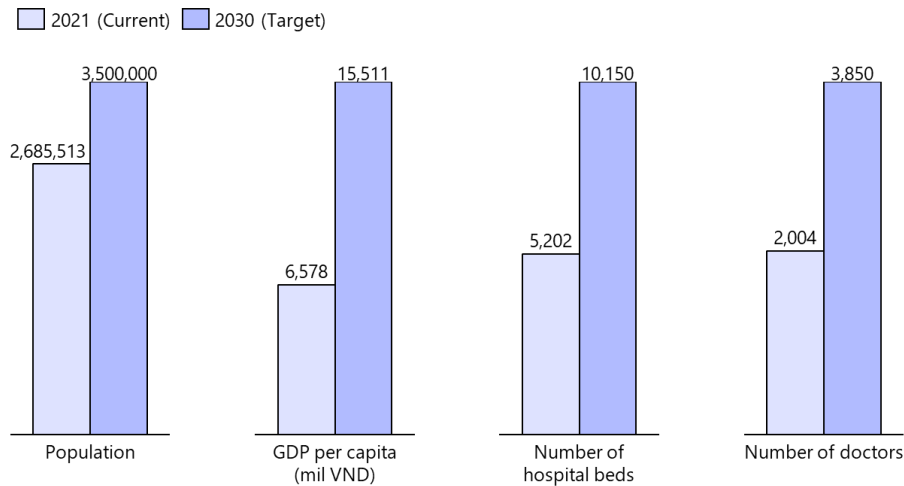


Figure 25: Binh Duong Province’s plan for 2030

Source: Compiled from an article⁶ of the Ministry of Health of Vietnam

2.2.3 Healthcare system and public insurance system in Vietnam

In Vietnam, there is a public insurance system called Vietnam Social Security (VSS), which was established in 1992. It is a universal health insurance system operated by the Ministry of Health, and the insurance covers 85-100% of medical expenses at designated medical institutions. As of 2020, more than 90% of the population was enrolled in this insurance.

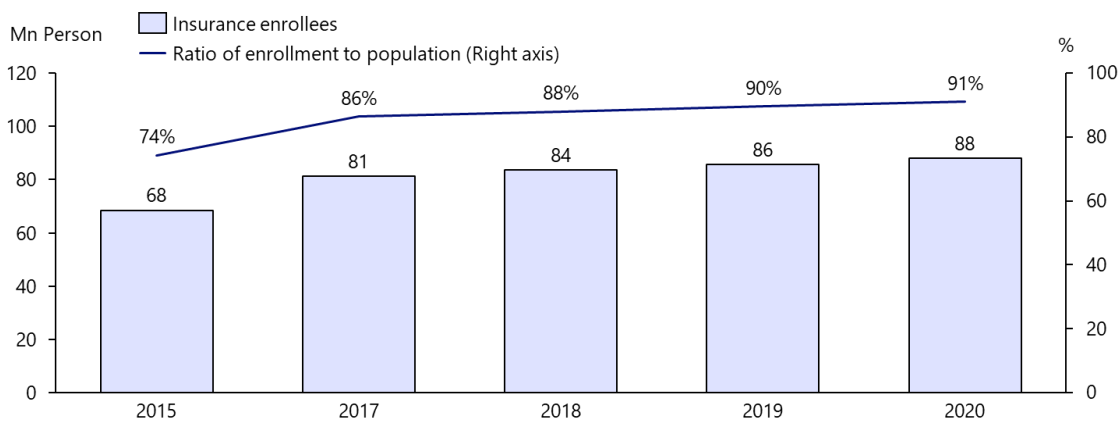


Figure 26: Number and percentage of public health insurance enrollees

Source: Compiled from Vietnamese Government statistics

⁶ https://moh.gov.vn/hoat-dong-cua-lanh-dao-bo/-/asset_publisher/TW6LTp1ZtwaN/content/binh-duong-moi-chuyen-gia-hien-ke-cho-nganh-y-te

The main three cases where the insurance system applies are: “receiving medical examination and treatment at a hospital designated on the medical insurance card,” “receiving a referral to a hospital based on the specialties in accordance with the regulations of the Ministry of Health,” and “receiving medical examination and treatment at an appropriate state-run hospital in case of emergency.”

In addition, Vietnam has introduced a referral system, which refers seriously ill patients to higher-level medical facilities. By receiving medical examination and treatment in accordance with the referral system (from district-level medical institutions to provincial-level medical institutions to central-level medical institutions), patients become eligible for insurance-covered medical treatment at lower costs⁷.

2.2.4 Disease structure and causes of death

Generally, in advanced countries, non-communicable diseases account for the majority of causes of death, while in emerging countries, deaths from causes other than non-communicable diseases account for a fair percentage. In Vietnam, it can be observed that deaths from infectious diseases, which accounted for 26% in 1990, have fallen to less than 10% in 2019.

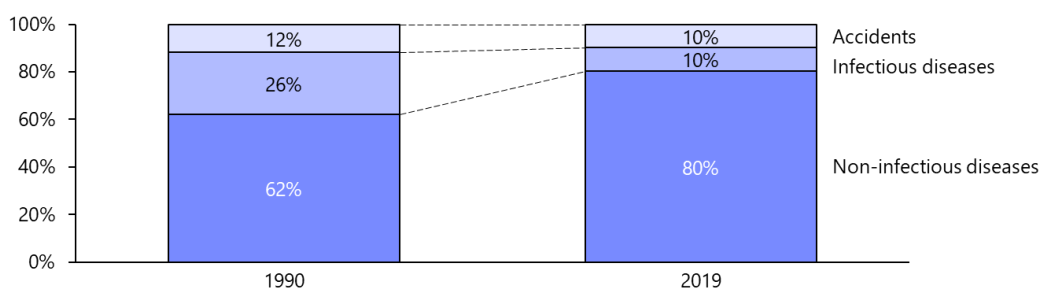


Figure 27: Changes in causes of death

Source: Compiled from the Ministry of Economy, Trade and Industry report⁸

As major diseases, it can be observed that lifestyle-related diseases such as cerebrovascular and heart diseases, diabetes, and neoplasms also account for a significant proportion in Vietnam.

⁷ The Ministry of Economy, Trade and Industry, “Global Healthcare Development Country Report - Basic Information on Healthcare Market Environment in Emerging Countries and Others: Vietnam Edition,” March 2021

⁸ The Ministry of Economy, Trade and Industry, “Global Healthcare Development Country Report - Basic Information on Healthcare Market Environment in Emerging Countries and Others: Vietnam Edition,” March 2022

Tumor / Cancer			Cardiovascular disease			Diabetes and kidney disease		
	Disease	Share		Disease	Share		Disease	Share
1	Trachea, bronchus and lung cancer	3.98%	1	Cerebrovascular disease	21.53%	1	Diabetes mellitus	4.65%
2	Colon and rectum cancer	2.46%	2	Ischemic heart disease	11.81%	2	Chronic kidney disease	3.40%
3	Breast cancer	1.89%	3	Hypertensive heart disease	2.59%	3	Acute glomerulonephritis	0.01%
4	Stomach cancer	1.43%	4	Cardiomyopathy/Myocarditis	0.56%			
5	Cervical cancer	0.75%	5	Atrial fibrillation/atrial flutter	0.49%			
6	Other malignancies	0.63%	6	Other cardiovascular diseases	0.29%			
7	Pancreatic cancer	0.62%	7	Rheumatic heart disease	0.24%			
8	Lip and oral cancer	0.55%	8	Aortic aneurysm	0.23%			
9	Leukemia	0.54%	9	Endocarditis	0.15%			
10	Prostate cancer	0.46%	10	Non-rheumatic valvular disease	0.06%			
11	Nasopharyngeal cancer	0.44%	11	Maternal vascular disease	0.03%			
12	Esophageal cancer	0.43%						
13	Other oropharyngeal cancer	0.38%						
14	Liver cancer	0.38%						
15	Ovarian cancer	0.36%						
16	Non-Hodgkin's lymphoma	0.31%						
17	Laryngeal cancer	0.29%						
18	Brain and central nervous system tumors	0.28%						
19	Bladder cancer	0.23%						
20	Gallbladder and bile duct cancer	0.20%						
21	Thyroid cancer	0.19%						
22	Kidney cancer	0.13%						
23	Non-melanoma skin cancer	0.11%						
24	Uterine cancer	0.11%						
25	Multiple myeloma	0.11%						
26	Hodgkin lymphoma	0.05%						
27	Other neoplasms	0.05%						
28	Melanoma skin cancer	0.04%						
29	Mesothelioma	0.03%						
30	Testicular tumor	0.02%						

Figure 28: Major diseases in Vietnam (2019)

Source: Compiled from the Ministry of Economy, Trade and Industry report⁸

2.2.5 Market structure of healthcare facilities in Vietnam

As mentioned earlier, there are both public and private hospitals in Vietnam, and the numbers of both are almost the same, though public hospitals occupy about 90% of the hospital bed share. With a universal insurance system in place, people can receive medical treatment at lower costs in public hospitals. On the other hand, as can be seen from the distribution of medical resources, the number of doctors and nurses per bed is significantly lower in public hospitals. Due to the low costs of medical treatment and the shortage of medical resources, public hospitals, especially central medical institutions, are always operating at more than 100% bed occupancy rate, and it is difficult to say that the patients' healing environment is good. Nonetheless, the trust in public medical institutions by the population is high, and even those who usually visit foreign-invested medical institutions or high-end private hospitals tend to visit public medical institutions when serious symptoms are suspected. In addition, medical tourism to Singapore and Thailand has been widespread among the wealthy.

Based on the above, hospitals in Vietnam can be broadly categorized into public and non-public hospitals. Non-public hospitals include a variety of medical institutions, from foreign-capital hospitals such as FV Hospital and City International Hospital to local high-end hospitals, such as Vinmec Central Park International Hospital under the VIN Group and Hoan My Sai Gon Hospital⁹.

In Binh Duong Province, as shown below, the major hospitals include a public hospital with 1,500 beds that is currently being reconstructed, as well as foreign-owned hospitals like Colombia Asia Hospital and Hoan Hao Hospital, and hospitals under local groups like Hoan My and Becamex.

⁹ Private medical group, acquired by a Singaporean investment company (Clermont Group) in 2013.

Table 5: Major hospitals in Binh Duong Province

Hospital name	Area	Establishment	Owner	Hospital beds	Doctors
Colombian Asia Hospital-Binh Duong	Thuan An City	2012	Hong Leong/ TPG *Foreign-owned	100	32
Hoa Hao Hospital	Di An City	2006	Keimeikai Medical Corporation *Japanese	147	200
Becamex International Hospital	Thu Dau Mot City	2016	Becamex IDC	300 (planned to expand)	80
My Phuoc General Hospital	Ben Cat Town	2007	Becamex IDC	489	N/A
Hoan My Binh Duong Private Hospital	Thu Dau Mot City	2011	Hoan My	350	N/A
Hoan My Van Phuc Hospital	1. Thu Dau Mot City 2. Thuan An City	1. 2011 2. 2013	Hoan My	1. 200 2. 150	N/A
Hanh Phuc International Hospital	Thuan An City	2011	Hoan My	N/A	N/A
Sai Gon Binh Duong General Hospital	Thu Dau Mot City	2009	N/A	200	N/A
Medic General Hospital Binh Duong	Thu Dau Mot City	2015	N/A	35	N/A
Binh Duong General Hospital (finished)	Thu Dau Mot City	1890	Public	1500	205
Binh Duong General Hospital (under construction)	Thu Dau Mot City	2023 (plan)	Public	N/A	N/A
Hospital for Women and Children	Thu Dau Mot City	2001	Public	200	N/A

Source: Compiled from hospital websites

Additionally, the following are the major private hospitals in Ho Chi Minh City that aim to provide advanced medical care, similar to the international hospital.

Table 6: Major private hospitals in Ho Chi Minh City

Hospital Name	Location	Year Established	Owner	Number of Beds	Number of Doctors	Medical Departments
FV Hospital (JCI accredited)	District 7	2003	Quadria Capital *Foreign-invested	220	190	Pediatrics, Obstetrics and Gynecology, Cardiology, Surgery, Gastroenterology, Internal Medicine, Infectious Diseases, Emergency Medicine, Traditional Medicine, Oncology, Ophthalmology, Nephrology, Anesthesiology, Otolaryngology, Dermatology, Psychosomatic Medicine/Psychiatry, Orthopedic Surgery, Dentistry, Neurology, Diagnostic Imaging

Hospital Name	Location	Year Established	Owner	Number of Beds	Number of Doctors	Medical Departments
Vinmec Central Park International Hospital (JCI accredited)	Binh Thanh District	2015	VinGroup	178	95	Pediatrics, Obstetrics and Gynecology, Cardiology, Surgery, Gastroenterology, Internal Medicine, Emergency Medicine, Oncology, Rheumatology, Nephrology, Anesthesiology, Otolaryngology, Dermatology, Orthopedic Surgery, Neurology, Diagnostic Imaging
CITY International Hospital	Binh Tan District	2014	Hoa Lam-Shangri-la Healthcare and Aseana Properties *Foreign-invested	320	N/A	Pediatrics, Obstetrics and Gynecology, Surgery, Internal Medicine, Infectious Diseases, Emergency Medicine, Oncology, Ophthalmology, Anesthesiology, Dentistry, Diagnostic Imaging
American International Hospital (JCI accredited)	Thu Duc	2018	My My Trading	120	51	Pediatrics, Obstetrics and Gynecology, Cardiology, Surgery, Gastroenterology, Internal Medicine, Emergency Medicine, Oncology, Rheumatology, Ophthalmology, Nephrology, Anesthesiology, Otolaryngology, Orthopedic Surgery, Dentistry, Diagnostic Imaging
Hoan My Thu Duc Hospital	Thu Duc	2021	Clermont group *Foreign-invested	500	50	Pediatrics, Surgery, Gastroenterology, Internal Medicine, Infectious Diseases, Emergency Medicine, Oncology, Rheumatology, Ophthalmology, Nephrology, Anesthesiology, Otolaryngology, Dermatology, Psychosomatic Medicine/Psychiatry, Orthopedic Surgery, Dentistry, Neurology, Diagnostic Imaging
Hoan My Sai Gon Hospital	Phu Nhuan District	1905		300	N/A	Pediatrics, Obstetrics and Gynecology, Cardiology, Surgery, Gastroenterology, Internal Medicine, Infectious Diseases, Emergency Medicine, Oncology, Rheumatology, Ophthalmology, Nephrology, Anesthesiology, Otolaryngology, Dermatology, Psychosomatic Medicine/Psychiatry, Orthopedic Surgery, Dentistry, Neurology, Diagnostic Imaging

Source: Compiled from hospital websites

Furthermore, focusing on the Thu Duc District adjacent to the proposed site for the international hospital, there are public hospitals such as Ung Buou Hospital, Thu Duc City Hospital, and Nhan Ai Hospital. It is worth noting that Thu Duc City Hospital, a regional general hospital, is undergoing reconstruction and is expected to expand from its current 700 beds to more than 1,000 beds (originally

scheduled for completion in 2023, but delays have been observed).

Table 7: Major public hospitals in Thu Duc City

Hospital name	Year established	Number of beds	Number of Doctors	Medical departments
HCMC Oncology Hospital	2011	1000	432	Cancer specialist hospital
Nhan Ai Hospital	2006	N/A	N/A	AIDS specialist hospital
Thu Duc City Hospital	1978	700	N/A	Pediatrics, Obstetrics and Gynecology, Surgery, Gastroenterology, Internal Medicine, Infectious Diseases, Emergency Medicine, Traditional Medicine, Rheumatology, Ophthalmology, Nephrology, Anesthesiology, Otorhinolaryngology (ENT), Dermatology, Orthopedics, Dentistry, Neurology, Diagnostic Imaging

Source: Compiled from hospital websites

2.2.6 Customer segments and customer characteristics

Many of the Vietnamese people use public hospitals, which are inexpensive. However, public hospitals are often overcrowded and the quality of services is not very good, so those who have a certain level of income tend to use private or foreign-owned hospitals. In addition, many employees of foreign and large companies have insurance that covers the costs of private or foreign-owned hospitals as part of their employee benefits, so they also tend to use those hospitals. Similarly, many expatriates and foreigners living in Vietnam also use foreign-owned or high-end private hospitals. As mentioned earlier, even relatively wealthy Vietnamese people tend to choose public hospitals if they suspect they have a serious condition because they believe that the best doctors are gathered in public hospitals. On the other hand, wealthy people and foreigners living in Vietnam tend to use medical tourism to travel to Singapore or Thailand for treatment, or to return to their home country for treatment if they suspect a serious condition.

Table 8: User Demographics by hospital type

		Public Hospitals	Non-public Hospitals	Foreign-owned Hospitals ¹⁰	Overseas Hospitals ¹¹ (Travel overseas)
Outpatient		<ul style="list-style-type: none"> Vietnamese (Monthly income up to 20 million VND) 	<ul style="list-style-type: none"> Vietnamese (Monthly income from 20 million VND) Vietnamese (With private insurance) 	<ul style="list-style-type: none"> Vietnamese (Monthly income from 100 million VND) Vietnamese (With private insurance) Wealthy Vietnamese Foreigners 	<ul style="list-style-type: none"> Wealthy Vietnamese Foreigners <p>*For health check-ups, etc.</p>
Inpatient	Mild	<ul style="list-style-type: none"> S/A 	<ul style="list-style-type: none"> S/A 	<ul style="list-style-type: none"> S/A 	<ul style="list-style-type: none"> S/A
	Severe	<ul style="list-style-type: none"> Vietnamese (excluding the wealthy) 	<ul style="list-style-type: none"> - 	<ul style="list-style-type: none"> Foreigners 	<ul style="list-style-type: none"> S/A

Source: Compiled based on local interviews

Patients primarily choose hospitals based on four criteria: ①treatment quality, ②service (comfort), ③convenience, and ④price (whether it is acceptable or covered by insurance). When it comes to outpatient or mild inpatient cases, as long as the desired treatment quality is met, the emphasis is placed on service (comfort) and convenience. Therefore, the possibility of choosing a hospital far away is low. On the other hand, when dealing with serious cases, treatment quality is more important than service (comfort) and convenience. Patients will choose a hospital with high treatment quality, even if it's a bit far away. The faith in public hospitals among Vietnamese people is strong, and as a result, central hospitals like Cho Ray Hospital always have occupancy rates exceeding 100%, with the number of patients exceeding the capacity of the hospital rooms. Despite this situation, many Vietnamese people still choose public hospitals based on the quality of treatment they offer.

From the perspective of the catchment area, patients tend to go towards the center (south) of Ho Chi Minh City based on the level of medical care available. Taking into account the location of the international hospital, the direct target catchment area includes Di An City (about 400,000 people) and part of the adjacent Thu Duc City (about 1.2 million people). Additionally, if it is possible to obtain the same reputation as the top public hospitals in terms of treatment quality, it will be possible to attract patients from wider areas, particularly in severe cases. In reality, Cho Ray Hospital, which is a public central hospital, and foreign-owned FV Hospital attract patients not only from the central and southern regions of Vietnam but also from overseas (Cambodia, Laos, Myanmar, etc.). From a marketing perspective, the international hospital can emphasize their collaboration with VNU-HCM and accumulate medical track records to attract

¹⁰ Foreign-owned hospitals and local high-end private hospitals such as Vinmec and Hoan My.

¹¹ Countries with high-level healthcare such as Singapore and Thailand. Foreign residents tend to choose their home countries.

more patients from wider areas.



Figure 29: Location and catchment area image of the international hospital

Source: Created from an image on TRIPPING! website

Furthermore, from the perspective of user demographics, the hospital aims to attract not only foreigners such as Japanese nationals residing in Vietnam but also the wealthy who seek medical treatment abroad and the general Vietnamese citizens, who make up a significant portion of the patient population. In terms of profitability, the goal of the international hospital is to make contributions to healthcare in Vietnam through medical care, and based on this concept, the hospital plans to offer competitive pricing compared to domestic private hospitals. Rather than emphasizing excessive luxury, the hospital plans to provide high-quality medical care at a reasonable price to attract patients.

2.2.7 Current challenges and patient needs for healthcare

As mentioned earlier, there is a shortage of hospital beds in Binh Duong Province. Despite the development of new industrial parks, urban areas, and population growth that have produced many middle-income earners, hospital infrastructure development has not kept up. Increasing the lifeline medical infrastructure is essential, regardless of public or private hospitals.

Furthermore, in terms of patient needs, there are two main aspects from the patient's perspective. One is to improve the level of medical care mainly in some medical fields of medical practice, and the other is to improve the quality and quantity of medical services.

Although the level of medical care has been improving year by year, there are still many challenges, and the following issues have arisen. The fact that patients are crowded in some public core hospitals is considered a manifestation of the people's doubt about the quality of medical care. In addition, the wealthy use medical tourism to seek treatment abroad when they suspect serious symptoms. According to the Ministry of Health, it is estimated that around 40,000 people visited Singapore,

Malaysia, Thailand, etc., for medical treatment purposes before the COVID-19 outbreak. They mainly sought treatment for cancer and cardiovascular diseases and their expenditure totaled 3 billion USD per year¹² (75,000 USD per person).

Table 9: Examples of problems that are occurring in the medical field

Field	Problems
Respiratory Surgery	Safe, reliable, accurate, and detailed diagnoses are required, but there are technical and knowledge gaps in basic procedures such as flexible bronchoscopy and CT interpretation.
Otolaryngology	There are approximately one million people with hearing loss in Vietnam, but their condition and degree of hearing loss have not been accurately examined or diagnosed.
Anesthesiology	Anesthesia-related accidents occur regularly.
Cancer Treatment	There is an increase in lung cancer caused by air pollution and high smoking rates, stomach cancer caused by H. pylori infection, and esophageal and colorectal cancer due to the westernization of dietary culture. However, there is no foundation in oncology for tumor surgery, and the level of technique is not high, resulting in many early recurrences even after surgery. Systematic lymph node dissection is not being performed, and staging diagnosis is not sufficient. As a result, postoperative adjuvant therapy cannot be received, and outpatient follow-up is not possible. There is also no surgical data available
Obstetrics and Gynecology	Although the infant mortality rate has improved, medical infrastructure is insufficient, especially in rural areas, and the infant mortality rate is still about 10 times higher than in Japan, with 10 deaths per 1,000 births.

Source: National Center for Global Health and Medicine, TENKAI project reports 2015-2020

In terms of medical services, patients are concentrated in some hospitals, causing a situation where hospital beds are always overflowing in such hospitals. As a result, there are problems with the hygiene environment for patients under treatment. In addition, there is a shortage of medical staff in hospitals, and patient care in public hospitals has become the responsibility of their families. Therefore, patients' families need to provide constant care. While some private hospitals have a sufficient number of doctors and nurses, prioritizing the quality of treatment often leads patients to choose public hospitals. In other words, high-quality treatment and high-level medical services are not available simultaneously.

2.3 Competitive research

In this section, we identify hospitals in Vietnam that have similar target customers and capabilities to the international hospital. We organize the basic information and features of these competitor hospitals, and summarize their positioning. According to the survey results, in terms of the quality of treatment and services, only the foreign-owned FV hospital in the vicinity is positioned similarly to the international hospital. While there are several hospitals with high-grade equipment and luxurious facilities, the number of hospitals that can provide advanced medical care and services is limited when verifying the level of physicians' skills and medical services offered. While Columbia Asia Hospital, a foreign-owned hospital, is located in Binh Duong Province, the medical services it provides are generally common and it may not be appropriate to use it as a benchmark. Also, VNU-HCM affiliated hospital, which will be our partner and

¹² Vietnam Investment Review, March 1st, 2019 <https://vir.com.vn/medical-tourism-model-full-of-potential-in-vietnam-66119.html>

may also be a competitor, has a policy of focusing on general internal medicine and surgery, which are in high medical demand as an educational and regional hospital.

2.3.1 Analysis 1: FV Hospital

FV Hospital is a foreign-funded hospital established in 2003 by a group of French doctors. Located in District 7 of Ho Chi Minh City, FV Hospital was the first hospital in southern Vietnam to obtain JCI accreditation, and provides regional residents with internationally standardized treatment and high-quality services all in one location. It is recognized as one of the top non-public hospitals in Ho Chi Minh City and accepts not only local Vietnamese and expatriates, but also patients from neighboring countries such as Cambodia, Laos, and Myanmar.

Table 10: Basic information of FV Hospital

Year of establishment	March, 2003
Owner/Investor	(1) Vien Dong Vietnam Medical Company Limited, (2) Quadria Capital (major healthcare investment company in Asia)
Capital	520,360,179,747 VND
Hospital address	District 7, Ho Chi Minh City (6 Nguyễn Lương Bằng, Tân Phú, Quận)
Number of beds	230 beds
Floor area	25,000m ²
Medical departments	Pediatrics, Cardiology, Surgery, Gastroenterology, Internal Medicine, Infectious Diseases, Emergency Medicine, Traditional Medicine, Oncology, Ophthalmology, Nephrology, Anesthesiology, Otolaryngology, Dermatology, Psychiatry, Orthopedics, Dentistry, Neurology, Diagnostic Imaging
Number of doctors	194 (Vietnamese 178, Non-Vietnamese 16)
Number of nurses	200 or more (including assistants)
Number of other staff members	Approx. 1,000
Number of patients per year	ND
Patient ratio	Vietnamese 75%, Foreigners (including tourists)25%
Number of surgeries per year	ND
Affiliated facilities	<ul style="list-style-type: none"> • ACC Chiropractic Clinic (Hanoi, Ho Chi Minh, Da Nang) • Cardiovascular Intervention Center • FV Saigon General Clinic
Hospital network collaborations	The Physician Cooperation Program allows non-member doctors to refer and send patients to FV Hospital.
Collaborations with universities	Vietnam National University Ho Chi Minh City (VNU-HCM) has signed a cooperation agreement regarding training with FV Hospital. The university provides training courses in engineering, management, and other related fields to develop human resources. FV Hospital offers opportunities for internships, site visits, and employment after graduation. Additionally, the hospital dispatches instructors for the university's training programs. Both parties also collaborate on joint training and research initiatives.
Other collaborations	The hospital provides short-term training courses on medical devices for medical students in collaboration with Philips.

Recent initiatives	<ul style="list-style-type: none"> • April 2022: Acquired ACC Chiropractic Clinic • June 2022: Improved obstetrics and gynecology services to provide a comfortable, five-star vacation-like childbirth experience.
Other relevant information	FV Hospital has become the first private hospital in HMC to obtain JCI accreditation. The hospital provides medical examinations and treatments not only for Vietnamese but also for foreigners such as Cambodians, Laotians, and Myanmar people. It aims to provide international standard medical care and enable both Vietnamese and foreigners to receive quality medical care and complete their treatments in Vietnam.

Source: Compiled from the hospital website and interviews, etc.

Table 11: Major medical equipment of FV Hospital

Equipment	Brand name	Model
3D/4D ultrasound diagnostic equipment	GE Healthcare	Voluson 730
CT scanner	GE Healthcare	Brivo CT385
CT scanner	Siemens	Somatom Drive
Electrocardiogram	GE Healthcare	N/A
Endoscope	Olympus	N/A
FibroScan (Liver stiffness measurement device)	Echosens	N/A
Echocardiogram	GE Healthcare	N/A
MRI scanner	Siemens	MR360 1.5T
Radiation therapy system	Siemens	Primus
Radiation therapy system	Elekta	N/A
Ear, nose and throat (ENT) endoscope system	Olympus	ENF – V2
Multipurpose vascular imaging device	Phillips	Allura Xper FD20
Ultraviolet therapy device	Waldmann	UV 7002
Magnetic stimulation device	MagVenture	N/A
Cataract surgery laser	Ziemer	New generation LDVZ8
X-ray examination device	GE Healthcare	OEC 9900

Source: Compiled from the hospital website and interviews, etc.

Table 12: Price information (delivery package)¹³

Description	Price range
Normal delivery	19,500,000~41,847,000 VND
Caesarean section	26,000,000~55,796,000 VND
Emergency caesarean section	31,000,000~61,796,000 VND
Upgrade to private room	1,210,000~1,452,000 VND/day
Upgrade to VIP room	4,220,000~5,064,000 VND/day

Source: Compiled from the hospital website and interviews, etc.

¹³ Excluding direct costs for doctors or surgeons, as well as other expenses that may arise during childbirth and hospitalization.

2.3.2 Analysis 2: Vinmec Central Park International Hospital

Vinmec Central Park International Hospital is one of the hospitals operated by Vinmec Healthcare System (Vinmec), a hospital group developed by Vin Group, a major local conglomerate. Vinmec was established in 2012 and currently operates seven hospitals and four clinics, aiming to provide world-class treatment and high-quality medical services through excellent medical teams. Vinmec Central Park International Hospital is one of the flagship hospitals established by the group in Ho Chi Minh City in 2015 and has been JCI accredited since 2017.

Table 13: Basic information of Vinmec Central Park International Hospital

Year of establishment	2015
Owner/Investor	Vin Group
Capital	12 trillion VND
Hospital address	Binh Tan District, Ho Chi Minh City (208 Nguyễn Hữu Cảnh, Phường 22)
Number of beds	178 beds
Floor area	38,643 m ² (7 floors above ground, 3 floors below ground)
Medical departments	Pediatrics, Obstetrics and Gynecology, Cardiology, Surgery, Gastroenterology, Internal Medicine, Emergency Medicine, Oncology, Rheumatology, Nephrology, Anesthesiology, Otorhinolaryngology (ENT), Dermatology, Orthopedics, Neurology, Diagnostic Imaging
Number of doctors	95 (Vietnamese 82, Non-Vietnamese 13)
Number of nurses	N/A
Number of other staff members	N/A
Number of patients per year	Outpatients and inpatients in total (2020): Approx. 105,000
Patient ratio	Vietnamese 90%, Foreigners 10%
Number of surgeries per year	Surgical operations (2020): Approx. 21,000
Affiliated facilities (hospitals)	<ul style="list-style-type: none"> • VINMEC TIMES CITY • VINMEC DA NANG • VINMEC NHA TRANG • VINMEC HAI PHONG • VINMEC HA LONG • VINMEC PHU QUOC
Hospital network collaborations	In 2021, Saigon obstetrics and gynecology medical center, Duy Khang Clinic signed an agreement for storage services of umbilical cord blood and umbilical cord tissue.

Other collaborations (as Vinmec Group)	<ul style="list-style-type: none"> Established Vietnam-American Liver Center (VALC) in cooperation with Asia American Medical Corporation (AAMG) Signed an agreement with Seoul National University Hospital to cooperate on health examinations for early screening of risks for cancer, heart disease, diabetes, stroke, and elderly diseases. Collaborate with the US-based Cleveland Clinic Healthcare System to allow medical staff to participate in capacity-building programs in the US. Signed a cooperation agreement with Ewha Womans University Seoul Hospital on capacity-building support in the three fields of oncology, obstetrics and gynecology, and degenerative joint disease. Collaborate with ICON Group (Australia) in the field of cancer and established Vietnam's first Center of Excellence facility. Signed a memorandum of understanding with pharmaceutical company Roche for three years (2022-2025) for personalized treatment solutions. Roche provides the Evidens platform for cancer treatment and hematological diseases.
Recent initiatives	In 2023, Thu Duc International Vinmec Hospital, a seven-story, 300-bed facility with a floor area of 36,000 m ² , is scheduled to open in Thu Duc City.
Other relevant information	JCI accredited

Source: Compiled from the hospital website and interviews, etc.

Table 14: Major medical equipment of Vinmec Central Park International Hospital

Equipment	Brand name	Model
MRI	Siemens	Magnetom skyra 3.0T
MRI	GE Healthcare	Signa Pioneer 3.0T
CT scanner	Toshiba	TSX - 301C
CT scanner	GE Healthcare	N/A (16-row)
CT scanner	GE Healthcare	CT 512 Revolution
PET/CT	GE Healthcare	PET/CT GE Discovery MIDR
SPECT/CT	GE Healthcare	Discovery NM/CT 670 Pro
Ultrasound diagnostic equipment	GE Healthcare	Logig E9
Ultrasound diagnostic equipment	GE Healthcare	Voluson E6
Ultrasound diagnostic equipment	GE Healthcare	Voluson E10
3D breast ultrasound diagnostic equipment	GE Healthcare	3D Invenia ABUS
Cardiovascular ultrasound equipment	GE Healthcare	4D Vivid - E95
Angiography equipment	GE Healthcare	Innova IGS 530
Equipment for transcatheter aortic valve replacement surgery	Medtronic Group	Evolut R (EVR)
High-brightness light source device	Olympus	EVIS EXERA III CV-190/CLV-190
Hybrid operating room	GE Healthcare	IGS 730
Operating room system	KARL STORZ	OR1

Equipment	Brand name	Model
Extracorporeal shock wave lithotripsy (ESWL)	Lisa laser Products	Sphinx
Radiation therapy equipment	Varian	Truebeam

Source: Compiled from the hospital website and interviews, etc.

Table 15: Price information of Vinmec Central Park International Hospital

Medical Services			Price (USD)	
Outpatient	General medical care	General physician	With appointment	17
			Without appointment	46
		Specialist physician	With appointment	29
			Without appointment	46
	after-hours/holiday consultation fee (additional charge)			12~25
Other	Endoscopic examination (ENT)		51~76	
Inpatient	Emergency	Medical care		76
		Hospital monitoring (1-12 hours)		49~116
		Ambulance transportation	Within 10km	93
	10-20km		186	
	Hospitalization	Room fee	Single	161/day
			Deluxe	423/day
			Suit	1,000/day
		Special hospitalization based on physician's orders	Normal	211/day
			ICU general	296/day
			ICU isolation room	381/day
HDU general			211/day	
HDU isolation room	296/day			

Source: Compiled from the hospital website and interviews, etc.

Financial Information

The following is the financial statement of Vinmec (the healthcare division of Vin Group), and it should be noted that it does not solely represent the financial situation of Vinmec Central Park International Hospital. While the financial statement shows a deficit, Vin Group continues to establish new hospitals in developing areas with each urban development project. It is possible that hospital operations constitute only a small portion of the group's business portfolio. Therefore, they may not be focusing solely on the short-term profits of individual hospitals, but rather considering the financial situation of the entire urban development projects.

It should also be noted that the COVID-19 pandemic had a significant impact on the financial performance of many hospitals in 2020 due to movement restrictions and other factors. Although the situation has improved in 2021 compared to 2020, complete recovery has not yet been achieved.

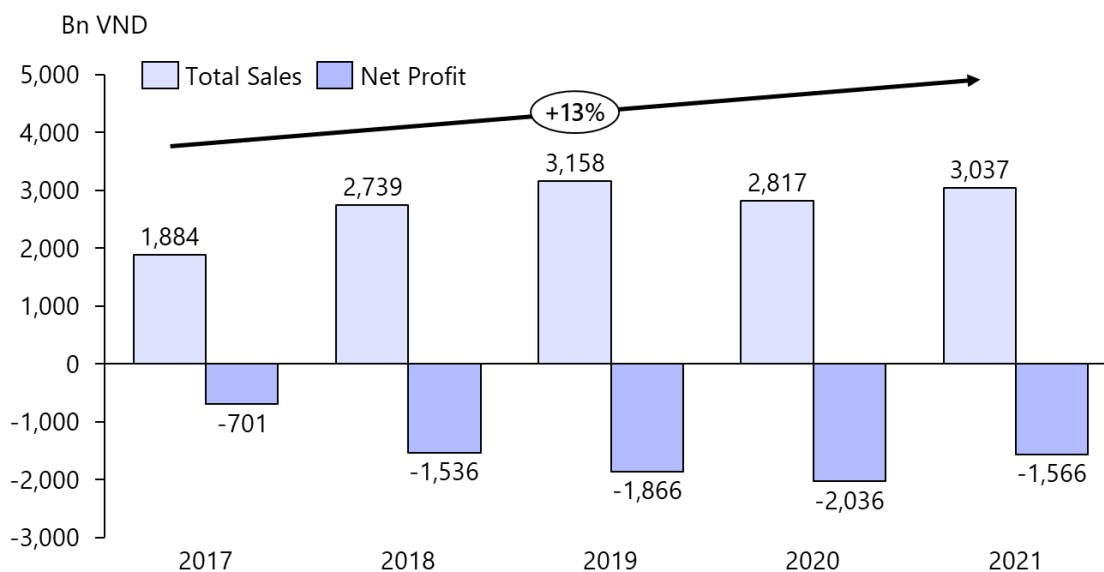


Figure 30: Financial performance trend of VINMEC

Source: Compiled from Speeda database

▪ Systems used

Medical software and applications developed by Vinbrain, a Vin Group member company, are used.

The main applications include:

- DrAid™ Appliance: Medical image screening system that utilizes artificial intelligence (AI)
- DrAid™ Teleradiology: Remote image diagnosis system
- AIviCare: Remote medical examination platform that supports online consultations

2.3.3 Analysis 3: Hoan Hao General Hospital

Hoan Hao General Hospital is the only Japanese hospital in Vietnam, operated by Hoan Hao Holdings, in which Keimeikai medical corporation has invested. It is located in Di An City, where the international hospital is planned to be established. Hoan Hao Holdings started its business in 2006 and currently operates one hospital and two clinics in Ho Chi Minh City and Binh Duong Province. Keimeikai acquired the group before the spread of COVID-19 in 2018.

Note that Hoan Hao General Hospital is a general hospital with a strong local flavor, rather than emphasizing luxury or high-end services like FV Hospital and Vinmec Central Park International Hospital. Although it has started to promote Japanese-style medical care after the acquisition by Keimeikai, it is currently recognized as a local private hospital with almost all patients being Vietnamese and no foreign doctors.

Table 16: Basic information of Hoan Hao General Hospital

Year of establishment	2006
Owner/Investor	Keimeikai Medical Corporation
Capital	N/A
Hospital address	Di An City, Binh Duong Province (26/14 KP. Binh Duong 2. An Binh Ward)
Number of beds	147 beds
Floor area	Approx. 12,000 m ²
Medical departments	Pediatrics, Obstetrics and Gynecology, Surgery, Internal Medicine, Emergency Medicine, Traditional Medicine, Anesthesiology, Otorhinolaryngology (ENT), Dermatology, Dentistry, Diagnostic Imaging
Number of doctors	200 (all Vietnamese)
Number of nurses	500 staff members in total
Number of other staff members	
Number of patients per year	Approx. 500,000 outpatients/ year
Patient ratio	Almost 100% Vietnamese
Number of surgeries per year	2,500 surgeries/ year
Affiliated facilities	<ul style="list-style-type: none"> • Clinic 1 (District 9, Ho Chi Minh) • Clinic 2 (Binh Duong Province)
Recent initiatives	In December 2018, Keimeikai acquired shares of Hoan Hao Holdings, and CUC Inc., a M3 Group member company, acquired shares of a company that provides operational support for Hoan Hao Holdings.

Source: Compiled from the hospital website

Table 17: Major medical equipment of Hoan Hao General Hospital

Equipment	Brand name	Model
MRI	GE Healthcare	Signa Explorer
CT scanner	GE Healthcare	CT 512 Revolution
General-purpose ultrasonic diagnostic imaging equipment	GE Healthcare	LogiQ P7
Glycohemoglobin analysis device	Arkray	Adams A1c HA-8180T
Clinical chemistry analyzer	Beckman Coulter	AU680

Source: Compiled from the hospital website

Table 18: Price information of Hoan Hao General Hospital

		Medical Services	Price (USD)	
Outpatient	General medical care	General medical examination	4	
	Examination	Electrocardiogram, ultrasound, endoscopy, X-ray, CT scan, MRI, etc.	2-127	
		Blood and urine tests	1-4	
	OB/GYN	Maternity checkup package	72-258	
	Pediatrics	Newborn checkup package	85	
	Health checkup	Standard plan	Male	68
			Female	76
Vaccination	Various	4100		
Inpatient	Emergency	Emergency medical examination	8	
	Surgery	Carpal tunnel syndrome	150	
	Delivery	Normal vaginal delivery	112	
		First-time cesarean section	217	
		Repeat cesarean section	250	
	Maternity and delivery package	Examination and delivery package (vaginal delivery)	368	
		Examination and delivery package (cesarean section, first-time)	540	
		Examination and delivery package (cesarean section, repeat)	575	
Room fee	Bed type 3, Class II	8/day		

Source: Compiled from the hospital website and interviews

▪ Policies

Hoan Hao General Hospital aims to utilize the rich experience of its owner company (Keimeikai) and introduce the latest medical equipment in line with Japanese standards. The specific details are as follows:

- i. Diagnosis using artificial intelligence (AI)
- ii. Remote medical examination
- iii. Rehabilitation using robots
- iv. Monitoring of patients using mobile applications
- v. Improvement of health checkups for corporations
- vi. Collaboration with medical universities in Japan for human resources cooperation.

▪ Financial information

The following shows the income and expenses of Hoan Hao Holdings (group), which includes the income and expenses of clinics and other separate operations in addition to their hospital. Until 2019, the revenue gradually increased, and the net profit margin was maintained at 3-4%. However, in 2020, the income of many hospitals deteriorated due to the impact of COVID-19 and related restrictions, and the group incurred a large deficit, too. Although the situation has improved in 2021 compared to 2020, the group has not yet become profitable.

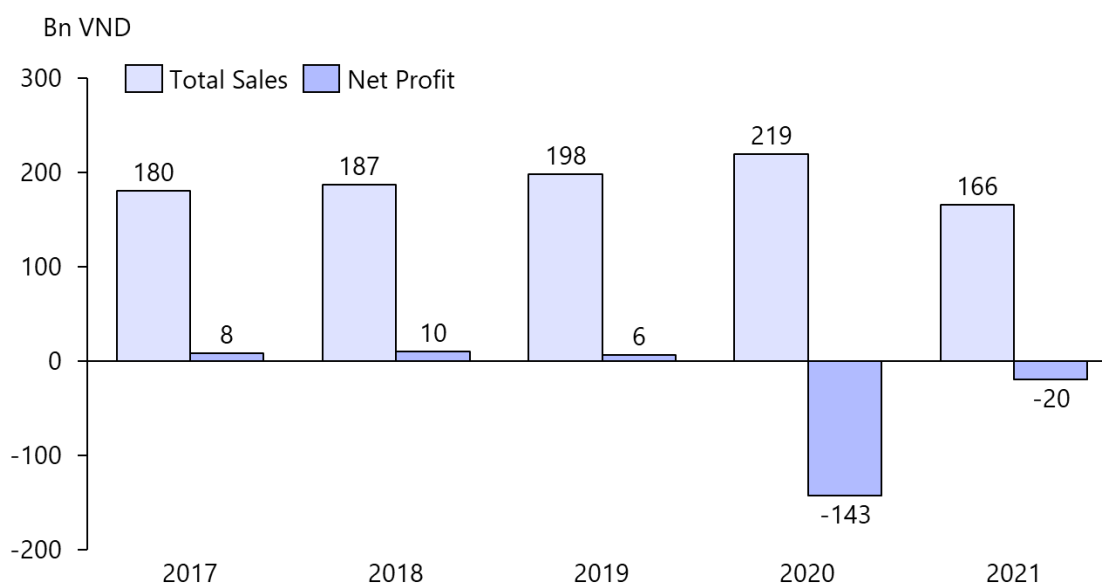


Figure 31: Financial performance trend of Hoan Hao Holdings

Source: Compiled from Speeda database

2.3.4 Understanding the profitability of non-public hospitals

- Profitability analysis of publicly listed hospitals

To understand the profitability of non-public hospitals in Vietnam, the financial statements of two publicly listed hospitals with disclosed information were reviewed. In addition, a report from a local securities firm, SSI Securities, was also referred to.

Tam Duc Cardiology Hospital is a 250-bed hospital specializing in heart diseases located in District 7 of Ho Chi Minh City. In 2019, prior to the outbreak of COVID-19, the hospital received over 100,000 outpatients and nearly 6,000 new inpatients (bed occupancy rate of 44%). They have conducted prudent management practices and have managed to maintain profitability even during the COVID-19 pandemic. In their most recent financial statement (2022), they achieved a net profit margin of 13%.

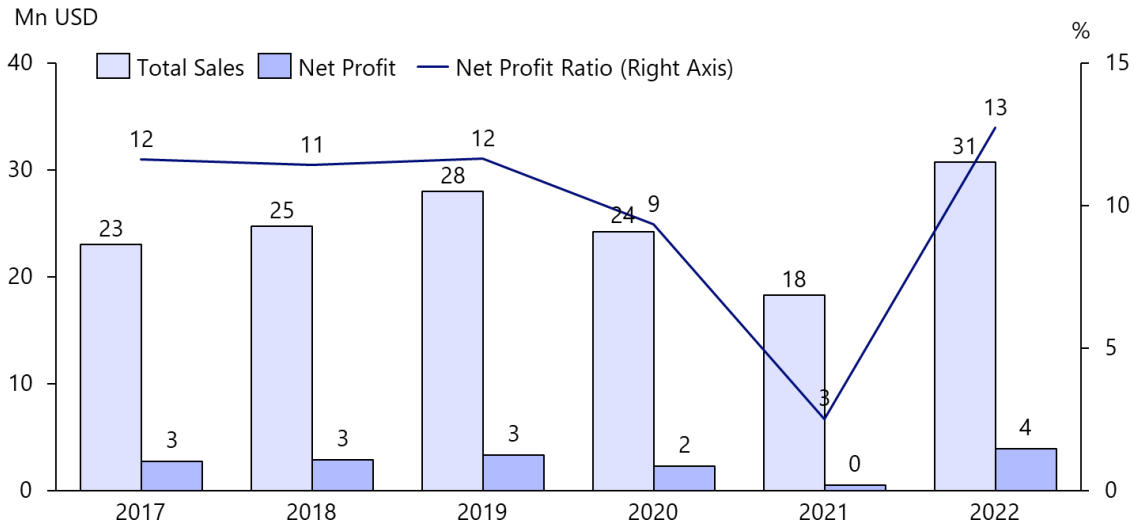


Figure 32: Financial performance trend of Tam Duc Cardiology Hospital

Source: Compiled from the hospital's annual reports, etc.

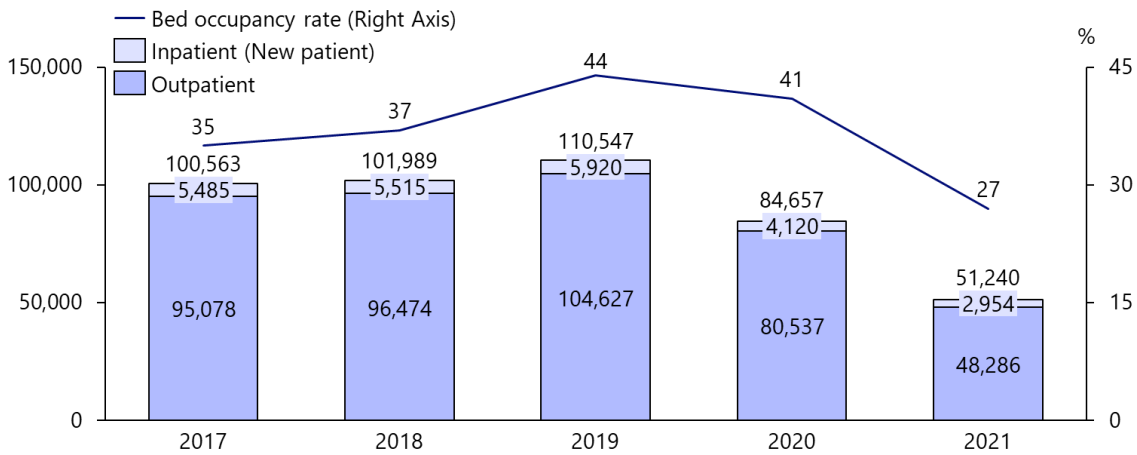


Figure 33: Outpatient/new inpatient numbers and bed occupancy rate of Tam Duc Cardiology Hospital

Source: Compiled from the hospital's annual reports, etc.

The other listed hospital is Thai Nguyen International Hospital Group. The group operates two hospitals, Thai Nguyen International Hospital and Yen Binh Thai Nguyen General Hospital, both located in Thai Nguyen in northern Vietnam, with a total of 550 beds. In addition, in 2021, the group announced plans to invest in two new hospitals.

The group's revenue has been growing rapidly along with the development of the region, and it recorded a revenue of 20 million USD in 2022. Its profit margin is also high, recording a net profit margin of approximately 30% except for 2021, when the group's business was significantly affected by the COVID-19 pandemic.

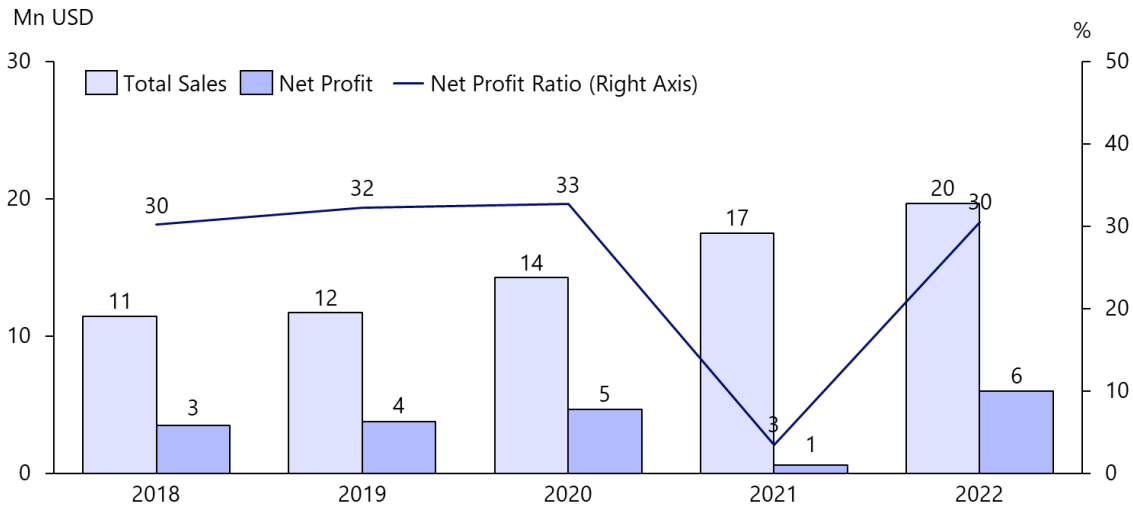


Figure 34: Financial performance trend of Thai Nguyen International Hospital Group
 Source: Compiled from the hospital’s annual reports, etc.

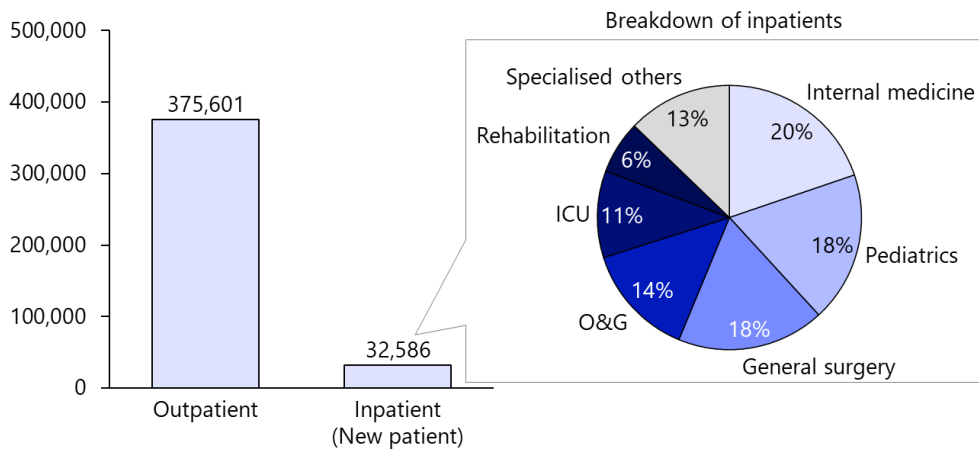


Figure 35: Outpatients/new inpatient number and the breakdown of inpatients at Thai Nguyen International Hospital (2021)
 Source: Compiled from the hospital’s annual reports, etc.

The surveys on each hospital and the report by SSI Securities¹⁴ were used to compare the net profit margins of benchmark hospitals and major hospitals side by side. For the comparison, data from 2020 and 2021 were not used due to the impact of COVID-19, except for Vinmec, which had favorable data in 2021 compared to other periods. Hospital operation involves various factors that affect profitability, so we shouldn’t easily draw a conclusion that hospital operation is profitable. However, it was confirmed that many of the hospitals surveyed in this report were profitable except for the impact of COVID-19, and there were also non-public hospitals that achieved a net profit margin exceeding 30%.

¹⁴ SSI Securities Corporation, [Công ty Cổ phần Bệnh viện Quốc tế Thái Nguyên \(TNH: HOSE\)](#)

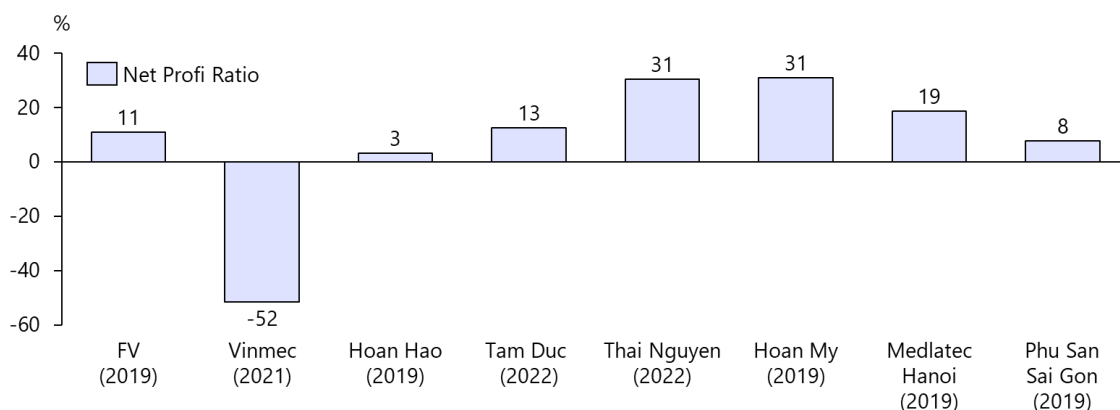


Figure 36: Comparison of net profit margins among major non-public hospitals

Source: Compiled from SSI market report, etc.

2.3.5 Service prices of competitors within the local market

Although a thorough benchmark analysis was not carried out, we referred to the services and prices provided by Columbia Asia Hospital, a foreign-owned hospital located in the same province of Binh Duong, as a point of reference during the assessment of our business revenue and expenditure. The following is a list of services and prices offered.

Table 19: List of services and prices of Colombia Asia Hospital

Services	Price (VND)
Consultation fee (Vietnamese doctor)	500,000
Follow-up consultation fee (Vietnamese doctor)	400,000
Hospitalization fee 1	1,070,000
Hospitalization fee 2	1,284,000
Hospitalization fee 3	856,000
Laparoscopic appendectomy	19,590,000
Hemorrhoidectomy	17,940,000
Anal polyp	11,960,000
Liposuction	12,438,000
Breast tumor excision and biopsy	7,176,000
Fine needle aspiration (FNA)	1,500,000
Tracheal intubation anesthesia	4,664,000
Spinal anesthesia	4,042,000
Intravenous sedation	2,631,000
Soft tissue lesion (less than 2cm)	1,840,000
Soft tissue lesion (2-5cm)	2,153,000
Soft tissue lesion (5-10cm)	3,827,000
Soft tissue lesion (with complications)	7,176,000

Services	Price (VND)
Endoscopic examination (with sedation)	2,400,000
Endoscopic examination (without sedation)	1,430,000
Colonoscopy	3,900,000
Polypectomy	2,325,000
Sigmoidoscopy	1,545,000
Fingerstick blood glucose test	97,500
PPD skin test	168,000
Electrocardiogram (ECG)	278,200
Intramuscular injection	123,500
Intravenous injection	653,900
Large splint (12/10cm)	880,000
Medium splint (7/10cm)	660,000
Small splint (5/10cm)	440,000
Sling	424,000
Urinalysis	220,000
Urinary catheterization	686,400
Inhalation nebulizer	176,000
Abdominal ultrasound	497,000
Renal ultrasound	497,000
Prostate ultrasound	663,000
Transthoracic echocardiogram	1,118,000
Thyroid ultrasound	603,000
Breast ultrasound	603,000
Testicular ultrasound	602,000
Spinal ultrasound	600,000
Carotid ultrasound	1,118,000
Deep vein thrombosis test	1,043,000
Nasal bone X-ray	232,000
Cervical spine X-ray	664,000
Sinus X-ray	332,000
Thoracic spine X-ray	442,000
Lumbar spine X-ray	442,000
Sitting and standing lumbar spine X-ray	442,000
Chest X-ray (front and back)	232,000
Shoulder X-ray (left and right)	232,000
Hand X-ray (left and right)	232,000
Finger X-ray	166,000
Pelvic X-ray	332,000

Services	Price (VND)
Knee (left and right) X-ray examination	232,000
Lower leg (left and right) X-ray examination	332,000
Ankle (left and right) X-ray examination	232,000
Foot (left and right) X-ray examination	232,000
Toe X-ray examination	232,000
Venous pyelography	2,209,000
Barium enema	789,000
Stomach X-ray examination	751,000
Upper gastrointestinal X-ray examination	1,578,000
Albumin test	91,000
Alkaline phosphatase test	91,000
ALT (SGPT) test	91,000
Amylase test	139,000
AST (SGOT) test	91,000
Direct bilirubin test	91,000
Total bilirubin test	91,000
Blood urea nitrogen test	91,000
Calcium test	80,000
Fasting cholesterol test	91,000
CKMB test	161,000
CPK test	128,000
Creatinine test	91,000
Electrolyte test (Na, K, Cl)	203,000
Fasting glucose test	86,000
Ferritin test	216,000
Gamma-glutamyl transpeptidase test	91,000
HbA1c test	214,000
HDL cholesterol test	98,000
Serum iron test	107,000

Source: Compiled from the information on the hospital website

2.4 Simplified forecasting of target demand

In this section, we organize the basic concepts of patient distribution between the international hospital and VNU-HCM affiliated hospital, and predict the target demand. As mentioned above, the population in Binh Duong Province is rapidly increasing, while the number of hospital beds is insufficient. Therefore, to forecast the demand, it is necessary to understand if there are enough potential customers to target, and then verify if we can compete with other companies.

2.4.1 Patient distribution between the international hospital and VNU-HCM affiliated hospital

The specific medical departments and functions that the International Hospital and VNU-HCM affiliated hospital will establish will be discussed in detail in the future. However, there are three basic concepts for patient distribution:

The first concept is based on the nationality of the patient. Foreigners will prefer the international hospital over public hospitals due to language barriers, and therefore expatriates and their families are mainly targeted as patients at the international hospital.

The second concept is based on income and whether the patient has private insurance. As mentioned earlier, users of private hospitals are mainly those who earn a monthly salary of over 20 million VND or those whose medical expenses are covered by company benefits or private insurance. Therefore, the main target patients at the international hospital are those in quadrants ①, ②, and ④. On the other hand, patients at VNU-HCM affiliated hospital are mainly those in quadrant ③. However, some patients in quadrants ①, ②, and ④ may choose to use VNU-HCM affiliated hospital despite the waiting time, as there are Vietnamese people who prefer public hospitals.

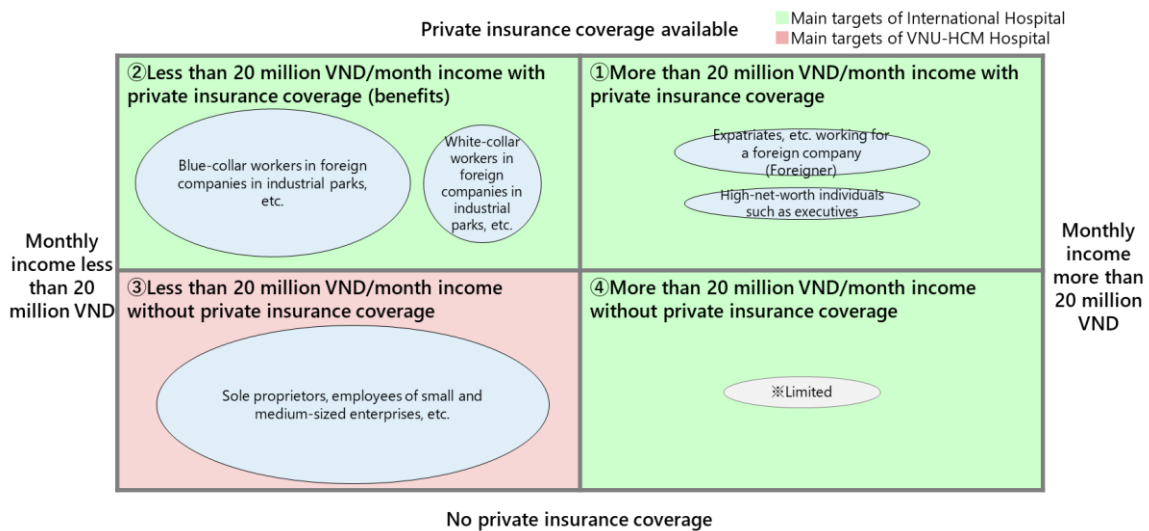


Figure 37: Patient segment image based on income and private insurance enrollment

The third concept is the medical departments and cases targeted. While both VNU-HCM affiliated hospital and the international hospital will have the capability to provide the minimum level of medical care, we focus on different areas to avoid overlap. Normally, the range of medical services that can be provided by a hospital with 100-200 beds is limited. However, by doing so, we can offer more medical services. Details on this can be found in section 6.2, 'Business concepts and services of the international hospital'.

2.4.2 Identifying target hospitals for survey

We selected FV Hospital and Vinmec Central Park International Hospital as the target hospitals for our survey. These hospitals, which have obtained JIC accreditation, are known for providing advanced medical care, and are popular among both Vietnamese citizens and foreigners. Additionally, we selected

Hoan Hao Hospital, the only Japanese hospital in Vietnam in which Kemeikai Medical Corporation is involved, and which is located in the same city as the planned international hospital site, as a benchmark. We also gained an understanding of the profitability of listed hospitals and non-public hospitals in Vietnam from publicly available reports and other sources.

2.4.3 Demand forecast for target customers

The concept of the international hospital is to provide advanced medical care and services in Vietnam, and to treat patients who are not currently being treated in the region, including not only the local area but also throughout the country and neighboring countries. However, in this section, we focus on conservative forecasting by narrowing down the area from the perspective of considering sound hospital management.

The area of Di An City, where the hospital is planned to be constructed, is about 60 km², and approximately 500,000 people live in the area. Although the construction site is located south of the city adjacent to Ho Chi Minh City, considering the flow of patients, it is assumed that Di An City and districts such as Thu Duc District in Ho Chi Minh City will be the main catchment areas.

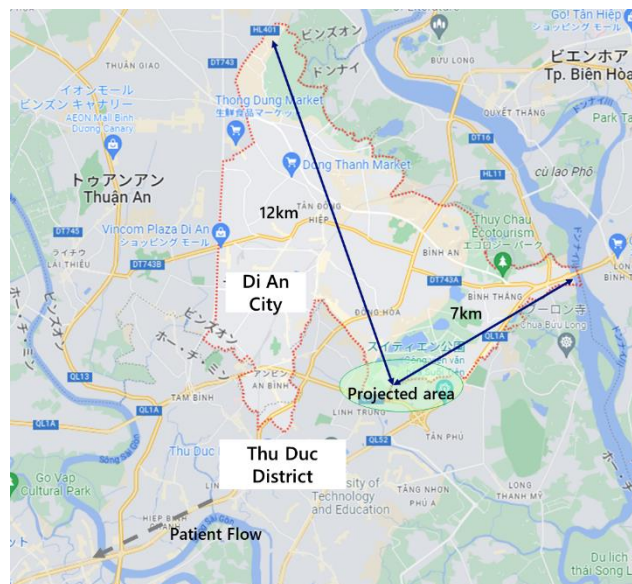


Figure 38: Planned site for the international hospital and its neighboring areas

Source: Created by modifying Google Map

Although Thu Duc District in Ho Chi Minh City has fewer medical facilities and doctors, Di An City has a significant shortage of hospital beds and doctors per capita, indicating a lack of healthcare infrastructure. As a result, it heavily relies on Ho Chi Minh City for healthcare services.

Table 20: Medical resources of Di An City (2021)

	Di An City	Ho Chi Minh (reference)
Population	497,193	9,166,840
Number of hospitals	3	123
Number of hospital beds	450	38,185
Number of hospital beds per 1,000 people	0.9	4.2
Number of doctors	127	18,521
Number of doctors per 1,000 people	0.3	2.0

Source: Compiled from Ho Chi Minh City and Binh Duong Province statistics

Based on the medical statistics in Binh Duong province, healthcare utilization status is shown below. The number of annual hospital visits is less than one-fifth of the OECD average, hospitalizations are less than half, and the average length of hospital stay is just over two days shorter. While some factors characteristic to the country and the region, such as a relatively young population and the use of traditional medicine may play a role, it is also possible that limited healthcare resources are suppressing medical demand. It should be noted that Vietnam has a well-established public health insurance system with high enrollment rates, and many large private companies provide medical insurance as a benefit to their employees. Therefore, it is expected that healthcare needs will gradually become more apparent over time.

Table 21: Comparison of healthcare utilization in Di An City to OECD average (2019)

	Binh Duong Province	Di An City (Population adjusted)	OECD Average
Number of hospital visits	3,150,694	583,316	-
Number of Hospital visits/ person/ year	1.3	Same as left	6.8
Number of inpatients	186,934	34,609	-
Number of inpatients/ 1,000 people	59	Same as left	146
Total number of inpatients	981,445	181,704	-
Average length of stay (in days)	5.3	Same as left	7.6

Source: Compiled from Binh Duong Province medical statistics and OECD Health at a Glance

In Di An City, the total number of days of hospitalization is 181,704 days, while the medical capacity provided by the 450 beds in the area is 164,250 days per year (450 beds x 365 days). Even with this rough calculation, it can be confirmed that the medical needs in Di An City are not being met, even though they are potentially suppressed ($181,704 \text{ days} \div 164,250 \text{ days} = 110\%$).

To accurately predict medical needs, the correction results using the OECD average of annual medical visits (6.8 visits per person per year), 146 hospitalizations per 1,000 people, and an average length

of stay of 7.6 days are as follows. The population growth in the region has not been considered, and there is a possibility that medical needs will increase even further.

Table 22: Potential medical needs in Di An City adjusted based on the OECD average

	Di An City (2019 estimate)	Adjusted based on the OECD average
Number of hospital visits	583,316	3,092,370
Number of hospital visits/ person/ year	1.3	6.8
Number of inpatients	34,609	85,164
Number of inpatients/ 1,000 people	59.3	146.0
Total number of inpatients	181,704	647,248
Average length of stay (in days)	5.3	7.6

Source: Compiled from Binh Duong Province medical statistics and OECD Health at a Glance

If the 127 doctors in the city were to cover only outpatient care, it would still require the treatment of 97 patients per day, highlighting the clear lack of medical resources (outpatient visitors: 3,092,370 / 250 days / 127 physicians = 97.3 patients per day).

In addition, to cover the annual total of 647,248 inpatients in the city, assuming a constant seasonal fluctuation and a 100% bed occupancy rate, it would require 1,773 beds, further highlighting the clear lack of medical infrastructure (total number of inpatients: 647,248 / 365 days = 1,773 beds).

As mentioned above, potential medical needs in the area have been confirmed. Next, to estimate the target customer base for the international hospital, we examined the occupations and social status of the residents (as we could not find statistics limited to Di An City, we referred to the statistics for Binh Duong Province). 60% of the provincial population consists of working population, while the remaining 40% are children under 15 years old. Among the working population, about 10% are business owners, senior and middle managers, and a third are factory workers. It is assumed that some of the factory workers do not have medical insurance as a company benefit, but some salespersons and clerks may work for large companies and have medical insurance. Therefore, about 40% of the population in the area has the potential to be a target for the international hospital. In simple calculations, it is assumed that there is a need for a private hospital with about 741 beds (1,773 beds × 42% = 741 beds). Currently, only a few private hospitals in Binh Duong Province, such as Colombia Asia Hospital and Becamex Hospital, provide high-quality services. However, even these hospitals do not provide highly advanced medical services. While Hoang Hao Hospital under the medical corporation Keimeikai is also in Di An City, their medical and service quality is at a local level, and there is a gap between their direction and the direction that the international hospital aims for. Therefore, it is believed that supply of medical services will be adequately absorbed if the international hospital offers competitive and reasonable prices.

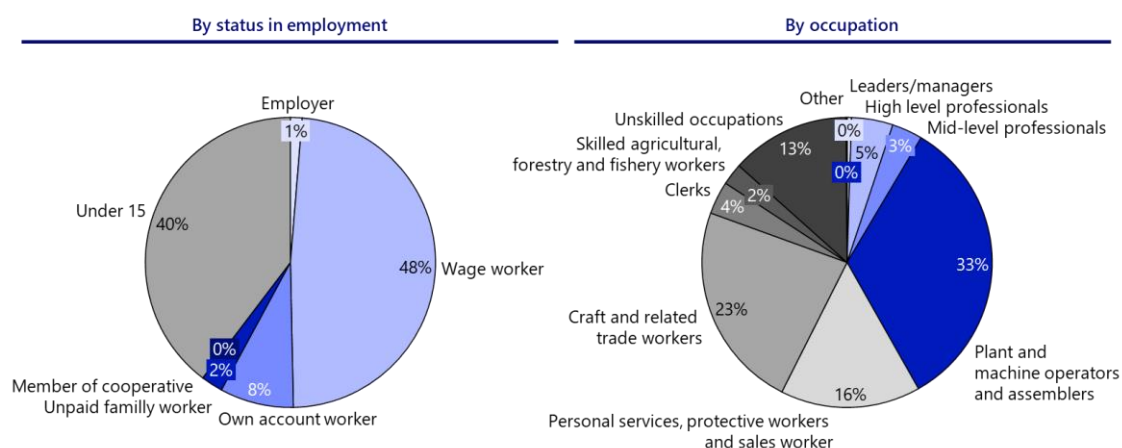


Figure 39: Breakdown of workers and occupations in Binh Duong Province

Source: Compiled from Binh Duong Province statistics

2.5 Study of past cases

We have identified and organized the risks and obstacles that have become apparent in past hospital businesses in developing countries, which are similar to our project. We will be mindful of these risks and obstacles, collaborate with various experts, and conduct advance risk assessment to address issues in a timely manner and prevent them from becoming significant problems.

Table 23: Risk categorization based on past cases

Stage	Category	Subcategory	Measures
Planning phase	Risks related to bidding and contracting procedures	Condition setting that make it difficult to bid, high guarantee deposits	Close consultation with government-related authorities and partners
	Risks associated with changes in laws, policies, regulations, etc.	Licenses/permits related to construction/hospital operation/personnel	Monitoring of relevant laws and policies. Collaboration with experts.
	Risks related to changes in scope of work, required standards, etc.	Increased burden due to increased response requirements	Close consultation with government-related authorities and partners.
	Risks due to force majeure	Sudden occurrence of natural disasters, strikes, epidemics, war, etc.	Identification of potential risks and consideration of contingency plans in the event of their occurrence.
Construction phase	Risk of inadequate building quality; risks arising from errors in measurement or survey by the ordering party	Review of construction plans/designs	Do not leave the fundamental aspects of construction to the other party, but conduct double-checks in-house. Not necessarily adhering to Japanese standards, but also referring to overseas hospitals as a reference.
	Risks associated with obtaining building permits	-	Close consultation with government-related authorities and partners.

Stage	Category	Subcategory	Measures
	Risks associated with opposition movements by neighboring residents and others after delivery of the business site	-	It is assumed that the risk related to land issues is low in this project business structure.
Operation phase	Failure to meet required service levels for operation services	Labor visas for foreign doctors not granted, medical interpreters not functioning, inability to secure necessary personnel in terms of quality/quantity, lack of service providers (cleaning/linen, etc.) or low level of service providers.	Licenses and permits will be discussed in close consultation with government-related authorities and partners. Domestic (Japanese) personnel have already been secured. Local personnel and service providers will be explored early on, and pre-education will be considered if expectations are not met.
	Inability to balance income and expenses (lower-than-expected revenue or excessive cost)	Higher investment required than anticipated, costs exceeding assumptions, high inflation, etc.	Understanding real numbers through benchmarking and discussions with stakeholders, and creating plans based on real numbers. Developing plans considering annual cost increases. Creating operational plans that is not dependent on certain medical departments.
Procurement-related	Risks associated with defective procurement items	Lack of suppliers of medical equipment and consumables that can provide what is required	Existing distribution products and major suppliers have been identified. Partner candidates will be informed of expectations early on, and cooperation will be sought to create a suitable environment.
	Risks associated with damage during the transfer and installation of medical equipment and supplies	Inability to start business as planned due to damage, resulting in double cost	Collaboration with partners with a proven track record. Utilizing insurance to mitigate cost-related risks.
Other	Compliance risks	Bribery demands related to license acquisition/maintenance, threats of non-compliance.	Grasping the key persons of government-related authorities and partners.

Stage	Category	Subcategory	Measures
	Risk of Japanese-style not resonating with patients	Inability to convey attractiveness to patients or inability to attract patients	The Vietnamese general public has high trust in public institutions. Leveraging the relationship with VNU-HCM, the attractiveness of the Japanese-style will be steadily permeated.

Of the above, the investigation team considers that the following three problems have particularly manifested in similar past projects: (1) mismatch between medical department settings and local needs, (2) failure of construction management and inadequate building quality, and (3) securing high-quality medical operators. Regarding (1), it is considered that a wide range of medical departments should be set up, not just specialized in advanced medical care. Regarding (2), it is suggested that a reliable design and construction company that has worked on overseas hospitals should be appointed. Regarding (3), it is thought that this issue can be addressed by ensuring a system of full support from Japanese medical corporations.

3 Consideration of legal matters

We engaged a law firm that is knowledgeable about the local laws to confirm the legal structure of the project. We also worked with them to identify business risks and establish measures to address them from a legal perspective.

3.1 Confirmation of legal structure

3.1.1 Project framework

The project framework is assumed to be as follows:

1. Establishing a PPP project company (PPP Act, Article 3, Paragraph 8)
 - (1) Investors will jointly invest and establish a company based on Vietnamese corporate law ("PPP project company").
 - (2) VNU will not make any investment in the PPP project company in any form (cash, contribution of land use rights as an investment in kind, etc.).

2. Entering into a BOT contract
 - (1) The PPP project company and VNU-HCM will enter into a BOT contract (PPP Act, Article 3, Paragraph 16(a)).
 - (2) The basic contents of the BOT contract (PPP Act Article 45, Paragraph 1(a)) are as follows:
 - a. The PPP project company will construct a hospital on the subject land, purchase and install equipment, fixtures, and furnishings, and operate the hospital.
 - b. When the BOT contract's specified term expires, the PPP project company will transfer all assets related to the hospital operation, such as the hospital building, equipment, fixtures, and furnishings, to VNU-HCM.
 - (3) Matters related to project implementation, such as the provision of services and intellectual property and payment for them, can be stipulated in addition.

Table 24: Explanation of PPP Law: Overview of the laws related to the project framework

Keyword	Description
PPP project company	In this document, it is interpreted as a company established by investors with the sole purpose of entering into and performing a PPP project contract
PPP Act, Article 3, Paragraph 16 (a)	Paragraph 16) A PPP project contract is a written agreement between the contracting authority and the PPP project investor or company, approved by the government, allowing the investor or PPP project company to implement a PPP project in accordance with the provisions of the law. Various types of contracts that fall under this definition include: (a) <u>Build-Operate-Transfer (BOT) contract</u> (b) Build-Transfer-Operate (BTO) contract (c) Build-Own-Operate (BOO) contract (d) Operate-Manage (O&M) contract (e) Build-Transfer-Lease (BTL) contract (f) Build-Lease-Transfer (BLT) contract (g) Mixed contract as defined in Article 45, Paragraph 3 of this law

Keyword	Description
PPP Law, Article 45, Paragraph 1 (a)	<p>Classification of PPP contracts</p> <p>A group of contracts that utilize mechanisms for collecting fees directly from users of public products and services.</p> <p>(a) BOT contracts are contracts in which PPP project investors or companies are granted the right to construct and operate infrastructure or systems for a specified period, and after the expiration of that period, the PPP project investors or companies transfer the facilities or systems to the government.</p>

Source: Report prepared by the contracted law firm

3.1.2 Matters related to land use

The matters concerning land use are recognized as follows:

1. VNU-HCM has received the grant of land within the university campus from the government free of charge, and therefore, VNU-HCM does not have the original right to transfer the land use rights to a third party, sublease the land, or make an in-kind contribution of land use rights under the Land Law.
2. The PPP project company becomes the land user by receiving the direct grant or lease of the subject land from the government (PPP Law Article 56, Article 79, Article 80, Paragraph 2 (a), Land Law Article 173 or 174).

Table 25: Explanation of PPP Law: Overview of the laws related to the matters concerning land use

Keyword	Description
PPP Law, Article 56	<p>Preparation of the construction site</p> <p>The People's Committee shall bear primary responsibility for compensation, support, resettlement arrangements, land allocation for the purpose of project implementation, land leasing, and procedures for handing over the construction site in accordance with land-related laws, PPP, and other related contracts, and cooperate with the competent authorities and contracting parties.</p>
PPP Law, Article 79	<p>Investment Incentives</p> <p>Investors and PPP project companies are eligible for tax incentives, land use benefits, land leases, and other preferential treatments in accordance with tax, land, investment laws, and other relevant laws and regulations.</p>
PPP Law, Article 80, Paragraph 2 (a)	<p>Investment Guarantee</p> <ol style="list-style-type: none"> 1. Investors and PPP project companies are eligible for investment guarantees in accordance with this law and the Investment Law. 2. Guarantees for land use rights and other public assets shall be set forth as follows: <ol style="list-style-type: none"> a) PPP project companies shall be allocated land by the government, leased land, or authorized to use other public assets in accordance with land-related laws and laws governing the management and use of public assets for the purpose of fulfilling PPP contracts. b) The purpose of land use shall be protected, regardless of any changes that may occur during the contract period or if the lender exercises the rights stipulated in Article 53 of this law.

Keyword	Description
Land Law, Article 173	<p>Rights and obligations of organizations that have been allocated land by the government without land use fees being levied</p> <ol style="list-style-type: none"> 1. An organization that has been allocated land by the government without being levied land use fees has rights and obligations as stipulated in Articles 166 and 170 of this law. 2. An organization that has been allocated land by the government without being levied land use fees cannot exchange, transfer, donate, lease, or establish mortgage rights on the land use right, nor contribute it as capital. They also have no right to compensation from the government when the land is expropriated.
Land Law, Article 174	<p>The rights and obligations of organizations that have been allocated land by the government, with land use fees being levied, or have been granted a lease of land for the entire lease term with a lump sum payment.</p> <ol style="list-style-type: none"> 1. In addition to the rights and obligations specified in Paragraph 1 of this Article, economic organizations that have been allocated land by the government, with land use fees being levied, or have been granted a lease of land for the entire lease term with a lump sum payment have the rights and obligations specified in Articles 166 and 170 of this Law. 2. Economic organizations that have been allocated land by the government, with land use fees being levied, or have been granted a lease of land for the entire lease term with a lump sum payment have the following rights: <ol style="list-style-type: none"> a) to transfer their land use rights and land-attached assets b) to rent out their land use rights and land-attached assets if they have been levied land use fees, or to sublease their land use rights and land-attached assets if they have been granted a lease of land for the entire lease term with a lump-sum payment c) to donate their land use rights to the government and the community for the construction of facilities for the common public interests of the community, and to donate their land-attached facilities in accordance with the law d) to establish mortgages on their land use rights and land-attached assets at credit institutions that have been granted a business license in Vietnam e) to contribute their land use rights and land-attached assets as capital in accordance with the law for cooperation in production and business with organizations, individuals, overseas Vietnamese, or foreign-invested enterprises 3. If public non-business organizations that are operated with their own funds have been granted a lease of land for the entire lease term with a lump sum payment that was not derived from the national budget, they shall have the rights and obligations specified in Paragraphs 1 and 2 of this Article. The exercise of these rights requires the written approval of the competent state agency. If public non-business organizations that are operated with their own funds have been granted a lease of land for the entire lease term with a lump sum payment that was derived from the national budget, they shall have the rights and obligations specified in Article 173 of this Law.

Source: Report prepared by the contracted law firm

3.1.3 Investor selection method

The investor selection methods are organized as follows:

1. As a method for selecting investors under the PPP Law, open bidding is the principle method (PPP

Law, Article 37).

2. If the number of investors who meet the project implementation requirements is three or less, there is a possibility of using competitive negotiation (Article 38 of the same law)

Table 26: Explanation of PPP Law: Overview of the laws related to the investor selection method

Keyword	Description
PPP Law, Article 37	<p>General competitive bidding</p> <ol style="list-style-type: none"> 1. General competitive bidding is an investor selection method that does not limit the number of participating investors. 2. General competitive bidding must be applied to all PPP projects, except for those specified in Articles 38, 39, and 40 of this law.
PPP Law, Article 38	<p>Competitive negotiation</p> <p>Competitive negotiation shall be applied in the following cases.</p> <ol style="list-style-type: none"> 1. When the number of investors who satisfy the project implementation requirements is three or less. 2. When it is a high-tech application project on the high-tech list, which prioritizes development investments based on the law on high technology. 3. When it is a new technology application project based on the law on technology transfer.

Source: Report prepared by the contracted law firm

3.1.4 Process for foreign-invested companies to acquire land-use rights in Vietnam

In Vietnam, all land belongs to all citizens, and the state is responsible for the unified management of land on their behalf. The building on the land can be traded separately from the land, and the ownership of the building itself is allowed.

In principle, foreign-invested enterprises in Vietnam, including but not limited to hospital projects, can acquire land use rights only when they are allocated or leased directly from the state or when they sublease from industrial park developers. Since hospital projects are not concentrated in industrial parks or economic zones like factories, obtaining land-use rights directly from the state is considered more mainstream than leasing land from developers who develop an entire area.

In addition, the PPP Law came into effect in Vietnam on January 1, 2021. As a result, infrastructure projects in Vietnam, including hospital projects, in cooperation with the state, are now required to go through the bidding process described above. The existing foreign-invested medical institutions mentioned below are not subject to the PPP Law because they were commercialized prior to 2021. The project currently envisioned will use land that VNU-HCM has been granted free of charge by the state, so it will need to use the PPP Law framework.

Under Vietnam's Investment Law, when a foreign-invested company directly receives land allotment or lease from the state, it must either do so through auction or bidding, or obtain investment policy approval from the provincial People's Committee (Article 32, Paragraph 1 of the Investment Law). Although it is understood that it is legally possible for foreign-invested enterprises to receive land allotment or lease from the state even if it is not a PPP project, such a case is not common in practice. In recent years, there have been many corruption cases related to land-use rights in Vietnam, and there is a demand for the acquisition of rights through fair procedures.

In addition, the purchase of shares in Vietnamese domestic corporations with land use rights is also practiced in practice as a form of acquisition of land use rights by foreign companies. Therefore, there have been cases where a foreign company has also acquired land use rights by acquiring a Vietnamese domestic corporation that is engaged in the hospital business.

3.2 Overview of related regulations, permits and licenses

We organized the permits and licenses necessary for hospital operations and their acquisition processes.

3.2.1 Related laws and regulations

The following are the major laws and regulations related to hospital operations:

- (1) Law on Medical Examination and Treatment No. 40/2009/QH12 (Medical Examination and Treatment Law)
- (2) Decree on implementation of Medical Examination and Treatment Law No. 109/2016/ND-CP (Amended by Decree No. 155/2018/ND-CP, Decree No. 109)
- (3) Circular No. 06/2021/TT-BXD of the Ministry of Construction on classification of buildings and construction investment management guidelines (Circular No. 06)
- (4) Law on Environmental Protection No. 72/2020/QH14 (Environmental Law)
- (5) Decree on implementation of Environmental Law No. 08/2022/ND-CP (Decree No. 08)
- (6) National technical regulation QCVN 28:2010/BTNMT on healthcare wastewater promulgated under Circular No. 39/2010/TT-BTNMT of the Ministry of Natural Resources and Environment (QCVN 28:2010/BTNMT)
- (7) National technical regulation QCVN 02:2012/BTNMT on emissions from solid medical waste incinerators promulgated under Circular No. 27/2012/TT-BTNMT of the Ministry of Natural Resources and Environment (QCVN 02:2012/BTNMT)
- (8) Decree on implementation of Law on Fire Prevention and Fighting No. 136/2020/ND-CP (Decree No. 136)

3.2.2 Requirements for Issuance of Business License

- Common requirements for hospital, general clinic, and specialty clinic

According to the Law on Medical Examination and Treatment, diagnostic and treatment facilities, regardless of their form, are required to obtain a business license in accordance with the same law (Article 42, Paragraph 2 of the law). However, the requirements for issuing licenses vary depending on the type of facility, as stipulated by the Decree No. 109. The common requirements for issuing a license are as follows:

- (1) Facility: It must comply with safety regulations related to radiation and fire safety, and be a facility installed in a fixed location with a dedicated area for processing reusable medical devices (except in cases where a service contract for processing is concluded with an external contractor, or when no reusable medical devices are used).
- (2) Equipment: It must have sufficient and appropriate medical equipment suitable for the facility's business operations.
- (3) Personnel:

- a. At least one designated specialist who meets the requirements specified below must be appointed in charge.
- b. They must possess a license or qualification that matches the facility's business operations.
- c. In facilities with multiple specialist departments, they must possess a license or qualification that matches at least one clinical department. In the case of specialist clinics, the designated specialist in charge must possess a license or qualification that matches the clinic's business operations.
- d. They must have obtained their license or qualification at least 36 months prior, or have been directly involved in diagnostic and treatment activities for at least 54 months.
- e. They must be a full-time employee of the facility.
- f. In addition to the designated specialist in charge, if other employees of the facility are involved in diagnostic and treatment activities, they must also possess a license or qualification and perform their duties in accordance with the same license.

- Individual regulations

The regulations regarding hospitals are as follows:

- (1) Size: General hospitals with at least 30 beds, specialized hospitals with at least 20 beds, and high-tech ophthalmology/psychiatric hospitals with at least 10 beds.
- (2) Facilities:
 - a. The hospital must have a minimum floor area of 50 m² or more per bed.
 - b. The frontage of the building must be at least 10 m wide.
 - c. A backup power generator must be installed.
 - d. The hospital must comply with environmental regulations for the disposal of medical waste.
- (3) Medical Equipment: The hospital must be equipped with emergency transportation vehicles, or have a patient transportation service contract in place with a facility that has obtained a license to provide such services.
- (4) Organization:
 - a. At least two of the four departments (internal medicine, surgery, obstetrics/gynecology, and pediatrics) must be present in the hospital.
 - b. The diagnostic department must have a waiting room, an emergency room, a temporary patient room, a diagnostic room, and a private room for minor surgery, if applicable.
 - c. The clinical testing department must have at least one test room and one diagnostic imaging room.
 - d. The pharmacy department must be present.
- (5) Staff:
 - a. Full-time employees must account for at least 50% of the total number of employees in each department.
 - b. The head of each specialized department must be a full-time employee with qualifications

and licenses that match the department's field.

- c. The head of a specialized department where qualifications and licenses are not required by law must be a full-time employee who holds a university degree that is relevant to their responsibilities.

3.2.3 License application procedure

The same procedure applies to hospitals, general clinics, and specialized clinics.

- (1) Submit the application documents for license issuance as follows:

- If it is a hospital affiliated with the Ministry of Health, a private hospital, or a hospital affiliated with another ministry, submit the application to the Ministry of Health.
- For all other types of hospitals, submit the application to the provincial health bureau.
 - a. After receiving the application documents, the authorities will issue and provide a receipt for the documents.
 - b. If the application documents are deemed sufficient, the authorities will review the documents within 60 days for hospitals and 45 days for other types of diagnostic and treatment facilities, and determine whether or not to issue the license. If it is decided not to issue the license, the reason must be stated in writing and provided as a response.
 - c. If the application documents are deemed insufficient, within 10 days from the date of the receipt, the authorities will notify the applicant in writing of the required modifications or additions to the documents. If no further modifications or additions are requested within 10 days from the receipt of the modified documents, the authorities will determine whether or not to issue the license. If it is decided not to issue the license, the reason must be stated in writing and provided as a response. If no modifications or additions are made or if it is not possible to make modifications or additions as requested, even after 60 days from the receipt of the request document of modifications or additions, the applicant must resubmit the application documents again.
 - d. The authorities will establish an on-site inspection team and conduct an on-site inspection within the designated period.
 - e. After issuing the license, the authority will take the following actions:
 - i. If the Ministry of Health is the issuing authority, they will send the notification to the local provincial level people's committee and health bureau of the location of the medical facility.
 - ii. If the provincial health bureau is the issuing authority, they will send the notification to the local district-level people's committee of the location of the medical facility.
 - iii. The authority will disclose the list of licensed facilities on its official portal.

3.2.4 Regulations based on laws and ordinances other than medical laws

- Regulations related to construction laws:

According to Circular No. 06, hospitals are categorized into various building levels based on the number of hospital beds. In this circular, if a building is not clearly categorized but serves the same purpose as a categorized building, it will be classified according to the provisions specified for the categorized building. General or specialized clinics can be considered to have the same purpose as hospitals, so they are likely to be classified according to the hospital categorization provisions specified in the circular.

Table 27: Circular No. 06 Appendix I, 1.1.2

	Type of building	Classification criteria	Level				
			Special	I	II	III	IV
1.1.2	Medical facilities						
	1.1.2.1. General hospitals and specialized hospitals at central-level/ lower-level (with central-level hospitals being classified as the lowest Level I)	Number of beds	>1000	500 -1000	250 - 500	<250	-
	1.1.2.2. Biosafety testing centers (with biosafety levels complying with the regulations of the health authorities)	Biosafety level	-	Biosafety level 4	Biosafety level 3	Biosafety level 1&2	-

Source: Report prepared by the contracted law firm

All buildings must be designed and constructed by organizations that hold business licenses and individuals who hold qualification licenses of the corresponding level. Therefore, it is necessary to carefully consider the selection of contractors.

- Regulations related to environmental laws and ordinances

1. Environmental license

According to environmental laws, if a project classified as level III or above according to environmental laws is implemented, an environmental license must be obtained. Decree No. 08 mandates that if a project generates wastewater, exhaust gas, dust, or hazardous waste defined by environmental laws that need processing, it falls under the category of level III or above in the table above and is required to obtain an environmental license.

2. Management, collection, and transportation of hazardous waste after the start of operation

If a hospital generates hazardous waste, it is required to comply with environmental regulations as follows:

- The waste must be categorized by hazardous waste codes and temporarily stored in appropriate packaging or containers. It is necessary to designate specific packaging, containers and storage areas for temporary storage of hazardous waste.

- (2) The temporary storage of hazardous waste must not exceed one year from the date of generation.
- (3) If the hospital does not process hazardous waste on its own, it must contract with a licensed waste processor to handle it on its behalf. Within six months from the date of handing over the hazardous waste to the processor, the hospital must make efforts to receive a waste transfer note from the processor. If the note is not received even after this period, and the processor does not provide a valid reason, the hospital must notify the provincial-level natural resources and environmental protection bureau.

- Regulations on medical waste

At present, there are two national standards QCVN (QCVN 28:2010/BTNMT for medical wastewater and QCVN 02:2012/BTNMT for solid medical waste incinerator emissions) established for medical waste.

- Fire regulations for medical facilities

According to Decree No. 136, medical facilities with five or more floors or a volume of 3,000 m³ or more must obtain approval from the fire and rescue police department for fire-related design and inspection results.

3.2.5 Establishment situation of foreign medical institutions

- Before the WTO commitment in 2007

The Hanoi French Hospital was widely known as a hospital established and operated by foreign investment in Vietnam. However, the hospital was established in 1997 as a 100% foreign-owned limited liability company, and began operating in 2000. Therefore, at the time of the Vietnamese government's commitment to the service sector in 2007, when the country joined WTO ("WTO commitment"), it was already established and operating, and was considered to be outside the scope of the WTO commitment and therefore not subject to further consideration.

- After the WTO commitment in 2007

After the establishment of minimum investment capital requirements for foreign medical institutions due to the WTO commitment, the number of new foreign hospital projects has decreased. However, in recent years, there have been some examples of such projects, including the following:

- (1) FV Hospital (located in Ho Chi Minh City)

FAR EAST MEDICAL VIETNAM LIMITED, which operates FV Hospital, was established as a one-person limited liability company in 2008, according to the enterprise registration certificate (ERC) dated February 9, 2022. The owner of the company is FAR EAST MEDICAL HK LIMITED, a Hong Kong corporation. The company's charter capital is 520,360,179,747 VND. According to the company's information on the national enterprise portal (accessed on February 9, 2023), the company's business scope is described as "general hospital" (VSIC 8610/CPC 9311).

- (2) Shing Mark Medical University Hospital (located in Dong Nai Province)

UNIVERSITY MEDICAL SHINGMARK HOSPITAL, the operator of Shing Mark Medical University Hospital, was established as a one-person limited liability company in 2013, according to the

ERC dated February 9, 2022. The owner of the company is SHING MARK ENTERPRISE CO., LTD, a 100 foreign-owned Vietnamese company (its parent company is CARVEN INDUSTRIES LIMITED, a British Virgin Islands corporation). The company's charter capital is 2,458,532,157,194 VND. According to the company's information on the national enterprise portal (accessed on February 9, 2023), the company's business scope is general hospital operations (VSIC 8610).

3.2.6 Regulations on requirements and procedures for foreigners' medical qualifications in Vietnam

- Reference regulations:

- (1) Law on Medical Examination and Treatment Law No. 40/2009/QH12 (Medical Examination and Treatment Law)
- (2) Decree on implementation of Medical Examination and Treatment Law No. 109/2016/ND-CP (Amended by Decree No. 155/2018/ND-CP, Decree No. 109)
- (3) Education Law No. 43/2019/QH14 (Education Law)
- (4) Labor Code No. 45/2019/QH14 (Labor Code)
- (5) Decree No. 152/2020/ND-CP on foreign workers in Vietnam (Decree No. 152)
- (6) Law on Entry, Exit, Transit, and Residence of Foreigners in Vietnam No. 47/2014/QH13 (Amended by Law No. 51/2019/QH14, 2019 Law on Entry, Exit, Transit, and Residence of Foreigners)

- Vietnam's healthcare qualification system

Under Article 17 of the Law on Medical Examination and Treatment No. 40/2009/QH12, the following six qualifications are stipulated as healthcare qualifications: "Doctor", "Nurse", "Midwife", "Technician", "Herbalist", and "Holder of Traditional herbal medicine practice". Anyone who wishes to engage in healthcare-related activities in Vietnam, regardless of nationality, must obtain one of these six qualifications.

- License issuance requirements and procedures

The following outlines the requirements and procedures for obtaining licenses for foreign employees in this project who apply for qualifications as "doctors", "nurses", and "midwives".

- (1) Common requirements with Vietnamese nationals

- ① The applicant must have an appropriate medical qualification for which they are applying, and hold a specialized degree issued or recognized in Vietnam.
- ② The applicant must have a written confirmation regarding their experience in practicing diagnosis and treatment.
- ③ The applicant must have a certificate confirming their health status is suitable for practicing medical examination and treatment.
- ④ The applicant must not fall under any of the following conditions: unable to engage in medical-related activities due to a court judgment or decision, being investigated for criminal responsibility, being sentenced to punishment through a criminal judgment, or being detained by an administrative decision, receiving a disciplinary decision more severe than a warning in relation to medical examination and treatment, or having limited civil

capacity.

(2) Additional requirements for foreigners

- ① The applicant must meet the language requirements for medical examination and treatment procedures as stipulated in Article 23 of the Law on Medical Examination and Treatment.
- ② The applicant must provide a police clearance certificate approved by the relevant authorities of their country of origin.
- ③ The applicant must obtain a work permit issued by the Vietnamese labor authorities.

(3) Procedure

- ① The applicant shall submit the required documents under Article 6 of Decree No. 109 to the Ministry of Health. After receiving the appropriate documents, the Ministry of Health will issue a receipt.
- ② Within 20 days from the date of the receipt, the Ministry of Health will review the documents and create a review record.
- ③ If the application is deemed appropriate, the Ministry of Health will issue the license within 10 days from the date of the review record.
- ④ If the application is deemed inappropriate, the Ministry of Health will notify the applicant of the need for document modification or addition within 5 days from the date of the review record. If the applicant resubmits the modified or additional documents, the above procedure will be repeated. If the applicant does not resubmit the documents within 60 days, the applicant must start the application process from the beginning again.

- Work permit requirements and procedures (Requirements for issuing a work permit)

Foreigners who wish to work in Vietnam must meet the following requirements:

- (1) Being 18 years of age or older and having civil capacity.
- (2) Having specialized or technical skills and experience, and meeting the health requirements specified by the Minister of Health.
- (3) Not being subject to execution of a penalty, having a criminal record, or being pursued for criminal responsibility under foreign or Vietnamese laws.
- (4) Having obtained a work permit issued by Vietnamese authorities (except in cases exempt from a work permit).

In addition, regarding the provisions of labor laws and administrative practices for issuing work permits, foreign doctors, nurses, and midwives apply for and receive work permits under the categories of "experts" or "technicians" (generally, those who have a bachelor's degree or higher in the relevant field are categorized as "experts," while those who have graduated from junior college or vocational school are categorized as "technicians") among foreign workers defined by labor laws. The requirements for experts and technicians are as follows:

Table 28: Requirements for experts and technicians

Category	Requirements
Expert	<ul style="list-style-type: none"> • Foreign workers who hold a bachelor's degree or higher (or equivalent) in a field related to the job or position they plan to work in, and have at least three years of work experience in that field; or • Foreign workers who have at least 5 years of work experience and possess a professional qualification certificate relevant to the intended job position in Vietnam; or • Special cases, as determined by the Prime Minister based on proposals from the Ministry of Labor, Invalids and Social Affairs
Technician	<ul style="list-style-type: none"> • Individuals who have received at least one year of education in a technical or other specialized field and have at least three years of practical experience in that field, or • Individuals who have at least five years of practical experience in the job relevant to the intended position in Vietnam

Source: Report prepared by the contracted law firm

The main procedures for applying for a work permit are as follows:

- The employer must submit a report on the employment of foreign workers to the People's Committee of the province or centrally-run city where the foreign worker will work (provincial level People's Committee), or to the Ministry of Labor, Invalids and Social Affairs (MOLISA) if required by Decree No. 152, at least 30 days before the expected employment date. The provincial level People's Committee or MOLISA will review the report and approve the employment of the foreign worker in writing.
- After obtaining the approval for employing foreign workers issued by the competent authority, the company must apply for a work permit for the foreign worker at least 15 days before the expected employment start date.
- Visa requirements and procedures: If a work permit is required, the foreign worker must apply for an LD2 visa (work visa).

The main procedures for obtaining a visa are as follows:

Before issuing a letter of invitation, social organizations, companies, local entities complying with Vietnamese laws, branches of foreign companies, representative offices of foreign economic, cultural and other professional organizations in Vietnam must notify the Immigration Department in writing and submit the following documents:

- Notarized copy of the license or notarized copy of the decision issued by the state agency authorized to establish the organization.
 - Confirmation letter of the signature and seal of the representative of the organization.
- This notification is made only once and additional notifications are required if any changes occur. Furthermore, under the Law on Entry, Exit, Transit, and Residence of Foreigners in 2019, it is possible to apply for an electronic visa through the Immigration Department's portal website.

The Immigration Bureau will review the visa invitation letter within five business days of the receipt

date and provide a response to the inviting institution, organization, or individual, as well as notify the Vietnamese visa issuing agency abroad. After receiving a written response from the Immigration Bureau, the inviting institution, organization, or individual will notify the foreigner to complete the visa application process at the Vietnamese visa-issuing agency abroad.

3.3 Track record in obtaining medical qualifications for foreigners in Vietnam

In Vietnam, there are numerous foreign-owned clinics, including those run by Japanese companies, primarily in Ho Chi Minh City and Hanoi. There are also foreign-owned hospitals in Vietnam. Foreign doctors working in these clinics and hospitals are commonly referred to as "expats" (short for "expatriates"), and many expats are engaged in medical practices in Vietnam. From interviews with Japanese doctors working in Vietnamese clinics and law firms that have supported establishment of Japanese clinics in Vietnam, it has been confirmed that obtaining a foreign medical qualification in Vietnam as a Japanese citizen is fully possible. Additionally, a Japanese doctor who had a connection with the Ishiikai's medical-related business in Myanmar obtained a medical qualification in Vietnam in 2022 and is currently practicing in a hospital. Therefore, it can be considered that the project team has a sufficient track record in obtaining foreign medical qualifications in Vietnam.

4 Consideration of tax matters

We have organized information on the general tax categories that apply to hospitals established under the PPP scheme in Vietnam, an overview of tax compliance timelines, and potential preferential treatment for corporate income tax that may apply to the hospital. In addition, a detailed tax investigation is necessary for the investment and fundraising scheme after stakeholders have been identified.

4.1 General tax implications applicable to the hospital

The following is a list of general tax implications and legal bases that apply to the hospital.

4.1.1 Business License Fee (BLF)

BLF is imposed on organizations trading goods and providing services. BLF is determined based on the amount of charter capital in the business registration license or the amount of investment capital in the investment registration certificate, ranging from 1 million VND to 3 million VND per year. If the total charter/investment capital is more than 10 billion VND, the highest BLF level of 3 million VND per year shall be applied.

For the first year of establishment, the hospital shall be exempted from BLF but required to submit the BLF declaration by 30 January of the following year. For subsequent years, only BLF payment by 30 January of each year is required. BLF payment is the deductible expense for Corporate Income Tax calculation purpose of the hospital.

The legal bases related to BLF are as follows:

- Decree No. 139/2016/ND-CP
- Decree No. 22/2020/ND-CP
- Decree No. 126/2020/ND-CP

4.1.2 Corporate income tax (CIT)

CIT is imposed on the profit that the hospital earns from its business activities annually. The current standard CIT rate is 20%. The Hospital is required to pay provisional CIT on quarterly basis. The hospital may be entitled to CIT incentives according to healthcare sector, subject to conditions. (Details will be described later.)

When the hospital incurs tax losses, such losses can be carried forward “wholly” and “consecutively” to offset against the profits of subsequent years for a maximum period of five (05) years from the year after the year of incurring tax losses. For example, tax losses of the year 2023 can be carried forward up to 2028, any remaining tax losses of the year 2023 from 2028 onward will be forfeited. Losses from transfer of real estate, transfer of investment project, or right to participate in a project of investment (except for mineral exploration and extraction) are also allowed to offset against incomes from business operation.

Vietnam tax system is under the self-assessment regime. Therefore, taxpayers shall declare and pay CIT liabilities by themselves. However, the tax authorities shall conduct tax audit/ inspection to review later on and may impose tax collection, administrative penalties and interest for late tax payment.

The legal bases related to CIT are as follows:

- Law on CIT No. 14/2008/QH12, amended in 2013 and 2014
- Decree 218/2013/ND-CP
- Circular 78/2014/TT-BTC
- Circular 96/2015/TT-BTC

4.1.3 Value Added Tax (VAT) and Invoicing

Generally, goods and services (including goods and services purchased from organizations and individuals overseas) used for the purposes of production, trading and consumption in Vietnam shall be subject to Vietnamese VAT.

The hospital must file its VAT returns at the local tax authority on a monthly/ quarterly basis. Where applying the VAT credit method, the hospital records and computes all its input VAT and output VAT, then either pays the difference between the output VAT and input VAT to the tax authority or carries forward the creditable input VAT to offset against output VAT of subsequent periods. Of note, input VAT which is related to the provision of goods/services (output) NOT subject to VAT is non-creditable for VAT calculation purpose and must be recorded as expenses.

Input VAT on fixed assets, machinery and equipment (including input VAT on leasing activities of assets, machinery, equipment and other related input VAT such as warranty and repairing) of medical facility will not be creditable but can be included into the historical cost of fixed assets or recorded expenses for CIT calculation purpose. Common VAT refund schemes in Vietnam are applied to goods export activities and construction of investment projects. Provided that (i) input VAT on the hospital fixed assets is not creditable and (ii) the hospital has no export activities, there is no VAT refund scheme applicable to the hospital.

Under the VAT credit method, the VAT rates are 0%, 5%, 10% or “NOT subject to VAT” depending on the type of products and services. In which, the following VAT rates applicable to some typical goods/services related to hospital’s business activities are regulated in VAT regulations:

- “NOT subject to VAT” applicable to: Medical services

VAT regulations further instructs that medical services include: medical examination, treatment and prevention of diseases for human, birth control, and rehabilitation for patients, caring for the elderly and disabled, patient transportation, renting of medical facilities’ sickbed and sickroom; testing, radiography; blood and blood products for patients. Caring for the elderly and disabled includes health care, nutrition care, cultural activities, sports, entertainment, physical therapy and rehabilitation for the elderly and disabled. In case the medical service package (as prescribed by the Ministry of Health) includes the medicines, such medicines are also not subject to VAT.

- 5% VAT rate applicable to:

Preventive and curative medicine, including: final medicine products, pharmaceutical starting materials (EXCEPT dietary supplement).

- Vaccine.
 - Medical biologicals, distilled water for diluting injectable medicines, intravenous fluids.
 - Medical cotton, bandages, and first-aid.
 - Chemicals for experiment and sterilization in medical.
 - Hat, clothes, facemasks, surgical gloves, gloves, leg cover, shoe cover, towels, specialized medical gloves, breast implants and dermal fillers (EXCEPT cosmetics).
 - Medical machines and equipment, including: screening, scanning and imaging equipment for medical examination and treatment; specialized equipment for surgery, treatment, emergency medical services; measuring instrument for measuring blood pressure, cardiac activities, pulse, blood transfusion instrument; syringes; contraception equipment. Other medical tools and equipment according to the provisions of the laws on health or under the management of the Ministry of Health.
 - Science and technology services, including: activities and technical support for scientific research and technology development; activities related to intellectual property; technology transfer, standards, technical regulations, measurement, product and goods quality, radiation safety, nuclear and atomic energy; services on information, consulting, training, fostering, dissemination and application of scientific and technological achievements in the socio-economic fields under the agreement(s) of science and technology services specified in the Law on Science and technology.
- With respect to the above, the treatment of VAT in the "health check" and "plastic surgery" services is as follows (opinions of a tax accountant corporation):

A health check is a medical examination and evaluation of overall health, and could fall into a type of medical services mentioned above. Accordingly, health check service should NOT be subject to VAT (unless such a health check, in factual position, is performed with a purpose and substance distinct from its usual definition and may be challenged by tax authorities).

Regarding plastic surgery service, due to the complicated definition of plastic surgery as well as in the purpose of providing such service, the applicable VAT rate is unclear and depending on the detailed nature, substance, supporting documents as well as the views/interpretations of the tax authorities. In practice, if plastic surgery is a specialty surgical involving the restoration, reconstruction, or alteration of the human body (helping patients recover function of body parts) and this service is more medical-oriented so could likely NOT be subject to VAT. However, if the surgery in pure cosmetic sector is surgical procedures intended to enhance the appearance and not really related to medical services, so it may be subject to 10% VAT rate. Additionally, it is difficult and insufficient to rely on the materials used in the plastic surgery (i.e. botox, hyaluronic acid) to identify the nature of service as it can apply in both health and cosmetic sectors. Therefore, for the ultimate purpose of applying proper VAT rate for plastic surgery service of the hospital, at the stage where the service is specifically planned to be performed in Vietnam and have sufficient supporting information and documentation, the hospital is recommended to seek its managing tax authority to provide a confirmation/guidance on applicable VAT rate as a prudent approach.

Regarding invoicing, electronic invoice is compulsory in Vietnam (applicable from 1 July 2022 onwards). Under the VAT credit method, the hospital is required to issue VAT invoices upon the goods delivery; or the completion of service or the collection of service fees, whichever happens first (output VAT). Also, it will receive invoices with applicable VAT rates when purchasing goods and services from suppliers (input VAT). The input VAT should be creditable if the required conditions are met.

The hospital must strictly follow the requirements on using and retaining invoices. Failure to comply with the regulations may result in either or both consequences:

- (i) invoices not allowed to be VAT input creditable; or
- (ii) invoices disregarded as deductible expenses for CIT determination.

The legal bases for invoicing are as follows:

- Law on VAT No. 13/2008/QH12 amended in 2013, 2014 and 2016
- Decree 209/2013/ND-CP
- Circular 219/2013/TT-BTC
- Circular 130/2016/TT-BTC
- Decree 123/2020/ND-CP
- Circular 78/2021/TT-BTC

4.1.4 Personal Income Tax (PIT)

Generally, PIT is the tax liability imposed on the employment income (e.g., salary, bonus, allowance, welfare, benefit, etc.) paid by the contemplated to its employees. As the income payer, the hospital is responsible for withholding, declaring and paying PIT on behalf of its employees. For business income or non-employment income, the employees are self-responsible for their PIT filing and payment.

Where the hospital fails to register, declare, and make PIT payments by the statutory deadlines, it shall be subject to PIT collection, administrative penalties, and interest for late tax payment.

In case the hospital's expatriate employees (doctors, etc.) receive remuneration both from the hospital and from the oversea organization and/or other organizations, the responsibilities of PIT declaration are as below:

- The hospital is required to withhold and declare PIT on the remuneration paid by the hospital under the hospital's tax returns
- The employees are required to declare PIT on the remuneration paid from the oversea organization and/or other organizations under their individual tax returns
- The employees, who are Vietnam tax residents, are required to combine their worldwide income and finalize their PIT liabilities under the individual year-end PIT finalization return.
- Resident taxpayers are taxed on worldwide employment income at progressive tax rates ranging from 5% to 35%, while non-resident taxpayers are taxed on Vietnam sourced income at flat rate of 20%.
- When the hospital pays salary, wages or other payments to tax residents not having labor contract with the hospital or employees with labor contract of less than three (03) months, the hospital shall

be required to withhold PIT at the flat rate of 10% imposed on each payment with value of 2 million VND or more before making payment to such individuals. Of note, the high frequency of this type of payment to specific individuals may trigger the risk of being considered as employment income which is subject to progressive tax rate ranging from 5% to 35%.

The legal bases related to PIT are as follows:

- Law on PIT No.04/2007/QH12 amended in 2012 and 2014
- Decree 65/2013/ND-CP
- Circular 111/2013/TT-BTC
- Circular 92/2015/TT-BTC

4.1.5 Foreign Contractor Tax (FCT)

Pursuant to the prevailing regulations, foreign business organizations/individuals (“foreign contractor” or “FC”) with or without a Permanent Establishment (PE) in Vietnam, doing business in Vietnam and/ or having income arising in Vietnam on the basis of a contract/ agreement with a Vietnamese organization (i.e. the hospital) shall be subject to FCT comprising of two components, i.e. VAT and CIT (or VAT and PIT for individual FC).

The foreign contractor is allowed to choose one of the three FCT declaration methods including (i) full deduction method, (ii) deemed taxation method, and (iii) hybrid method to declare its FCT liabilities with the local tax authorities. In which, deemed taxation method is widely applied by foreign contractors as under this method, the Vietnamese party will be responsible for registering, withholding, declaring and remitting the FCT to the local tax authorities on behalf of the foreign contractors. The foreign contractors are therefore freed from tax administration works in Vietnam.

Furthermore, who actually bear the Vietnamese FCT cost depends on whether the price quoted on signed agreements is agreed on a net of tax basis (i.e. Vietnamese party to bear the relevant FCT liabilities) or a gross of tax basis (i.e. FC to bear the relevant FCT liabilities). Accordingly, it is essential to specify the party who is responsible for Vietnamese FCT in the signed agreements between the hospital and overseas suppliers.

The legal basis related to FCT is as follows:

- Circular 103/2014/TT-BTC

4.2 Overview of tax compliance timeline

The general tax compliance timeline is as follows.

Table 29: Overview of tax compliance timeline

Tax type	Monthly	Quarterly	Finalization
Deadline of declaration and payment	20th day of the following month	Last day of the 1st month of the following quarter	Last day of the 3rd month from the end of tax year
Corporate Income Tax (CIT)	N/A	Yes – Provisional tax payment only (*). No declaration is required.	Yes – fiscal year
Personal Income Tax (PIT)	Yes	Yes**	Yes**- calendar year
Value Added Tax (VAT)	Yes***	Yes***	N/A
Foreign Contractor Tax (FCT)	10th day following the payment day under payment basis; OR 20th day of the following month if declaring under monthly basis; AND 45th day from the contract termination/ completion date.		
Business License Fee (BLF)	Deadline for submission of BLF declaration in the 1st year of establishment is 30 January of the following year Deadline for BLF payment in subsequent years is 30 January of each year		
<p>Legal basis</p> <ul style="list-style-type: none"> • Law on Tax Administrations No. 38/2019/QH14 • Decree 126/2020/ND-CP • Decree 91/2022/ND-CP <p>Note:</p> <p>(*) Deadline for quarterly CIT payment is 30th day of the following quarter. The total provisional CIT payment in a fiscal year must not be less than 80% of the total CIT liability arising on completion of the annual CIT finalization.</p> <p>(**) The deadline for individual PIT finalization return is the last day of the 4th month from the end of tax year. The hospital can select to declare PIT on monthly basis if VAT is declared on monthly basis.</p> <p>(***) Quarterly VAT declaration and payment are applicable for 1st year of establishment and when prior year's annual revenue is of 50 billion VND or less.</p> <p>(****) Tax declaration and payment must be in VND.</p>			

Source: Report prepared by the contracted tax accountant corporation

Where a taxpayer fails to comply with the tax compliance timeline and/or commits a tax administrative violation (e.g. under-declared tax, non-compliance in tax registration, etc.), administration penalties and interest on late tax payments shall be imposed.

- Regarding administration penalties for under-declared tax
 - No penalty shall be imposed if the under-declared tax is voluntarily disclosed by the taxpayer.
 - In case the under-declared tax is detected by the tax authorities during tax audit/ inspection, shortfall penalty of 20% of the tax collection amount shall be imposed.
 - In case of being concluded as acts of tax evasion, the penalty ranging from one (1) to three (3) times of tax collection amount would be applied.

- Regarding administration penalties for late submission of tax returns
 - Warnings in case of filing late from one (1) to five (5) days after the deadline with mitigating circumstances; or
 - For other cases, a fine from 2 million VND to 25 million VND in case of filing after the deadline.
- Regarding interest on late tax payment: Interest on late tax payment is calculated at 0.03%/day of late payment for both cases of voluntary disclosure and being detected by the tax authorities.
- Statute of limitation for administration penalties, tax arrears and interest on late tax payment:
 - Statute of limitation for tax arrears and interest for late tax payment is ten (10) years, counting backwards from the date when the violation is identified by the tax authorities.
 - Statute of limitation for administration penalties for under-declared tax is five (05) years since the date of violation.
 - Statute of limitation for administration penalties for late submission of tax returns is two (02) years since the date of violation.

4.3 Overview of potential CIT incentives applicable to the hospital

In terms of incentives, there are two types: CIT incentives for enterprise implementing socialization in the health sector, and CIT exemption for donations received for humanitarian and social activities in Vietnam.

4.3.1 CIT incentives for enterprise implementing socialization in the health sector

Circular 78/2014/TT-BTC (amended by Circular 96/2015/TT-BTC) on CIT provides that income of an enterprise from the implementation of socialization in the health sector shall be entitled to the following CIT incentives:

- (i) Preferential CIT rate of 10% applicable in the entire periods of operation; and
- (ii) CIT exemption in 4 years and 50% CIT reduction in subsequent 9 years. CIT exemption and reduction are applied if the enterprise implements a new investment project in the field of socialization implemented in geographical areas with difficult or special difficult socio-economic conditions.

The type, scale and criteria on standards of enterprises implementing socialization in the health sector shall be implemented according to the list prescribed by the Prime Minister (i.e. Decision No. 1466/QĐ-TTg dated 10 October 2008 and some documents amending and supplementing this Decision) and other related-health legal documents. In Decision 1466, some examples of types of health facilities are mentioned including:

- General Hospital
- Specialized Hospital
- Specialized Clinic
- Traditional Medicine Clinic
- General Clinic

- Counseling Center for Health and Family Planning
- Departments providing maintenance and repair services for medical equipment
- Departments providing inspection service for medical equipment; etc.

In addition, under Circular 78/2014/TT-BTC, “undivided income” of an enterprise from the implementation of socialization in the health sector shall be exempt from CIT. “Undivided income” is the business income used for re-investment for the purpose of business development in accordance with the laws on health and other socialization fields. In case the undivided income that the enterprise actually uses to pay dividends or uses for wrong purposes, it will be subject to CIT arrears. However, this CIT exemption is uncommon in practice and subject to other regulations than tax law so it should be further checked with tax authorities and/or other relevant competent authorities to determine if the taxpayer would like to apply.

With respect to the above regulation, in case the hospital is considered an enterprise implementing socialization in the health sector (subject to conditions under the Prime Minister's regulations and the laws on health), income from the implementation of socialization will be entitled to:

- 10% CIT rate in the entire periods of operation; and
- CIT exemption for “undivided income” used to reinvest in socialization activities.

Regarding the incentives package of CIT exemption in 4 years and 50% CIT reduction in subsequent 9 years, if a PPP project is located in an area that is not included in the list of geographical areas with difficult or special difficult socio-economic conditions (such as the case of the Hospital), it may not meet the conditions to apply such CIT incentives package.

4.3.2 CIT exemption applicable to donations received for humanitarian purposes and/or social activities in Vietnam

Under Circular 78/2014/TT-BTC, donations received by an organization used for charity, humanitarian and other social activities in Vietnam will be exempted from CIT. The organization receiving the donations must be established and operate in accordance with the Vietnamese law and strictly comply with the the law on accounting and statistics. Accordingly, in case the hospital receives income from donations for charity, humanitarian and other social activities in Vietnam, such income can be subject to CIT exemption.

4.4 Response measures to various risks

There do not seem to be major concerns regarding the general tax implications and the tax compliance timeline applicable to the hospital.

On the other hand, regarding preferential treatment (particularly CIT incentives for enterprise implementing socialization in the health sector), there are benefits in applying from a CIT perspective. However, further examination is necessary to determine whether the project is eligible for such treatment and what specific impacts it would have. Under the CIT Law, preferential treatment for CIT is stipulated to be applicable to facilities that implement socialization in the health sector. In other words, it is believed that preferential treatment for CIT is not simply evaluated based on the type of activity, unlike the approach taken for VAT. If hospitals, clinics, and other medical facilities meet the conditions (taking into account the

type of facility, size, personnel standards, land, etc.) as facilities implementing socialization in the health sector, the income from such facilities may be eligible for CIT incentives under the CIT Law. However, since there is no guidance on what activities are included in the medical field under the CIT Law, there may be concerns regarding tax risks related to the type of activity (e.g., cosmetic surgery) even if the hospital meets the requirements as a facility implementing socialization in the health sector. Therefore, when considering tax matters, especially preferential treatment, consideration will be given to seeking written confirmation or guidance from the relevant tax authority upon the crystallization of business operations.

5 Initial survey of environmental impact assessment

After confirming laws and regulations related to the environment, we will organize measures to mitigate anticipated business risks and target risks.

5.1 General information about the project

This section will organize basic information about the project site, the status of fundamental infrastructure, and laws and regulations related to environmental impact assessment in Vietnam.

5.1.1 Current land use status of the project

The location of the investment project is in Dong Hoa District, Di An city, Binh Duong province, adjacent to VD02 road (22m right at National Highway 1). To the north, it overlooks the residential area of Dong Hoa – Di An commune, while the east side is adjacent to the hospital of VNU-HCM Medical School. The western and southern sides are currently vacant land, planned for the construction of a research institute of VNU-HCM.

The current land use status of the area planned for the establishment of VNU-HCM University Hospital, which is of 206,404 m², is as follows:

Table 30: Current land use status

	Category	Area (m²)	Share (%)
1	Land for the medical anatomy laboratory	9,476	4.6
2	Unused vacant land	179,986	87.2
3	Land for cultivation	5,418	2.6
4	Temporary housing site	1,928	0.9
5	Road	5,051	2.4
6	Land belonging to TC11 Road	5,454	2.6
	Total	206,404	100

Source: Compiled from VNU-HCM Reference Design Briefing Session

5.1.2 Basic infrastructure of the project implementation area

- Power situation

The required electricity is delivered through a substation via the power transmission network. As a

measure against power outages, it is essential to have backup generators.

- Water supply situation

Water is supplied from the local water supply network (Di An Water Plant). The estimated demand for the required amount of water for the international hospital project (first phase) is as follows.

Table 31: Water supply and demand

	Intended use	Norms of water use	Phase 1	
			Intended scale	Water demand (m ² /day)
1	Inpatient-related water supply (medical examination and treatment, sanitation of medical instruments, laundry, inpatient activities)	1,000 L /bed	120 beds	120
2	Outpatient-related water supply	45 L /person	900 people	40.5
Total				160.5

Source: Report prepared by the contracted environmental consulting firm

5.1.3 Related laws and regulations

The laws, decrees, and circulars regarding environmental impact assessments are as follows:

- Laws
 - (1) Law on Medical Examination and Treatment No. 40/2009/QH12 dated November 23, 2009
 - (2) Law on Water Resources No. 17/2012/QH13 dated 21/6/2012
 - (3) Law of the National Assembly of the Socialist Republic of Vietnam No. 27/2001/QH10 on Fire Prevention and Fighting dated 29/06/2001 and the Law amending and supplementing a number of articles of the Law on Fire Prevention and Fighting No. 40/2013/QH13 dated 22/11/2013
 - (4) Land Law No. 45/2013/QH11 dated 10/12/2013
 - (5) Law on Construction No. 50/2014/QH13 dated June 18, 2014
 - (6) Law on Occupational Safety and Health No. 84/2015/QH13 dated 25/06/2015
 - (7) Law amending and supplementing a number of articles of the Law on Construction No. 62/2020/QH14 dated June 17, 2020
 - (8) Law on Environmental Protection No. 72/2020/QH14 dated 17/11/2020
- Decrees
 - (1) Decree No. 201/2013/ND-CP dated 27/11/2013 of the Government detailing the implementation of a number of articles of the Law on Water Resources
 - (2) Decree No. 43/2014/ND-CP, dated 15/05/2014 of the Government detailing the implementation of a number of articles of the Land Law
 - (3) Decree No. 80/2014/ND-CP dated 06/08/2014 of the Government on drainage and wastewater treatment
 - (4) Decree No. 39/2016/ND-CP dated 15/05/2016 of the Government detailing the implementation of

a number of articles of the Law on Occupational Safety and Health

- (5) Decree No. 01/2017/ND-CP dated January 6, 2017 of the Government amending and supplementing a number of decrees detailing the implementation of the Land Law
- (6) Decree No. 88/2020/ND-CP dated 28/7/2020 of the Government on Detailing and guiding the implementation of a number of articles of the Law on occupational safety and health on compulsory occupational accident and disease insurance
- (7) Decree No. 136 /2020/N D-CP dated 24/11/2020 of the Government of Q detailing a number of articles and measures to implement the Fire and Fighting Act and the law amending and supplementing a number of articles of the law on fire prevention and fighting
- (8) Decree No. 148/2020 /ND-C P dated 18/12/2020 of the Government amending and supplementing a number of regulations detailing the implementation of the Belt;
- (9) Decree No. 10/2021/ND-CP dated February 09, 2021 of the Government on management of construction investment costs
- (10) Decree 06/2021/ND-CP guiding quality management, construction and maintenance of construction works
- (11) Decree No. 08/2022/ND-CP dated January 10, 2022 of the Government detailing a number of articles of the Law on Environmental Protection

- Circulars

- (1) Circular 04/2015/TT-BXD dated 03/04/2015 Minister of Construction guiding the implementation of a number of articles of Decree 80/2014/ND-CP dated August 6, 2014 of the Government on drainage and wastewater treatment
- (2) Circular No. 33/2017/TT-BTNMT dated September 29, 2017 of the Minister of Natural Resources and Environment detailing the implementation of the Government's Decree No. 01/2017/ND-CP dated January 6, 2017 amending and supplementing a number of articles of circulars guiding the implementation of the Land Law
- (3) Circular 149/2020/TT-BCA dated December 31, 2020 of the Ministry of Public Security detailing a number of articles and measures to implement the law on fire prevention and fighting and the law amending and supplementing a number of articles of the law on fire prevention and fighting and decree No. 136/2020/ND-CP dated November 24, 2020 of the government detailing a number of articles and measures to implement the law on fire prevention and fighting firefighting and the Law amending and supplementing a number of articles of the Law on Fire Prevention and Fighting
- (4) Circular No. 12/2021/TT-BXD dated 31/8/2021 of the Minister of Construction promulgating construction norms
- (5) Circular No. 20/2021/TT-BYT dated 26/11/2021 of the Ministry of Health regulating the management of medical waste within the campus of medical facilities
- (6) Circular No. 02/2022/TT-BTNMT dated January 10, 2022 of the Minister of Natural Resources and Environment detailing the implementation of a number of articles of the Law on Environmental Protection

5.2 Natural and socio-economic conditions

Based on the Statistical Yearbook of Binh Duong Province and other sources, we organized the characteristics of natural, socio-economic conditions of the project area.

5.2.1 Natural conditions

The project is located in Dong Hoa District, Di An City, Binh Duong Province. The area has a mild climate, located in the sub-equatorial tropics, and every year there are 2 distinct seasons: dry season and rainy season. The rainy season is from May to November, the dry season is from December to April of the following year. Based on the monitoring data of Chu Sao Station, the information regarding temperature, precipitation, sunshine hours, and other factors is as follows:

- Temperature

The average temperature in 2021 is 28 °C. During the rainy season, the months of December, January, and February are the coldest, with average monthly temperatures ranging from 26.2 to 27.7 °C. In the dry season, the hottest months are April, May, and June, with average monthly temperatures ranging from 28.9 to 29.8 °C. The amplitude of average daily temperature fluctuations ranges from 1 to 2 °C.

Table 32: Average temperatures in the months of the year (°C)

	2017	2018	2019	2020	2021
Full year	27.9	28.1	28.6	28.1	28.0
Jan	27.2	25.9	27.3	26.9	26.2
Feb	27.3	27.7	28.4	27.6	27.7
Mar	28.2	29.3	29.4	28.3	28.4
Apr	29.5	29.4	30.3	29.1	29.8
May	28.2	28.5	31.3	29.5	29.7
Jun	28.6	29.2	29.3	28.5	28.9
Jul	28.3	28.0	28.3	27.9	27.5
Aug	27.7	28.6	27.9	28.4	28.4
Sep	27.7	27.6	28.6	28.1	27.9
Oct	28.0	27.7	27.5	28.1	27.6
Nov	27.2	28.4	27.2	28.1	27.5
Dec	26.9	27.5	27.4	27.2	26.2

Source: Binh Duong Province Statistical Yearbook

- Rainfall

The rain regime will also affect air quality. When it falls, the rain washes away the amount of dust and pollutants present in the atmosphere as well as pollutants on the ground where rainwater flows. The average number of rainy days is 100-125 days per year, with an average annual rainfall of 1,800 - 2,000 mm. The months with the highest rainfall of the year: August, September, October with rainfall averages 260 - 280 mm/month. January, February, March are the least rainy months of the year.

Table 33: Rainfall in the months of the year (mm)

	2017	2018	2019	2020	2021
Full year	1,813	1,980	2,016	1,954	1,743
Jan	9.5	0.3	23	9.4	-
Feb	1.5	21.4	-	-	-
Mar	58.9	57.8	3.9	40.3	-
Apr	127	187	9.9	181.9	9.6
May	246.9	318.5	8.8	124.4	143.6
Jun	147.2	83.2	160	213.1	273.9
Jul	331.2	223	294.3	281.5	228
Aug	297.8	323.9	400.6	244.4	146.3
Sep	202.6	325.1	373.7	232.1	182.9
Oct	165.6	249	321.8	232.6	388.6
Nov	167.1	141.2	379.9	321.1	264.5
Dec	57.8	49.5	40.3	70	105.4

Source: Binh Duong Province Statistical Yearbook

- Number of hours of sunshine

The number of daily and monthly sunshine hours is quite high, with an average total of 2,208-2,495 hours from 2016 to 2020. The month with the highest number of sunny hours is April, with an average of 203-270 hours, while July has the lowest number with an average of 144-191 hours. The dry season has the largest number of sunny hours, peaking at 7.8-8.5 hours per day in February, March, and April. In contrast, the number of sunny hours decreases during the rainy season.

Table 34: Number of sunny hours in the months of the year (hours)

	2016	2017	2018	2019	2020
Full year	2,261	2,206	2,209	2,495	2,347
Jan	202.6	183.7	172	224.2	261
Feb	233.2	189.1	231.4	238.2	250
Mar	261.6	252	229	255.3	250.9
Apr	270.9	221.8	217.2	203.3	230
May	195	181.6	196.3	228.3	211.9
Jun	172.8	176	172	190	175.4
Jul	191.7	151	144.2	180	180.5
Aug	167.3	165	158.4	156.4	190
Sep	169.8	185.9	150.4	136.9	178.5
Oct	130.9	142.1	198	228.5	140
Nov	158.2	161.4	162	204.2	127.5
Dec	106.5	197	177.6	250	151.1

Source: Binh Duong Province Statistical Yearbook

- Air humidity

Air humidity as well as air temperature is one of the natural factors that directly affect the processes of metabolism and dispersion of pollutants in the atmosphere, the heat exchange of the body and the health of workers. The figures in the table below show that the air humidity is relatively high and varies markedly between seasons of the year. The highest humidity usually occurs in the middle of the rainy season

blown by the Southwest monsoon, while the lowest humidity occurs in the middle of the dry season. Air humidity is high in the rainy season, reaching about 84-94%, and lowest in the dry season, at around 75-79%. The relative humidity of the air during the day depends on the air temperature, with the highest humidity occurring around 6-8 am and the lowest humidity occurring around 1-3 pm.

Table 35: Humidity (%)

	2016	2017	2018	2019	2020
Full year	86	89	87	79.7	74.7
Jan	80	84	88	81.2	65
Feb	70	82	80	78.2	60
Mar	76	81	79	80.6	63
Apr	76	86	79	73.7	69
May	84	93	89	79.2	73
Jun	92	92	91	83.3	83
Jul	92	94	93	82.9	82
Aug	94	94	92	84.8	82
Sep	94	93	94	84.5	84
Oct	96	93	90	80.2	86
Nov	91	91	88	78.2	77
Dec	90	83	86	69.2	72

Source: Binh Duong Province Statistical Yearbook

- Wind mode

Wind serves to dilute pollutants in the air and is influenced by the local climate. During the rainy season, the prevailing wind directions are west and southwest with a frequency of 70%, from May to October with an average speed of 1.6-1.7 m/s. In the dry season, the main wind direction is the South, Southeast winds with a frequency of 60-70%, from November to April with an average speed of 1.7-2.0 m/s.

The strongest winds of the day accounted for the greatest frequency from level 3 to level 5, equivalent to speeds of 3.4-10.7 m/s. Strong winds of 6 or more (≥ 10.8 m/s) accounted for a negligible proportion.

Table 36: Major wind directions and speed (m/s)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Main directions	E	SE	E-SE	SW	SW	W	SW	W	W	NW	NW	N
Average speed	1.8	2.6	2	2.2	1.7	2.3	2.3	2.6	1.8	2.1	2.2	1.7
Mainstream speed	12	19	16	22	40	20	20	30	18	16	19	12

Source: Binh Duong Province Statistical Yearbook

5.3 Risk factors and response strategies regarding environmental measures

This project does not have any elements that would impact the environment stipulated in Article 25, Section 4 of Government Decree 08/2022/ND-CP dated January 10, 2022. Furthermore, this project is part of the adjustment plan approved by the Prime Minister in Decision No. 409/QĐ-TTg dated March 21,

2014 to adjust the detailed plan for the construction of a national university. The installation of a high-level university-affiliated hospital has significant meaning as it provides advanced medical care based on highly qualified physicians and modern equipment in the region, and alleviates the burden of high-level hospitals in the province and Ho Chi Minh City.

For the construction and operation of the international hospital, we will categorize the elements and risks that impact the environment into waste-related and non-waste-related categories and also organize the countermeasures. Additionally, we will organize the risks and incidents related to labor accidents and traffic accidents.

5.3.1 Risk factors and countermeasures during construction

1. Waste-related: Regarding dust and exhaust gas

(1) Risks related to land leveling work

- Risks

Dust on a construction site is typically comprised of dirt and sand particles larger than 75 microns, which are heavy and settle easily without spreading far. By referring to the results of dust concentration measurement at some construction sites of some large-scale projects, the concentration of dust pollution in the construction area during the construction phase of the project is about 0.15 – 0.20 mg /m³. Upon comparison with QCVN 05:2013/BTNMT - National technical regulation on ambient air quality, it can be observed that the amount of dust generated during the leveling process is expected to comply with the allowable standards.

- Countermeasures

Plan the construction schedule, allocate human resources rationally, avoid overlap between construction stages, minimize construction time, and minimize environmental impact. The truck covers for transporting materials such as cement, sand, bricks, and stones should be implemented to prevent spillage onto the road. Implementing the above-mentioned cover is a mandatory condition for selecting contractors for all means of transporting leveling materials. Cover the entire construction area with a wavy wall of at least 2 m high to suppress the spread of dust to the surrounding area. Additionally, set up a cleaning team and perform daily cleaning at the construction site, especially at the entrance to prevent scattering of solid waste or construction materials that could cause dust. Furthermore, provide the necessary protective equipment (work clothes, boots, masks, etc.) to the construction workers on the site.

(2) Dust and exhaust gases from vehicles transporting construction materials and machinery

- Risks

The operation of vehicles that use combustible fuels such as gasoline or diesel oil can emit pollutants and directly impact the surrounding air quality and construction workers. Since these vehicles travel within the project site, they can also affect the installation workers and other employees working on the project. Additionally, dust can be generated during the transportation process, which can impact the surrounding environment. Furthermore, dust can adhere to stems and leaves of vegetation, which can decrease photosynthesis and affect plant growth and development.

Therefore, it is important to consider specific measures and implement countermeasures to minimize these impacts.

- Countermeasures

All transportation methods used in the project must meet the Vietnamese standards for technical safety and environmental requirements. All machinery, equipment, and vehicles must be regularly maintained to minimize the generation of dust and emissions. Transportation routes and reasonable transport times should be set, and transportation on routes that are prone to traffic congestion during peak hours should be limited.

(3) Emissions from painting, welding construction works and equipment installation

- Risks

During welding processes, a certain amount of dust and exhaust gases are generated. The main components of this generation are dust and metal vapors. Welding fumes generated during welding or cutting contain toxic substances such as zinc, copper, mercury, and chromium. However, welding processes during the construction and installation stages are rare, and welding time is short, so the potential for significant impact is low. Nevertheless, there is still a possibility of adverse effects on workers.

- Countermeasures

Workers who operate at construction sites need to be trained in technical and safety aspects. Reasonable working hours should be set for construction workers. Additionally, workers should be equipped with protective equipment such as protective clothing, masks, goggles, hats, and gloves.

(4) The process of painting on walls

- Risks

During the painting and sanding processes of walls, a large amount of paint dust is generated. This paint dust is mainly composed of cyclic organic solvents, with a quite small particle size and not very strong odor. However, when exposed for a long time, it can enter the respiratory system and cause irritation and discomfort to the eyes, nose, and skin. The solvent vapors generated during wall painting are mainly composed of xylene and butanol. The interior space of a building often limits air circulation due to walls obstructing airflow, and the dispersal range of these substances is usually within 3-5 m. The impact of solvent painting or wall sanding directly affects workers who operate wall painting or sanding operations on the construction site. On the other hand, the impact on others is limited.

- Countermeasures

Similarly, workers must receive appropriate training, reasonable working hours must be set, and workers should be equipped with necessary protective equipment such as protective clothing, masks, goggles, hats, and gloves.

(5) Harmful effects of pollutants from exhaust gases

● Risks

Exhaust gas contains various pollutants. The main pollutants include dust (Airborne particles with a size of 0.01-10 μ m can often damage the respiratory system. Dust particles larger than 10 μ m can also be harmful to the eyes, and can cause infections or allergies. In addition, dust particles or aerosols in the air can absorb and diffuse sunlight, leading to reduced visibility and contributing significantly to pollution. If the concentration of dust is about 0.1 mg/m², the visibility would be around 12 km), SO₂/NO_x (SO₂ and NO_x gases can form acids that irritate mucous membranes. SO₂/NO_x can enter the body through the respiratory system or dissolve into the circulatory system, combine with dust to form acid aerosols, and if the size is 2-3 μ m or smaller, they can reach the alveoli and be destroyed by macrophages or transported to the lymphatic system. When SO₂/NO_x gases are oxidized in the atmosphere, they form acid rain when combined with rainwater. Acid rain can affect plant growth and crops, destroy ecosystems and vegetation, and have negative impacts on the climate, ecosystems, and the ozone layer. If the concentration of SO₂ in the air is around 1-2ppm, it can affect leaves after a few hours of exposure. Sensitive plants can be affected by concentrations of 0.15-0.30ppm. Moreover, when metals are exposed to hot and humid air containing SO₂/NO_x, the corrosion accelerates and can damage building materials.), CO (Carbon monoxide binds to hemoglobin and continuously forms carboxyhemoglobin, reducing the ability of blood to transport oxygen to tissues and cells. CO poisoning can cause symptoms such as dizziness, headache, and tinnitus, and can be life-threatening when it becomes severe. Solvents for paints can harm the health of workers directly by causing respiratory disorders, headaches, eye pain, and so on.), VOCs (Volatile organic compounds can have an impact on the brain or central nervous system, causing symptoms such as dizziness, headaches, irritability, fatigue, and nausea when exposed to low doses for a long period of time, and may increase the risk of cancer or other serious health problems. Chronic exposure to solvents for many years can result in permanent damage to the central nervous system, leading to memory loss, apathy, depression, and insomnia. Additionally, VOC vapors can cause anemia, damage to the stomach, kidney, and liver, skin inflammation, impact on the reproductive system, birth defects, and worsening of asthma.), and welding fumes (When workers and those around them are exposed to welding fumes, it can cause acute symptoms such as inflammation of the eyes, nose, and throat, dizziness, nausea, and more. Long-term exposure to welding fumes can lead to respiratory system disorders, lung cancer, laryngeal cancer, and other urinary tract diseases. In particular, when welding in enclosed spaces, the formation of carbon monoxide gas can threaten the life of the worker. In addition, the smoke from welding spreads into the atmospheric environment and affects the respiratory systems of neighboring wildlife and plants. Long-term effects on the internal cells of animals and plant species can cause serious illnesses and have a negative impact on the ecological balance of the region.)

● Countermeasures

Attention should be paid to environmental maintenance that minimizes air pollution caused by exhaust gas. Also, similar to the above, workers should receive appropriate training, reasonable working hours should be set, and workers should be equipped with necessary protective equipment

such as protective clothing, masks, goggles, hats, and gloves.

2. Waste-related: regarding impact of wastewater

(1) Rainwater runoff

● Risks

During the rainy season, rainwater washes away soil, sand, dry branches, impurities, and other materials scattered on the ground in the project area, carrying them to the watershed around the project site. If rainwater is not properly managed, it can have a negative impact on the region's surface water, groundwater, and aquatic life. Compared to other wastewater sources, the runoff from rainwater is considered relatively clean, and the impact is expected to be short-term. If the polluted area is not overflowing, the concentration of pollutants in the rainwater will be as follows.

Table 37: Average concentration of pollutants in rainwater runoff

	Pollutant	Concentration (mg/L)
1	Total Nitrogen	0.50~1.50
2	Total phosphorus	0.004~0.03
3	Chemical Oxygen Demand (COD)	10 - 20
4	Total Suspended Solids (TSS)	10 - 20

Source: Dr. Hoang Hiep, “Text of plumbing and drainage systems”, 2002

● Countermeasures

To minimize the impact of rainwater runoff generated during construction or installation of mechanical equipment, the following measures are taken.

- Restrict construction on rainy days.
- Conduct regular inspections, dredging, cleaning, and disposal of waste and dust to prevent blockages in the sewer.
 - Do not spread fuel, lubricants, or chemicals in the surrounding environment to prevent pollution from rainwater runoff.
 - Solid waste generated during mechanical equipment installation is collected and disposed of in designated disposal sites under the supervision of the supervising consultant to prevent contamination.
 - Conduct cleaning and tidying of the construction site, ensure surface drainage, and prevent water stagnation.
 - Collect and direct the runoff of rainwater to the general rainwater drainage system in the area.

(2) Domestic wastewater

● Risks

The main source of domestic wastewater generated during construction and equipment installation is from the workers on-site. It is estimated that up to 60 workers may gather at the construction site during peak times. Domestic wastewater contains pollutants that contaminate the

water environment, such as residue, suspended solids (SS), organic compounds, nutrient salts (N, P), microorganisms, etc. Assuming each worker uses approximately 45 L of water per day, the total amount of wastewater generated from construction work and equipment installation is approximately 2.7 m³/day. Based on the pollution coefficient of untreated household wastewater from the statistics of the World Health Organization (WHO, 1993), the pollutant load and concentration are calculated.

This coefficient is based on the assumption that one uses 24 hours of domestic water for cleaning, bathing, and cooking three meals per day. In reality, the workers work for about 8 hours in shifts, and they do not cook or bathe on-site. Therefore, the pollution coefficient is assumed to be approximately 50% of the coefficient proposed by WHO. Based on this, the pollutant load and concentration are calculated.

Table 38: Coefficient of pollution and load of pollutants in domestic wastewater

	Pollutant	Pollution coefficient according to WHO (g/person/day)	Pollution coefficient for workers (g/person)	Pollution load (kg/day)
1	Biological Oxygen Demand (BOD)	45 - 54	22.5 - 27	1.35 - 1.62
2	Chemical Oxygen Demand (COD)	72 - 102	36 - 51	2.16 - 3.06
3	Suspended Solids (SS)	70 - 145	35 - 72.5	2.1 - 4.35
4	Oil and Grease from Plants and Animals	10 - 30	5 - 15	0.3 - 0.9
5	Ammonium	2.4 - 4.8	1.2 - 2.4	0.07 - 0.14
6	Total Nitrogen	6 - 12	3 - 6	0.18 - 0.36
7	Total phosphorus	0.8 - 4,0	0.4 - 2.0	0.02 - 0.12
8	Coliform	10 ⁶ - 10 ⁹	5x10 ⁵ - 5x10 ⁸	3x10 ⁴ - 3x10 ⁷

Sources: Calculated based on WHO “Assessment of Sources of Water, and Land Pollution-A Guide to Rapid Source Inventory Techniques and Their Use in Formulating Environmental Control Strategies”, 1993

Table 39: Concentration of pollutants in domestic wastewater

	Pollutant	Concentration of pre-treatment pollutants	QCVN 40: 2011/ BTNMT, column B
1	Biological Oxygen Demand (BOD)	500 - 600	50
2	Chemical Oxygen Demand (COD)	800 - 1133	-
3	Suspended Solids (SS)	778 - 1611	100
4	Oil and Grease from Plants and Animals (mg/L)	111 - 333	20
5	Ammonium (mg/L)	26 - 52	10
6	Total Nitrogen (mg/L)	67 - 133	-
7	Total phosphorus (mg/L)	7 - 44	-
8	Coliform	1x10 ⁷ - 1x10 ¹⁰	5,000

Sources: Calculated based on WHO “Assessment of Sources of Water, and Land Pollution-A Guide to Rapid Source Inventory Techniques and Their Use in Formulating Environmental Control Strategies”, 1993

- Countermeasures

- Do not bathe or cook at the construction site.
- Provide a tank capacity of approximately 1.5 m² per toilet to meet the personal hygiene needs of people working at the construction site.

(3) Construction wastewater

- Risks

During construction projects, water is used for mixing construction materials, driving piles, and washing construction machinery, equipment, and tools. Sources of wastewater include sludge water during pile foundation construction, and wash water from construction machinery and equipment. The main components of construction wastewater are sludge, sand, cement, and oil and fat generated during construction and equipment washing. Construction wastewater is intermittently generated depending on the timing and amount of the work.

Water pollution is mainly caused by suspended solids. If construction wastewater is not managed properly, it can overflow and mar the scenery of the construction area and pollute the soil and water environment. The wastewater can flush rainwater and garbage to the surface, causing sedimentation in the sewer system. This can cause blockages in the drainage system over a long period of time and pollute the water environment.

The table below shows the drainage results at Ree construction site of Etown Central (11 Doan Van Bo, Ward 12, District 4, Ho Chi Minh City) as a reference (as the construction site wastewater properties are similar.)

Table 40: Construction wastewater concentration

	Parameter	Unit	Result	QCVN 40:2011
1	pH	-	7.48	5.5-9
2	Total Suspended Solids (TSS)	mg/L	15	100
3	Chemical Oxygen Demand (COD)	mg/L	19	150
4	Biological Oxygen Demand (BOD)	mg/L	10	50
5	Total Nitrogen	mg/L	KPH (LOD=3)	40
6	Phosphate	mg/L	0.20	6
7	Total oil, grease	mg/L	KPH (LOD=0.3)	10
8	Coliform	MPN/100ml	120	5,000

Source: Wastewater analysis table during construction of Etown Central Ree Tower in Ho Chi Minh City, 2021

- Countermeasures

- Ensure that the construction drainage generated is not released into the external

environment.

- Place a temporary construction wastewater collection system around the construction area. Reuse the construction wastewater by installing a sand trap to settle mud, sand, soil, and other materials contained in the construction drainage and reuse them in concrete mixing.
- Perform regular inspections, cleaning, etc., to prevent clogging of the sewer.
- To avoid contaminating the water source, do not scatter fuel, lubricating oil, construction additives, chemicals, etc. in the surrounding environment.
- Collect solid waste generated during construction and, under supervision, transport it to a designated disposal site to avoid pollution.

3. Waste-related: Solid waste and hazardous waste

(1) General waste

● Risks

The maximum amount of domestic solid waste generated during the construction and installation of equipment is calculated to be 60 kg/day, based on the following estimations:

- Solid waste emission coefficient in Binh Duong province: 1 kg/person/day (Decision 2474/QD-UBND dated 10/09/2012 of The People's Committee of Binh Duong province);
- The maximum number of construction workers and machinery installation workers involved in the construction is 60 people.

Table 41: Mass composition in general waste

	Ingredient	Volume (%)
1	Food	76.0 - 82.0
2	Paper	3.3 - 3.8
3	Nylon	3.0 - 4.2
4	Resin	0.0 - 1.4
5	Other ingredients	8.6 - 17.7
Total		100

Source: Nguyen Trung Viet, Workshop proceedings

According to the table above, household waste contains 76-82% organic matter and 18-24% other substances. Although the amount of general waste is not very large, the high proportion of organic matter can cause odor and pollution due to the decomposition of organic waste if it is not collected or treated properly. It can also create conditions for the generation of pathogenic microorganisms, potentially affecting the health of construction workers and others.

● Countermeasures

In accordance with Government Decree No. 08/2022/ND-CP and the Ministry of Natural Resources and Environment's Circular No. 02/2022/TT-BTNMT, dated January 10, 2022, it is necessary to manage all solid waste and hazardous materials. Specifically, the following measures should be taken to minimize the impact of waste:

- To minimize waste, a kitchen should not be set up on the construction site, and

construction and equipment workers should eat at cafeterias in residential areas near the project site.

- To collect general and solid waste generated by the project, plastic trash containers with lids and a capacity of 90-240 L should be arranged, and a contractor with collection and transportation capabilities should be contracted to collect and dispose of the waste every day in accordance with current regulations.

(2) Solid waste

● Risks

The solid waste generated during the construction and installation of mechanical equipment mainly consists of soil, stone, cement bags, waste cork beams, scrap iron, nylon, cardboard, wooden pallets, and so on. Construction waste generated during construction is the material loss fraction relative to the total amount of materials used. (Decision No. 1329/QD-BXD dated 19/02/2016 of the Ministry of Construction)

Table 42: Volume of solid waste

	Ingredient	Emission rate (%)
A	Construction	
1	Iron and steel	0.2
2	Sheet material	0.2
3	Brick	2.0
4	Stone	1.0
5	Sand	0.1
6	Cement	5.0
B	Installation of equipment	
1	Device	1.0
2	Pallet packaging equipment	-
3	Nylon wrapper covering the device	-
4	Paper, carton packing	-

Source: Decision No. 1329/QD-BXD dated 19/02/2016 of the Ministry of Construction

● Countermeasures

In accordance with Circular No. 08/2017/TT-BXD, measures will be taken to manage solid waste generated during construction and minimize the impact of solid waste.

- Labeling of concrete, stones, sand, cement, bricks, etc. on-site, collecting scrap such as iron, steel, and old cardboard, and selling them to certified businesses in accordance with legal regulations.
- Solid waste that cannot be collected will be stored temporarily at the storage site along with the solid waste generated during the installation of mechanical equipment.
- To dispose of construction waste that cannot be reused or recycled in accordance with current regulations, a collection and transportation company will be contracted to collect and dispose of it every two weeks.

(3) Organic waste

● Risks

During the construction and installation phases, hazardous waste such as cloths contaminated with oil, lubricant containers, and waste welding rods are generated. However, the amount of hazardous waste generated is not very large, nor does it occur frequently. Hazardous waste needs to be collected in accordance with regulations.

Table 43: Quantities of hazardous waste

	Waste name	State of existence	Quantity (kg/month)	Hazardous waste code
1	Oil-stained rags	solid	3	18 02 01
2	Soft packaging	solid	3	18 01 02
3	Plastic waste rigid packaging (Paint containers, additive containers)	solid	2	18 01 03
4	Waste welding rods with heavy metals or hazardous components	solid	3	07 04 01
Total		-	11	-

Source: Report prepared by the contracted environmental consulting firm

● Countermeasures

The following measures will be taken to minimize the impact of hazardous waste:

- Vehicle and machinery repairs will be kept to a minimum during the project. Vehicles will be maintained in the garage.
- Hazardous waste generated during construction will be collected in garbage bins, and sorted and stored in a temporary warehouse located on the project site. The warehouse will be equipped with concrete foundations, a roof, walls, and fire protection equipment.
- A collection and transportation company will be contracted to collect and dispose of hazardous waste every six months to comply with current regulations.

4. Non-waste-related

(1) Noise and vibration caused by construction and equipment installation

● Risks

During construction, noise is generated by drilling, iron cutters, air compressors, transport vehicles, fishing trucks, forklifts, and other equipment. If multiple sources of noise are released simultaneously, they can have a compounded impact. It should be noted that noise gradually decreases with distance, and it can be predicted using calculation formulas.

- $L_p(x) = L_p(x_0) + 10 \log_{10}(x_0/x)$
- $L_p(x_0)$: noise level at a point about $x_0 = 1.5m$ from source 1 (dBA);

- $L_p(x)$: noise level at the location to be calculated (dBA).

The noise level is 1.5 m from the source and the forecast of the maximum noise level of transport and construction vehicles are shown in the following table.

Table 44: Noise levels of construction equipment

	Device	Noise level (dBA)	Maximum noise level (dBA)	
			20m from source	50m from source
1	Cranes	84~94	82.8	78.8
2	Truck	82~94	82.8	78.8
3	Wheels	72~74	62.8	58.8
4	Concrete mixer	75; 75~88	76.8	73.8
5	Bulldozer	93	81.8	77.8

Source: (1) Nguyen Dinh Tuan et al., 2000; (2) Mackernize, L.da, 1985

In Vietnam, there are no specific regulations that limit the noise level of construction work in general. However, according to the National Technical Regulation on noise (QCVN 26:2010/BTNMT), the allowable noise level in special areas such as medical facilities and schools is 55 dBA. Based on this, the maximum noise level generated during construction and installation of machinery in the project can have an impact on nearby schools and residential areas. Furthermore, this level of noise can have a direct impact on construction workers and equipment installers.

- Countermeasures

To minimize the impact of noise and vibration generated during construction work or installation of machinery, the following measures should be taken:

- Install noise reduction devices on high-noise equipment such as air compressors and gas turbines.
- Attach stands to construction machinery to reduce vibration.
- All transportation equipment and machinery used in the project must meet Vietnam's technical and environmental safety standards.
- Avoid conducting construction work during peak hours that may affect nearby residents.

(2) Impact from excess heat during construction and installation of equipment

- Risks

The source of excess heat is mainly due to construction activities and the installation of construction machinery and equipment such as welding and cutting of metals. In the welding process of metal parts, the local temperature of the welding area increases due to the electrical arc rays generated during the process. Electrical arc rays are extremely hot, reaching approximately 2,000°C. These rays are emitted into the air and cause local heating of the welding area. Without appropriate shielding measures, this heat may cause burns to the welding operators. In addition, thermal pollution is also generated by the thermal radiation of the sun when applying outdoors.

Thermal pollution caused by excessive heat will cause negative effects that adversely affect the

health of construction workers. Specifically, physiological changes occur, causing the loss of minerals along with sweat. The functions of the kidneys and central nervous system may also be affected. Furthermore, working in high-temperature environments usually increases the incidence of diseases such as digestive and skin diseases. The common pathological disorders in high-temperature environments are heat stroke and spasms, which are more severe than dizziness.

- Countermeasures

To control thermal pollution, it is necessary to control the diffusion of heat sources and ensure a good working environment for workers. Investors should take the following measures when introducing machinery and equipment:

- Provide necessary clothing such as workwear, hats, gloves, protective goggles, and boots to mitigate the negative effects of heat on workers' health.
- Set a reasonable work schedule for construction workers in the project to avoid long hours of outdoor work that could increase the risk of productivity decline, work-related accidents, and affect the health of employees.

(3) Impact on surrounding buildings and socio-economy

- Risks

As mentioned earlier, construction projects can result in various types of pollution such as dust and noise. During the construction and installation phase, there may also be an increase in local traffic. Without proper scientific mobilization plans and traffic management, it can have negative impacts on the environment, such as an increase in air pollution, noise, the risk of traffic accidents, and disruptions to local traffic. Furthermore, the concentration of many workers in one area can also lead to social issues and disturbances to public safety and order. In addition to transportation, there are also risks of trouble and labor accidents during the process of unloading machinery and its parts from trucks.

- Countermeasures

To minimize the risks, the following measures will be taken:

- If the necessary conditions are met, local workers are given priority.
- Conduct regular supervision of the construction process to ensure that disputes are resolved appropriately
- Collaborate with local authorities to manage immigrant laborers participating in the project's construction.

To minimize the impact of machinery installation on neighboring buildings and residential areas, the following measures will be implemented:

- Avoid operating equipment that generates loud noises or vibrations during workers' break times.
- Cover the construction area to minimize the release of dust and pollutants into the neighboring area.
- Use technology to suppress noise and vibration from machinery and minimize their impact on the surrounding area.

- Limit traffic flow and plan for reasonable transport routes for waste, machinery, and equipment to minimize the impact of noise, dust, and exhaust fumes on the existing environment.
- The construction contractor will work closely with the project owner and local authorities to strictly manage construction, transportation, and labor activities, ensuring that they do not adversely affect the region's traffic safety, labor safety, and public order.

5. Risks and accidents

(1) Work accidents

● Risks

Generally, there is a possibility of work accidents occurring at any stage of construction. The causes of work accidents mainly include the following:

- High density of vehicles, and assembly, construction, and transportation of materials with noise and vibration, which can lead to work accidents and traffic accidents.
- When the labor safety and health regulations are not properly followed in loading and unloading work, there is a possibility of collapse of piled-up construction materials, accidents from access to electricity such as the construction of the power system, collisions with power lines leading across the road and wind storms causing electricity breaks.

● Countermeasures

In order to ensure the safety of workers, the following measures will be taken:

Safety and labor protection education

- Conduct education on labor safety and health for construction supervisors and workers in accordance with labor safety operations.
- Construction supervisors provide guidance and strict supervision on labor safety compliance of construction workers.
- Strengthen inspections and raise awareness to use protective equipment before starting work.
- Equip each worker with labor protection equipment appropriate for each task.

Ensuring safety during high altitude work:

- Confirm that the legs of the scaffold comply with TCXDVN 296:2004 (Safety Requirements for Scaffolding) and are constructed on a solid foundation.
- If erecting scaffolders from 3 levels or higher, use ropes to stabilize in 4 directions or anchor to a sturdy structure. Stabilize the scaffolders levels to prevent dislodging of scaffold legs.
- When stacking multiple floors, use nets.
- High altitude workers will wear safety belts.
- Prior to ascending, workers should check their protective shoes to ensure they are not slippery due to oil or grease.
- Check the scaffolders again before removing or relocating it.
- Do not move the scaffolders while there are people on the scaffolders.

Ensuring safety during construction machinery operation:

- Before starting work, confirm the power supply for the machinery and equipment.

- Prior to commencing work, confirm the specifications for the lifting gear and acquire the correct techniques.
- Install signs prohibiting movement within the operating range of the lifting equipment.
- Determine whether the machinery is operating properly through a shakedown.
- Shield the construction area to avoid incidents of swinging, throwing waste of materials around, causing danger or caused by fire.
- Shield the construction area to prevent accidents caused by debris or waste materials being thrown around, or by sparks causing fires.
- Ensure the operators wear complete protective gears

Ensuring safety during construction and installation:

- Adequate personnel and machinery with sufficient capacity should be arranged when transporting and installing materials to high places.
- Cranes should be positioned to secure the necessary tonnage for heavy machinery and materials, and signs should be placed in hazardous areas.
- Measures should be taken to support the supply of materials and equipment in the event of an incident.
- Pylons, racks, and tower cranes should be inspected to support equipment supply and installation.
- In the event of a labor accident, the injured should be transported to the nearest medical station for timely treatment.

Measures against labor accidents

- Provide workers with appropriate types of personal protective equipment for each task.
- Clearly display and make accessible emergency contact information, pharmacies, hospitals, and other necessary contacts.
- In the event of a labor accident, perform first aid on the victim, transport them to the nearest medical station, and provide timely treatment.

(2) Traffic accidents

● Risks

It is common for traffic accidents to occur during the transportation of construction materials.

The main causes of these accidents are as follows:

- Driver's negligence
- Failure to perform regular maintenance on vehicles

● Countermeasures

To minimize traffic accidents in the project area, the following measures will be taken:

Preventing traffic accidents

- Rational selection of transportation means and routes will be conducted. Restrict transport during high-traffic density peak hours.
- There should be a system of warning posts and hazard lights at the exits, turns, and

throughout the construction site, in locations that are easy to occur accidents, to prevent accidents.

- Handle appropriate cargo properly.
- Arrange appropriate vehicles with suitable tonnage to avoid damaging the roads.
- Install barriers to isolate dangerous areas such as substations and explosives.

Measures against traffic accidents

- Clearly indicate and make accessible emergency contact information, pharmacies, hospitals, and other necessary contacts.
- In case of a traffic accident, provide first aid to the victims of the accident, transport them to the nearest medical facility or hospital for timely treatment.

(3) Fire and explosion accidents

● Risks

When installing mechanical equipment, the likelihood of fire or explosion in the project is relatively low, but there is a possibility of problems occurring due to the following activities.

- Possibility of fire or explosion due to worker negligence or technical operation.
- Leaks in the air compressor or damage to the combustible safety valve.

Fires can potentially occur from any source of heat. However, once a fire accident occurs, it can cause enormous economic losses and environmental pollution. Furthermore, it can have an impact on the entire operation of the project and surrounding construction, and potentially endanger human life and property.

● Countermeasures

To manage, prevent, and respond to fire and explosion accidents, the following measures will be taken:

Fire prevention measures

- Machines and equipment will be accompanied by their usage history, and their technical parameters will be measured and monitored regularly.
- Install a complete set of fire prevention equipment.
- Inspect electrical systems and fire prevention equipment to ensure they are functioning properly.
- Install signs indicating flammable and explosive fuels in areas where they are stored or used.
- Workers or operators must receive appropriate training and practice for responding to problems that may occur, and must always check and operate the equipment at the site.

Measures against fire accidents

- If a fire is detected, the fire department at the construction site, etc., needs to immediately carry out firefighting activities. They will use tools such as fire extinguishers, sand, and water to extinguish the fire.
- Apply the recommended methods for dealing with chemical fires and explosions, occupational accidents, etc. as suggested by the manufacturer.
- After extinguishing the fire, send workers to clean up the burnt area and remove damaged parts, equipment, and machinery from the area.

- Apply proper management, prevention, and response measures for fires and explosions at the project construction site to ensure that they do not have an impact on the surrounding environment.

The overall summary of the main risk factors and impacts during construction is as follows.

Table 45: Overall summary of major risks, impacts, and affected areas

Object	Risk factors	Degree of impacts	Nature	Range of impacts
Air	Dust from land leveling work	Low	Disruptive, Inevitable	Project area
	Dust and exhaust gases from transport vehicles	Low	Disruptive, Inevitable	Roads from suppliers to the project site
	Noise from transport and construction vehicles	Low	Inevitable	Project area and surrounding areas
Surface water	Domestic wastewater	Low	Intermittent, Controllable	Project area and surrounding areas
	Rainwater runoff	Low - Medium	Intermittent, Controllable	Project area and surrounding areas
	Domestic solid waste	Low	Intermittent, Controllable	Project area
	Solid waste construction and installation of machinery	Low	Controllable	Project area
	Hazardous waste	Low - Medium	Controllable	Project area
Soil and groundwater	Domestic wastewater	Low	Controllable	Project area and surrounding areas
	Domestic solid waste	Low	Intermittent, Controllable	Project area
	Solid waste construction and installation of machinery	Low	Controllable	Project area
	Hazardous waste	Low - Medium	Controllable	Project area
Aquatic system	Domestic wastewater	Low	Intermittent, Controllable	Project area and surrounding areas
	Rainwater runoff	Low - Medium	Intermittent, Controllable	Project area and surrounding areas
	Domestic solid waste	Low - Medium	Controllable	Project area
	Solid waste construction and installation of equipment	Low	Controllable	Project area
	Hazardous waste	Low - High	Controllable	Project area
Site workers, and people around the project area	Dust and exhaust gases from transport vehicles	Low	Disruptive, Inevitable	Roads from suppliers to the project site
	Noise from transport and construction vehicles	Medium	Intermittent, Inevitable	Project area and surrounding areas
	Domestic wastewater	Low	Controllable	Project area and surrounding areas
	Domestic solid waste	Low -	Controllable	Project area

Object	Risk factors	Degree of impacts	Nature	Range of impacts
		Medium		
	Solid waste construction and installation of machinery	Low	Controllable	Project area
	Hazardous waste	Low - Medium	Controllable	Project area
	Large concentration of workers	Low	Inevitable	Areas around the project site
	Work accidents	Low	Controllable	Project area
	Traffic accidents	Low	Controllable	Areas around the project site
	Fire and explosion incidents	Low	Controllable	Project area
	Food safety incidents	Low	Controllable	Project area

Source: Report prepared by the contracted environmental consulting firm

5.3.2 Risk factors and countermeasures during hospital operations

1. Waste-related: dust and exhaust gases

(1) Exhaust gases from transport vehicles

● Risks

During the operation of the project, exhaust gas is generated due to the ambulance transportation vehicles, patients getting on/off vehicles, and project employees getting on/off vehicles. The main means of transportation in this area are trucks, cars, and motorcycles that use gasoline or diesel as fuel, which emit large amounts of exhaust gas containing air pollutants such as CO, NO_x, SO₂, VOC, and dust. The amount of pollutants emitted by vehicle exhaust is not concentrated around the hospital but is dispersed along the roads where the vehicles pass, thereby increasing the air pollution level in the surrounding environment.

● Countermeasures

- Construct the roads within the premises with concrete foundations and regularly clean them.
- Install sprinklers on the roads during the prolonged dry season.
- Restrict the weight and speed of transport vehicles.
- Conduct regular maintenance of vehicles to minimize emissions.
- Vehicles are not left idling for long periods of time within the hospital premises.
- Plant many trees within the hospital premises, and the green area will be made 20% or more of the total hospital construction area.

(2) Emissions from medical examination and treatment

● Risks

Solvent vapors of preservatives such as ether, acetone, alcohol, and ethanol, as well as the evaporation during medical examination and treatment, testing, storage of specimens and reagent and preservatives such as formaldehyde, and ethylene oxide vapor generated during sterilization of medical equipment and instruments, are a cause of air pollution. For example, when solvent vapors

are released into the air, an unpleasant odor is produced, which may affect the health of hospital staff, patients, and their families. However, a certain amount of use and discharge cannot be avoided in the operation of hospital business. Ethylene oxide gas (EOG) used for disinfection is a colorless and flammable gas with a smell similar to ether. Exposure to EOG can cause burning pain in the eyes and throat pain, and exposure at concentrations above 1 mg/m³ can cause dizziness, headaches, nausea, confusion, and coughing, as well as affect the nervous system and memory, and potentially lead to low oxygen levels in the body. Pathogenic microorganisms such as tuberculosis bacteria, influenza viruses, measles viruses, and tuberculosis can attach to patients and generate aerosols in the hospital room, and the dust in the air can spread diseases in the environment. Microbial contamination in the air in the hospital's specialized departments poses risks to patients undergoing treatment or recovery. In addition, microorganisms present in the hospital's atmosphere can directly threaten the health of medical staff and patients.

In addition, if appropriate measures are not taken during the process of storing a body in a mortuary, the body may undergo decomposition, causing it to decay and potentially generating hazardous substances. At the same time, this decomposition may produce pathogenic microorganisms. Contaminants from human remains may exist as water-soluble substances, vaporized organic substances, or water-soluble nitrogen forms (specifically NH₄⁺) depending on the environmental background. If the ratio of calcium is high, the pH will increase. When the body decomposes in a coffin, exhaust gases and odors are generated, especially in the early stages. These gases are ammonia, hydrogen sulfide, methane, and CO₂. Therefore, if these gases are released during the initial stage of decomposition, there is a potential to have a negative impact on the atmospheric environment and public health.

In addition, there is a potential for impact through radiation and the vapor of chemicals. Radiation generated mainly in treatment rooms, X-ray rooms, CT scanners, and so on, can be dangerous to the human body and the surrounding environment if appropriate protective measures are not taken. The type of illness caused by radioactive waste depends on the type of waste and the range of exposure. Symptoms include headaches, dizziness, and abnormal vomiting. Radioactive waste, like certain types of pharmaceutical waste, has genotoxicity and can affect genetic factors. Exposure to highly active radioactive substances, such as radioactive substances in diagnostic media (X-ray equipment, tomography devices, etc.), may cause various disorders (tissue destruction, requiring removal or amputation of part of the body, etc.). The danger posed by low-level radioactive waste may be due to contamination of the container surface caused by the storage form and storage period of such waste. Medical personnel and staff in charge of waste collecting/transporting who are exposed to this type of radioactive waste are part of the high-risk group. Additionally, chemicals used in medical equipment sterilization (such as ethylene oxide) and anesthetic vapors (halothane, xylene, acetone, isopropanol, toluene, ethyl acetate, acetonitrile, etc.) may have toxic effects on the human body.

- Countermeasures

Measures for medical examination and treatment activities

- Install air conditioning equipment and ventilation systems and design with good natural

ventilation.

- Make use of natural conditions in the area, such as sunlight and wind direction, and design with many windows, floor vents, and natural lighting. Additionally, make the shape of the building more soft and eye-catching to create a psychologically comfortable atmosphere for visitors.
- Implement local exhaust (suction of air) in places where pollutants are generated, such as specialized exhaust rooms, laboratories, sterilization rooms, and storage rooms for experimental chemicals, to suppress the diffusion of pollutants to other rooms during hospital operations.
- Contaminated medical equipment should not be reused or removed until it has been immersed in disinfectant solution after use. Disinfection and sterilization of tools and equipment using heat or chemicals must be carried out based on appropriate regulations and ensuring sufficient time, concentration, or temperature.
- Regular cleaning of clinics, examination rooms, and operating rooms should be carried out to prevent the accumulation of toxic gases and pathogenic microorganisms in the environment.
- Disinfectant should be sprayed inside and outside the hospital every week, particularly in waste storage areas and infectious sites, to remove pathogenic microorganisms and bacteria from the environment. The implementation of disinfectant spraying must be clearly planned and patients, relatives, and staff throughout the hospital must be notified to move to a different safe place during spraying to prevent any harmful effects on people in the hospital.
- Regularly collect waste from its generation and storage locations to prevent accumulation, odors, and the spread of pathogenic bacteria.

Measures to reduce air pollution caused by mortuary work

- To minimize air pollution and the risk of disease caused by harmful microorganisms due to the decomposition and decay of bodies, the following measures will be implemented in the body storage area.
- A body storage cabinet with a freezing system at 0 to -10°C will be installed in the body storage area, depending on the requirements for short-term (0 to -5 °C) or long-term (-5 to -10 °C) body storage. The temperature in the compartment containing the body will be constantly stable and maintained, preventing environmental pollution caused by body decay.
- For bodies showing signs of decay, they must be washed and wrapped in dedicated plastic bags to prevent the spread of odor to the outside.
- For bodies with dangerous infectious diseases, they must be disinfected and then placed in dedicated plastic bags before being put in compartments. After disposing of these bodies, the compartment must be properly cleaned and disinfected before putting new bodies in.
- When dressing the deceased, employees must wear necessary protective gear such as

gloves, masks, and nylon jackets to maintain hygiene and avoid infection. After the job, the body must be properly disinfected, and any odor or harmful microorganisms in the environment must be removed after moving the body to the burial site.

Relief measures from radiation and chemical vapor

- With regard to radiation, the owner must implement the regulations on ensuring radiation safety in health as stipulated in the Circular No. 13/2014/TTLT-BKHCHN-BYT dated September 6, 2014 of the Ministry of Health and the Ministry of Science and Technology.
- The X-ray room must have an area of at least 30 m², with walls that are 330mm thick, and the inner walls are plastered with barite according to technical requirements. Observation doors and doors must be equipped with a layer of lead at least 3mm thick to prevent radiation from escaping into the environment. Radiation marks must be placed around the equipment room, such as in corridors, patient waiting rooms, and workstations for radiation workers.
- The installation of beacons and warning signs for radiation accidents, the establishment of rules for the photography room and operation equipment, and education and training to minimize the harmful effects of radiation on medical staff, patients, their families, and surrounding residents must be conducted. Additionally, equipment inspections must be carried out once a year.
- Regarding chemical substances, the vapor, evaporative solvents, and exhaust vapor emitted from clinics, treatment rooms, sterilization rooms, and laboratories must be controlled within permissible levels by equipping effective ventilation systems that continuously operate at a flow rate that can exchange 20-40 times the clean air with the external environment (such as ceiling fans, tree fans, air conditioners, and exhaust fans).
- In addition, the following measures are taken to minimize odor pollution in clinics and hospital rooms.
 - Use deodorizers and odor eliminators in areas where odors are likely to occur.
 - Strengthen hygiene management within the facility, and regularly wipe and clean areas where odors are likely to occur.

(3) Emissions from backup generators

● Risks

The main source of energy for hospital operations is usually the national power grid, but in case of problems with the general power supply, diesel generators powered by diesel fuel will be installed to ensure that medical activities such as surgery and examinations can continue. Since the emissions from the generators are only produced during operation, quality control of emissions is not necessary, but the fuel used must meet the requirements of technical regulations and legal regulations related to the quality of products and commodities.

● Countermeasures

- Use a new type of generator and install exhaust gas reduction devices.
- To reduce the concentration of SO₂ in the exhaust gas after combustion, use Oil DO 0.05%S (Light oil with a sulfur content of less than 0.05%).
- Use backup generators only in the event of a power outage or system failure.

- To ensure that the operation of the generators does not affect the hospital's medical activities, the generator room should be constructed using proper techniques, placed in an independent location, and the impact on the surrounding environment should be limited as follows:
 - The generators will be installed in a separate machine room in the technical area, separated from office areas, examination/treatment areas, and other sensitive areas within the hospital.
 - The room where the generator is located will be designed with sound insulation, high heat resistance, soundproofing, fire resistance, and resistance to high temperatures.
 - The exhaust gas will be dispersed using an appropriate diameter and height chimney.

(4) Emissions from the kitchen

● Risks

LPG is planned to be used for cooking in the kitchen. LPG is a product obtained from the processing of petroleum and is composed of many paraffin hydrocarbons which are mainly propane and butane. Therefore, when LPG is burned, pollutants such as CO, CO₂, and NO_x are generated. The pollutant coefficients generated when LPG is burned are shown in the table below by the US Environmental Protection Agency.

Table 46: Coefficients of pollutants from burning LPG

	Pollutants	LPT butane (kg/ m³)	Propane LPG (kg/ m³)
1	NO _x	1.8	1.7
2	CO	0.25	0.22
3	CO ₂	1,760	1,500
4	TOC	0.07	0.06

Source: EPA, “Compilation of air pollutant emission factors, 5th edition”, 1988

Table 47: Density of LPG fuels

Fuel type	Density (lb/gal)	Density (kg/L)
Propane LPG	4.24	0.51
LPG butane	4.84	0.576

Source: EPA, “Compilation of air pollutant emission factors, 5th edition”, 1988

● Countermeasures

Cooking activities in the kitchen produce little exhaust gas and have a short impact time. Additionally, the kitchen area is designed to meet standards by ensuring proper ventilation, such as windows, and appropriate lighting. Furthermore, a hood will be installed in the kitchen area during the basic interior finishing stage. As a result, the impact of exhaust gas from cooking on the surrounding environment is not significant.

(5) Emissions from wastewater treatment equipment

● Risks

The wastewater from the hospital flows into the arranged sewage system. The main gaseous products generated by the anaerobic decomposition of organic compounds in the wastewater are ammonia, hydrogen sulfide, CO₂, and methane. In particular, ammonia and hydrogen sulfide are odorants, and methane becomes explosive if it accumulates. On the other hand, the sewage system and wastewater treatment facilities in this area are designed to be closed, so there is little possibility of affecting the surrounding environment.

Table 48: Density of bacteria in the air at the wastewater treatment system

	Bacterial group	Value (CFU/m ³)	The average number (CFU/m ³)
1	Total bacteria	0 – 1,290	168
2	E.Coli	0 - 240	24
3	Intestinal bacteria and other species	0 – 1,160	145
4	Fungal	0 - 60	16

Source: 7th International Conference on Environmental Science and Technology - Ermoupolis.
Bioaerosol Formation near wastewater treatment Facilities, 2001

Note: CFU/m³ = Colony Forming Units/m³

The amount of bacteria generated from wastewater treatment facilities varies greatly depending on the location, with the highest amount near the treatment facilities and lower amounts at greater distances.

Table 49: Amounts of bacteria released from the wastewater treatment system

Distance (m)	Amount of bacteria (in 1 m ³ of air)			
	0	50	100	>500
Wind direction head	100 - 650	10 - 20	-	-
wind direction end	100 - 650	50 - 200	5 - 10	-

Source: 7th International Conference on Environmental Science and Technology - Ermoupolis.
Bioaerosol Formation near wastewater treatment Facilities, 2001

● Countermeasures

The impact of odor and aerosols from the project area is not significant, and the affected area is also small. However, appropriate management measures are necessary to mitigate this impact. Specifically, the following measures should be implemented.

- Depending on the construction of wastewater treatment facilities in the planned area, separate the area of the facilities from other areas.
- Design a rational centralized wastewater treatment system and operate the system to minimize the generation of odor and aerosols.
- Plant trees with a canopy around the centralized wastewater treatment facility to isolate the area

and improve microclimate conditions, keeping the diffusion of odor and aerosols away.

- Assess the impact of dust and emissions

- Harmful effects of dust

Dust particles ranging in size from 0.01 to 10 μm can harm the respiratory system of both humans and animals. Dust particles larger than 10 μm can be harmful to the eyes and can cause infections or allergies. For plants, dust that settles on the surface of leaves can reduce their ability to carry out respiration and photosynthesis.

Dust is a significant source of pollution that can reduce visibility and cause atmospheric haze due to suspended particles and aerosols that absorb and scatter sunlight. Even a concentration of dust particles as low as 0.1 mg/m^3 can limit visibility to only 12 km. (The maximum visibility is 36 km, and the minimum visibility is 6 km).

- Harmful effects of CO

CO gas is a colorless, odorless, and tasteless gas generated by incomplete combustion of carbon-containing materials. Humans are vulnerable to CO. CO has an affinity with hemoglobin that is 200 times that of oxygen, which hinders the supply of oxygen from blood to tissues, making it dangerous for pregnant women or cardiac patients. In some human and animal experiments, it has been shown that individuals with weak hearts under stress and in an excessive state of CO suffer from angina attacks when CO concentrations increase. A concentration of about 5 ppm of CO can cause headaches and dizziness. Concentrations between 10 ppm and 250 ppm can damage the cardiovascular system and even lead to death. People who are exposed to CO for a long time will have pale skin and lose weight.

- Harmful effects of NO_x gas

Nitrogen dioxide gas is a reddish-brown gas with a strong odor, and its odor is detected at about 0.12 ppm. Nitrogen dioxide is a gas that irritates the respiratory system, affects the nerves, and destroys lung tissue, causing nasal discharge and sore throat. Exposure to 100 ppm of this gas for 1 minute can have fatal effects on humans and animals. Also, exposure to 5 ppm of nitrogen dioxide for 1 minute may have harmful effects on the respiratory system. Prolonged exposure to nitrogen dioxide gas at a concentration of around 0.06 ppm can cause serious lung diseases.

- Harmful effects of SO₂ gas

This gas, once completely dissolved in water in a powdered form, can enter the human body through the respiratory and digestive systems, and ultimately enter the circulatory system. SO_x can produce small acidic particles measuring 2-3 μm . SO₂ can also enter the human body through the skin, causing chemical changes that result in reduced blood alkalinity, ammonia release from the urinary tract, and effects on salivary glands.

- Harmful effects of methane gas

Methane gas is the second most dangerous man-made greenhouse gas after CO₂. Methane's impact is exacerbated by its interaction with airborne particles (aerosols) in the

atmosphere, which can exist in solid, liquid, or both forms. Fog, dust, and haze¹⁵ are all aerosols. Aerosols can have a significant impact on climate as they can reflect sunlight back into space. Methane also promotes the oxidation of water vapor in the stratosphere, which results in a much stronger greenhouse effect than the direct effect of CO₂. Moreover, if not properly collected and used, methane gas can pose a high risk of fire or explosion if produced in large quantities.

- Harmful effects of CO₂ gas

Molecules in the atmosphere act like glass in the greenhouse effect. Short-wavelength rays of light that can easily penetrate the atmosphere are absorbed by objects on the Earth's surface, which are then heated by the absorbed solar radiation. These heated objects then emit radiation, but the radiation has longer wavelengths due to the lower temperature, and is of the magnitude of infrared rays. When infrared rays enter the atmosphere, if there is CO₂ in the atmosphere, CO₂ molecules strongly absorb the infrared rays (due to the structure of CO₂ molecules, infrared radiation strongly stimulates the atomic vibration of CO₂ molecules). Therefore, the infrared radiation (i.e., heat) is trapped in the atmosphere, causing the Earth to warm up.

2. Waste-related: wastewater

(1) Rainwater runoff

- Risks

During the rainy season, rainwater washes away soil, sand, dead branches, and other impurities from the ground and carries them to the basin around the project site. If rainwater is not properly managed, it can have a negative impact on surface water, groundwater, and aquatic life in the area. Compared to other sources of wastewater, rainwater runoff is considered relatively clean, as long as it does not overflow from polluted areas. When waste collection and disposal measures are properly implemented and the quality of rainwater is relatively good, the negative impact of rainwater runoff is not significant. However, measures to manage rainwater sources must be taken.

- Countermeasures

The rainwater system will be designed separately from the sewer system. The amount of rainwater flowing on the surfaces of internal roads, gardens, and other areas will be filtered through steel grating or trash barriers on manholes before it flows into the rainwater pipes. Rainwater drainage facilities will be evenly distributed within the project area and connected to the general rainwater drainage facilities in the area. Manholes will be regularly dredged, and a commissioned contractor will be employed to transport and dispose of the collected sludge.

Rainwater from roofs will be collected in vertical plastic pipes and then directed to the project's rainwater drainage system before being discharged into the general rainwater drainage system in the area.

¹⁵ Smoke pollution caused by the smoke generated by burning fields or forest fires being carried by the wind.

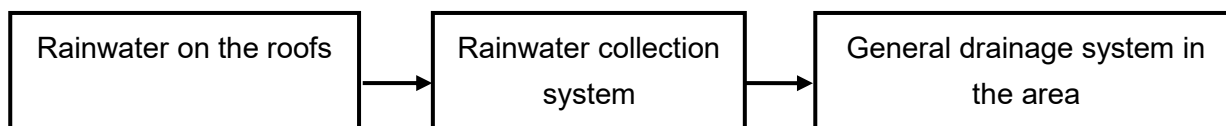


Figure 40: Rainwater collection plan

(2) Sewage

● Risks

The sources of wastewater are divided into two categories: domestic wastewater generated from patient and family members' activities such as meals, bathing, and cleaning, as well as from hospital staff, and medical wastewater generated from activities during medical examination and treatment of diseases, such as cleaning of medical equipment, post-surgery drainage, examination drainage, laundry of patient clothing and bed sheets, and cleaning of hospital rooms.

Medical wastewater generated from medical activities and patient activities is one of the main causes of serious environmental pollution. Once the hospital is operational, large quantities of highly contaminated wastewater, including many pathogenic bacteria, are discharged daily.

Domestic wastewater, which is mainly composed of suspended matter, easily decomposable organic matter, nutrient salts (N, P), fecal coliforms, and other pathogenic bacteria, is generated from sources such as household and hospital toilets. Untreated domestic wastewater may become a source of infection for the community in the area if the contaminated water is used. Additionally, domestic wastewater can cause soil pollution and have an impact on groundwater quality.

Wastewater components include detergents, residues of pharmaceuticals, some cytotoxic or antibiotic residues, hazardous substances specific to diagnosis and testing, and pathogenic bacteria such as Salmonella, Shigella, and Vibrio cholerae. Body fluids from patients in laboratories and during surgeries are particularly infectious. Poorly managed medical wastewater can significantly pollute the water quality of the water source where wastewater is discharged. Particularly concerning are enteropathogenic microorganisms that are easily transmitted through water.

To evaluate the components and properties of wastewater generated from hospital operations, the following are the results of water quality analysis of untreated wastewater from Ngoc Hoi General Hospital.

Table 50: Composition and properties of untreated hospital wastewater

	Indicators of analysis	Unit	Result	QCVN 28:2010/BTNMT column B, k=1
1	pH	-	6.77	6.5 – 8.5
2	COD	mg/L	244	100
3	BOD ₅ (20 °C)	mg/L	174	50
4	Total suspended solids	mg/L	668	100
5	Ammonium (in N)	mg/L	10.5	10

	Indicators of analysis	Unit	Result	QCVN 28:2010/BTNMT column B, k=1
6	Phosphates (in P)	mg/L	2.98	10
7	Nitrates (in N)	mg/L	0.21	50
8	Sulfide	mg/L	1.00	4,0
9	Animal and plant greases	mg/L	133.6	20
10	General Coliforms	MPN/ 100ml	<3	5.000
11	Salmonella	Bacteria /100ml	KPH	KPH
12	Shigella	Bacteria /100ml	KPH	KPH
13	Vibrio cholera	Bacteria /100ml	KPH	KPH
14	Total radioactivity β	Bq/L	<0.0100	0.1
15	Total radioactivity β	Bq/L	<0.030	1.0

Source: Department of Natural Resources and Environment of KON TUM Province “Center for Natural Resources and Environment Monitoring”, 2021

Referring to the analysis data of untreated hospital wastewater in the table above, 5 out of 15 parameters exceed the national regulation QCVN 28:2010/BTNMT - column B, k = 1 (regarding medical wastewater), and the content of organic matter, suspended solids, ammonium, and animal and plant greases in the wastewater is several times higher than the standard values. Therefore, appropriate wastewater treatment measures must be taken before discharging into the receiving water source.

- Countermeasures

The hospital wastewater is collected through pipelines and directed to the project's treatment system. Domestic wastewater from toilets is treated with primary treatment in septic tanks before being directed to the project's wastewater treatment system through collection pipelines. Wastewater from the cafeteria area containing a large amount of animal and plant greases is pre-treated in a grease trap. The wastewater is then pumped or allowed to flow to the wastewater treatment system through pipelines. Wastewater from the laundry area contains alkaline surfactants and is collected intensively, adjusted to neutral pH, and then directed to the project's wastewater treatment facility.

The wastewater is pre-treated and sent to the wastewater treatment system for processing according to its contents. The wastewater treatment system technology plan has not been finalized in this project. The wastewater treatment technology adopted by several general hospitals in the country is described in the separate environmental survey report.

3. Waste-related: solid waste and hazardous waste

(1) Solid waste

- Risks

We estimated the amount of general waste (domestic waste) generated during the hospital

operations using the following criteria:

- Coefficient of domestic solid waste emissions in Binh Duong Province: 1 kg/person/day (Decision 2474/QĐ-UBND dated 10/09/2012 of the People's Committee of Binh Duong Province).
- The total number of patients, doctors, nurses, medics and employees of the project.

General waste includes leftover food, used paper, and nylon packaging materials, among other things. Its composition consists of 76-82% organic matter and 18-24% other substances. Due to the high proportion of organic matter, if not managed properly, household waste can decompose and produce unpleasant odors that can have an impact on human health. Additionally, if accumulated in large quantities for a long time, it can become a breeding ground for disease-carrying mosquitoes and flies. Furthermore, solid waste generates toxic gases such as CO₂, CO, methane, hydrogen sulfide, and ammonia, causing local air pollution in the project area. In addition, general medical waste generated from medical activities includes drugs and chemicals that do not contain hazardous ingredients, as well as bottles and packaging containing drugs or chemicals that do not contain hazardous ingredients.

- Countermeasures

Medical waste is managed in accordance with the guidelines of Circular No. 20/2021/TT-BYT of the Ministry of Health dated November 26, 2021, which regulates medical waste management in healthcare facilities, and Circular No. 02/2022/TT-BTNMT of the Ministry of Natural Resources and Environment dated January 10, 2022, which provides detailed provisions for the implementation of several provisions of the Environmental Protection Law.

- General waste will be sorted into blue bags and placed in blue bins outside of the rooms. Staff will collect the waste to the project's temporary waste collection site (with cement foundation structure, roofed, and shelves around) on a daily basis. After collection, all waste will be returned to a temporary waste collection area. The hospital owner will contract with an authorized company that has the function of collection, transportation, and treatment to collect the waste at a frequency of 1-2 times per day.
- Ordinary medical waste will be stored in white plastic bags in white containers, and collected once a day by each department. Staff will collect the waste to the temporary waste accumulation area of the hospital, and the contracted company will collect and process it in accordance with regulations.

(2) Hazardous solid waste

- Risks

Hazardous waste refers to waste that contains harmful elements to human health and the environment, such as infectious, toxic, radioactive, flammable, explosive, and corrosive materials, and that has dangerous properties unless it is safely disposed of. The types of hazardous medical waste generated during hospital operations are divided as follows:

- Infectious waste refers to the waste that can cause cuts or puncture wounds, such as needles, needle pumps, sharp tips of electrical cords, acupuncture needles, scalpel blades, nails, saws

used in surgery, and other sharp objects. The objects in the composition of hazardous medical waste may contain a large amount of infectious pathogens such as staphylococcus, HIV, hepatitis B, and other infectious pathogens. These harmful substances can invade the human body through various means such as:

- Through the skin, such as cuts, scrapes, and punctures.
- Through the respiratory system by inhaling.
- Through ingestion, by swallowing or consuming contaminated substances.

Sharp objects not only cause cuts and puncture wounds but can also potentially lead to infection if the wound becomes contaminated with pathogens. The risks of infection from sharp object injuries is as follows:

Table 51 Risks of infection from sharp object injuries

Bacterial infection	Risk
HIV	0.3
Hepatitis A and B	3
Hepatitis C	3 - 5

Source: Dr. Pham Ngoc Chau, “Environment from the perspective of waste safety management” , 2017

- Non-sharp infectious waste refers to permeable and adhesive waste containing blood or biological fluids from the body, such as waste generated from isolation rooms.
- High-risk infectious waste includes waste generated in laboratories, such as samples, containers, and adhesive samples.
- Anatomy waste refers to the disposal of human tissues, organs, and experimental animal carcasses.
- Non-infectious hazardous waste includes the following items:
 - Chemicals containing dangerous or harmful components.
 - Discarded pharmaceuticals with warnings of toxicity or other hazards from pharmaceutical manufacturers.
 - Used medical equipment that is broken and contains mercury or heavy metals.
 - Discarded amalgam dental solder.
 - Medical waste containing complex compositions.

The process of infection from medical waste can occur through various routes such as the gastrointestinal tract and respiratory system, even without direct contact. The table below provides examples of bacterial infections resulting from exposure to fluids such as blood, cerebrospinal fluid, vomit, tears, and glandular secretions.

Table 52: Risks of infection from medical waste

Forms of infection	Examples of pathogens	Infused substances
Gastrointestinal infections	Gastrointestinal bacteria	Feces and vomit
Respiratory infections	Pneumococcal	Pus
Skin infections	Herpes	Secretions in the eyes
AIDS	HIV	Blood, genital secretions
Sepsis	Staphylococcus	Blood
Hepatitis A	Hepatitis A virus	Manure, feces
Hepatitis B and C	Hepatitis B and C viruses	Blood and fluids

Source: Dr. Pham Ngoc Chau, “Environment from the perspective of waste safety management”

● Countermeasures

Dangerous waste will be collected in the warehouse for hazardous materials. The warehouse will have a waterproof brick foundation, roof, walls, shelves, and gutters to ensure that liquid hazardous waste can be recovered if spilled. In addition, it will be equipped with complete fire prevention facilities and follow regulations such as labeling hazardous waste.

External contractors with the functions to collect, transport, and process waste on a daily basis for infectious waste and once a month for non-infectious waste will be responsible for regular collection. Specifically, radioactive waste generated by daily diagnosis and treatment of illnesses will be collected separately from other medical waste to prevent cross-contamination, stored in containers with lead shielding plates to prevent radiation diffusion, and clearly labeled with the internationally recognized radioactive material name. The date the waste was generated as well as the type of radioactive isotope inside the container must be indicated. This is to make it easier to keep track of the half-life of the waste. However, by storing radioactive waste for about three months, most isotopes used in medical settings will decay and radiation levels will decrease. Contractors with the ability to collect and process radioactive waste will handle it every three months.

The disposal methods for other types of hazardous waste are as follows:

- Hazardous waste: Infectious waste and non-infectious hazardous waste will be collected and sorted, and 180 lidded PVC containers with capacities of 35 L, 60 L, 120 L, and 240 L are prepared to ensure the collection of hazardous medical waste generated by the project.
- Sharp infectious waste: Put it in a yellow container with a tightly closed lid, and clearly indicate the code and name of the type of waste stored.
- Non-sharp infectious waste: Put it in a tightly closed yellow container, and clearly indicate the code and name of the type of waste stored.
- High-risk infectious waste: Put it in a bag and then in a yellow container with a tightly closed lid, and clearly indicate the code and name of the type of waste stored.
- Anatomy waste: Put it in a bag and then in a yellow container with a tightly closed lid, and clearly indicate the code and name of the type of waste stored.
- Liquid infectious waste: Put it in a tightly closed container, and clearly indicate the code and

name of the type of waste stored.

- Non-infectious hazardous waste: Put it in a tightly closed container, and clearly indicate the code and name of the type of waste stored.

4. Non-waste related impacts

(1) X-rays

● Risks

X-rays are highly toxic, and there are risks when X-ray imaging is performed under the following conditions.

- The X-ray room was not built according to the design standards.
- The equipment does not meet the safety standards established by the Ministry of Health and the World Health Organization.
- The X-ray team's knowledge is not sufficient.
- Medical staff's skills are limited and the reading of examination results is not accurate.
- Operation mistakes of the X-ray room, X-ray equipment, and processes.
- Lack of warning signals, unsafe door systems.

When X-rays leak, it is dangerous for both medical staff and patients. The negative effects of X-rays on the human body in non-standard X-ray rooms progress slowly, making it difficult to be aware of them. If affected by X-rays, there is a possibility of cancer, genetic mutations, weakened immunity, and decreased resistance, among others. Disorders caused by radiation exposure can appear in many organs, such as bone marrow (inactivation), intestinal mucosa (diarrhea, weight loss), blood (poisoning), skin (redness, dermatitis, sunburn), and can lead to a weakened immune system, infertility, and cancer.

● Countermeasures

The hospital operator must comply with the regulations on ensuring radiation safety in health as stipulated in Circular No. 13/2014/TTLT-BKHHCN-BYT dated September 6, 2014 by the Ministry of Health and the Ministry of Science and Technology.

- The X-ray room must have an area of at least 30 m², with walls of 330mm thickness and the inner walls plastered with barite for high radiation shielding effect in accordance with technical requirements. To ensure that radiation does not leak, a lead layer of at least 3mm thickness must be installed. In areas surrounding equipment rooms such as corridors, patient waiting rooms, and radiation workers' work areas, radiation symbols must be displayed.
- Beacons and warning signs for radiation accidents must be installed, and rules for the photography room and operating equipment must be established. Education and training must be provided to minimize the harmful effects of radiation on medical staff, patients, patients' families, and surrounding people. Equipment inspections must be carried out once a year.

X-ray equipment and CT scanners have safety regulations regarding their operation as follows. Radiation personnel should:

- Confirm the safety of the power supply before and after operation.
- Keep the doors closed while the machine is in operation.
- Follow the operating procedures of the machine.
- Pay attention to any abnormal signals of various equipment and make efforts to detect malfunctions early and prevent accidents.
- Do not remove the protection system for direct manual operation.
- Save operating data.
- Notify the radiation facility manager or radiation safety manager immediately if radioactive material is detected. In addition, they shall handle radiation problems within their responsibility.
- Use radiation safety devices suitable for their duties.
- Educate and oblige healthcare workers to strictly comply with safety conditions when working with the relevant equipment.

Means for ensuring the safety of radiation

- Equip devices that measure indicators of radiation contamination and provide protective equipment for X-ray room staff.
- Equipping personal dosimeters for medical staff.
- Conducting regular health check-ups for medical staff who are directly involved with the equipment.

(2) Risk of cross-contamination (pollution) in the hospital

● Risks

The causes of cross-contamination in hospitals include the following.

If the air environment within hospitals is not regularly cleaned and disinfected, it can become a place that contains pathogenic microorganisms and is harmful to health. It is necessary to be concerned about contaminated dust and bacteria in the air in such areas as infectious disease departments, morgues, hospital wastewater treatment facilities, and medical waste storage areas.

Hospitals have a high prevalence of antibiotic-resistant bacteria, so the rate of "cross-contamination" of diseases can be determined by the condition of the hospital's facilities and the skills of the doctors. Diseases such as colds, influenza, measles, whooping cough, and diphtheria, which are common in hospitals, cannot be avoided if quarantine measures are not properly implemented. Infants and seriously ill patients with weakened resistance cannot avoid the risk of cross-contamination if sterilization of medical equipment and other items is inadequate.

The patients most at risk of infection are those who require transfusions (such as during surgery) and those who require dialysis (such as hemodialysis). Hospitals prevent these infections through donor screening, but these are only simple screening tests and not detailed diagnostic tests. These simple tests cannot detect hepatitis or HIV, and their sensitivity is often poor, making it difficult to achieve accuracy. If there is a virus in a sample or blood, and there are no preventative measures or if disinfection is inadequate, the cross-contamination rate will be 100%. In the case of patients wearing artificial respirators, the more respirators they wear, the higher the infection rate for other diseases,

with pneumonia being the most risky. According to surveys conducted in some hospitals, after 10 days or more on an artificial respirator, there is almost a 100% chance of infection/cross-contamination.

One of the reasons for the high infection rate due to cross-contamination is incisions. According to the results of monitoring, the infection rate for patients who underwent an appendectomy is relatively high, ranging from 10% to 15%. Normally, the surgery takes about 5 to 7 days and patients can be discharged with a cost of over 1 million VND. However, if bacterial infection occurs, the treatment period will be doubled, and the treatment cost will also increase many times over. This is because most of the bacteria in the hospital are resistant to antibiotics, expensive specific antibiotics must be taken in large quantities to treat the infection. It has been scientifically proven that the bacteria called Helicobacter, which causes dangerous gastritis, is highly infectious. During a gastroscopy, if the equipment is not properly sterilized, these bacteria can enter the patient's body. Other procedures such as lumbar puncture, pleurisy, indwelling urinary catheter, intravenous infusion, and tracheotomy also carry a risk of introducing a large amount of bacteria or viruses into the patient's body.

Furthermore, healthcare workers are at high risk of "occupational hazards". Accidents where used needles accidentally puncture a person make up a relatively large proportion of these risks. There is also a risk of cross-infection when handling samples from patients with dangerous diseases such as HIV/AIDS, hepatitis A, B, and C. Needlestick injuries to healthcare workers mainly occur after blood sampling (63%). To minimize the risk of healthcare workers getting infected, it is necessary to provide protective equipment to prevent exposure, and ensure that healthcare workers receive vaccinations to prevent diseases. By receiving vaccinations, healthcare workers not only minimize their own risk of infection but also create a safer environment for patients. This reduces the risk of cross-contamination.

- Countermeasures

- Wash your hands before and after coming into contact with each patient. Wash your hands multiple times.
- Wear gloves when there is a risk of coming into contact with blood, bodily fluids, a patient's mucous membranes or damaged skin.
- Use personal protective equipment (surgical shirts, waterproof boots, masks, protective goggles) when there is a risk of blood splashing (e.g., during a procedure or surgery).
- Perform preliminary disinfection of tools before handling them. Always carry them when handling, cleaning, or disinfecting dirty tools.
- Limit contact with dirty clothing, etc. Prevent sharp objects from getting mixed in with clothing, etc. Collect and transport dirty clothing, etc. in bags.
- Handle experimental samples with care.
- If blood or bodily fluids is spilt in the patient's room, immediately wipe them up with appropriate disinfectant solution.
- Wear a mask or respirator when performing work as a hygiene worker.
- Each employee should be aware of preventing injuries from sharp objects. Sharp tools like

needles should be immediately disposed of in a special container after use. Do not mix sharp objects with other medical waste. Do not cover the needle cap, cut or break the needle, or pull the needle out of the syringe before disposing it. Dispose of the needle with the syringe into a container of sharp objects . When using sharp objects such as needles or scalpels during surgery, be careful not to harm others. Wear sufficient personal protective equipment.

- Conduct education for employees on basic preventive measures.
- Conduct vaccination and regular health checkups for employees.
- Establish a management system for employees exposed to blood or patient body fluids, and organize monitoring and prevention after exposure to minimize employee blood infections.

(3) Impacts of noise and vibration

● Risks

It is important to minimize noise as much as possible in hospital activities, including communication between hospital staff, patients, and visiting relatives, because hospitals are one of the most challenging environments. The following are typical sources of noise in a hospital:

- Human activities in a hospital.
- Operation of power generators.
- Vehicles circulating in hospital premises (ambulances, vehicles carrying goods to warehouses, cars, etc.).
- Operation of machinery equipment for ancillary facilities (drainage pumps, air blowers, etc.).

If you are exposed frequently to noise sources of 80 dBA or more, it can suppress your central nervous system, cause uncomfortable fatigue, lower labor productivity, and increase the risk of work-related accidents.

● Countermeasures

Hospitals are quiet environments, and it's important to always be mindful of reducing noise levels in human communication.

Measures against noise caused by human activities are as follows.

- Establish visitation hours and rules for patients in specialized hospital rooms and inform patients and their families of these rules.
- Limit noise in treatment rooms, etc. and display warning signs

Measures against noise and vibration caused by backup power generators are as follows:

- Use the latest generators.
- Use the generators with silent designs and install noise-cancelling rubber cushions.
- Install generators in appropriate locations away from sensitive areas in the hospital, such as examination and treatment areas and patient and family accommodation areas.
- Take measures such as installing machinery and equipment properly and using elastic springs to mitigate vibration.

Measures against noise caused by vehicles are as follows:

- Build high walls around the hospital to prevent noise from surrounding areas from affecting the hospital.
- Set a maximum speed allowed both inside and outside the hospital grounds.
- Restrict or prohibit the entry and exit of vehicles in areas where high tranquility is required.
- Increase the area of trees shared by the entire hospital (more than 20% of the total area).
- Regular maintenance and timely repairs of related vehicles.
- Check for wear and tear and replace damaged parts and lubricants for vehicles regularly.

(4) Socio-economic impacts

● Beneficial effects

The establishment and operation of the hospital are in accordance with the development situation and local legal regulations, and contribute to the development and promotion of social security in the region. The significance of the hospital in the local community is high. The establishment of the hospital responds to the needs of medical examination and treatment, alleviates the overload pressure of central and neighboring hospitals, promotes the intellectual and material potential of the citizens, mobilizes social resources, and contributes to the management of the nation's health. In addition, it creates many job opportunities and increases the income of workers. Furthermore, it contributes to the increase of the national revenue through sales and profits. It also contributes to the promotion of regional economic development and improves land values.

● Harmful effects

Along with the socio-economic benefits, the hospital may have the negative impacts. When operational, the hospital may contribute to air pollution and the risk of surface water pollution in the vicinity of the project. Moreover, the concentration of numerous patients, their relatives, and staff in the hospital may have a detrimental impact on the social security situation of the region. The establishment of the hospital involves other services such as restaurants, consumer goods transactions, and pharmacies in the surrounding areas, which could complicate social security and cause regional conflicts. In addition, traffic density may increase. The concentration of numerous employees working in the project may have a negative impact on the local social order and safety conditions.

● Countermeasures

To minimize the negative impact on local security and social order, such as traffic accidents and social unrest during the operations, the following measures will be taken:

- To prevent social conflicts, local workers will be given priority in employment if they meet the job requirements.
- Rules and labor regulations for all employees will be announced and made known and ensure their implementation.
- Security forces will be established and the direction of their activities will be clarified to create a mass movement to maintain security and order.
- Employees will be educated not to consume alcohol, beer, or stimulants while driving

transportation to avoid unfortunate accidents.

- Healthy sports, recreational and entertainment activities will be organized to encourage employee participation and engagement in local social activities.

Reducing pollution around residential areas: Since the hospital is located close to residential areas, the following preventative measures should be taken:

- Create fences around the hospital to reduce the impact of hospital waste.
- Regularly conduct spraying of chemicals to suppress the breeding of mosquitoes and insects that may transmit diseases in the hospital and neighboring households, and maintain an environmental hygiene inspection system around the hospital.
- Plan and implement regular employee health checkups and medical treatment.
- Thoroughly manage medical waste and drainage from the hospital based on legal regulations.

5. Environmental risks and accidents

(1) Fire and explosion accidents

● Risks

As part of the hospital's operations, various flammable and explosive solvents and chemicals such as oxygen and acetone are used and stored. Additionally, towels, cotton bandages, and all types of packaging are made of highly flammable materials.

If an explosion accident were to occur, it could lead to significant social and economic damage, potentially polluting all three ecosystems of land, water, and air. Furthermore, a fire accident could have an impact on the operation of the hospital and the surrounding areas, endangering lives and property. The causes of this type of problem are as follows.

- When fuel or chemical leaks are not detected and dealt with in a timely manner.
- When flammable fuel is stored or left in a place with a heat source.
- Malfunction of electrical equipment.
- Short-circuiting or explosion of the hospital's power system.

● Countermeasures

The hospital uses compressed air and liquid fuels that have a high risk of fire or explosion. To minimize the risk of fire or explosion in the storage areas of chemicals and liquid fuels, the following measures must be taken:

- Provide separate storage areas for chemicals and fuels. When necessary, steel-reinforced concrete frames will be installed, and fire-resistant coatings to increase the fire resistance time of the components, concrete foundation, corrugated metal roofing, and appropriate ventilation design will be applied. Chemicals will not be stored for long periods.
- Create a 0.2 m high embankment around the storage area to prevent chemicals and toxic liquid fuels from flowing into the drainage system.
- Install fire prevention equipment such as fire warning signs, fire alarms, fire extinguishers (CO₂ fire extinguishers, ABC dry powder fire extinguishers, etc.) on site. Fire prevention equipment should be installed in all rooms and areas of the hospital. The fire alarm system

includes fire alarm control panels, fire alarm display panels, and evacuation light systems. The fire extinguishing equipment includes underground water tanks, fire pumps, fire boxes, fire hydrants, and outdoor fire hydrants.

- Design a lightning protection system based on new technologies to ensure safety of the hospital buildings. The lightning protection system will be composed of active lightning rods installed on the building, ground resistance test boxes, and grounding systems, and will be designed and installed in accordance with safety technical standards.

(2) Disease spreading incidents

● Risks

When the treatment of hazardous waste and medical wastewater is insufficient, there is a possibility that contamination may spread not only to groundwater, but also to the surface. In addition, if the frequency of cleaning at the treatment facility is low, the risk of pathogenic viruses and bacteria increases, affecting not only the health of people around the hospital, but also the health of staff.

● Countermeasures

- Isolation
 - Detect infectious disease patients and cases of nosocomial infection at an early stage, and implement appropriate isolation measures.
 - Set up isolation rooms in each treatment unit and use them when necessary to isolate and treat patients.
 - Post signs in the isolation room indicating the type of isolation the patient is under and the appropriate preventive measures for that type. Keep the door to the isolation room closed at all times and clean the equipment and surfaces in the isolation room daily with disinfectant.
- Basic measures
 - Healthcare professionals must take basic preventive measures such as wearing gloves, hats, masks, etc. as prescribed.
 - Store all sharp objects in a collection container. After use, needles should be covered, bent, or removed from the syringe and placed in a container for sharp objects.
 - Install collection boxes for sharp objects in places where sharp objects are frequently used or disposed of.
 - Eating and drinking are not allowed in patient treatment areas.
 - Cooking utensils or tools contaminated with blood should be washed preliminarily and immediately disinfected with a disinfectant solution.
 - Persons caring for patients must be equipped with appropriate personal protective equipment.
- Washing hands
 - Wash hands before and after medical examination, caring for patients, and after touching contaminated tools.
- Infection prevention for healthcare professionals
 - All healthcare professionals should be warned of the risk of infection when caring for or

treating patients, especially during invasive procedures. If healthcare professionals become infected during care or treatment or an accident occurs due to sharp objects, they must notify the anti-infectious disease department and health authorities and take appropriate management measures.

- Reporting infectious diseases and reporting nosocomial infection cases
 - Departments are responsible for timely notification to the infection control unit about infected patients, and cases of hospital-acquired infections being treated in the department.
 - Environmental hygiene
 - Patient rooms and their surroundings should always be clean.
 - Clean surfaces with soap and water or appropriate disinfectant solution.
 - Keep clean and dirty cooking utensils stored separately. If a separate room cannot be arranged, the same room may be used, but the boundary between clean and dirty areas should be clearly separated.
- Medical instruments
 - Instruments used for invasive procedures such as surgical instruments, dental examination tools, and biopsy instruments must be sterilized before use.
 - Immediately after use, the tools must be preliminarily disinfected before washing and transferred to the sterilization unit.
 - During washing, flush water into all surfaces and slots of the tools. Employees handling contaminated instruments must wear necessary personal protective equipment.
 - After washing, package tools in a clean area.
 - Store sterilized tools in a sterile state.
- Fabrics
 - All contaminated fabrics must be collected and transported according to regulations.
 - Limit the scattering of soiled fabrics. Healthcare workers collecting soiled fabrics must wear masks and protective gear.
- Medications
 - Vials¹⁶ that are intended for multiple uses should be labeled with the date and expiration date and stored at the appropriate temperature.

(3) Accidents related to food hygiene and safety

● Risks

Accidents related to food hygiene and safety can occur in the following situations:

- Catering companies use chemicals such as formalin, industrial coloring agents, and Sudan, which are not allowed in food processing.
- Unsanitary methods are used to store and handle food.
- Unsanitary ingredients and cooking methods are used.
- Incorrect combination of ingredients leads to biological toxins.

¹⁶ A bottle for storing liquids.

Accidents related to food hygiene and safety can lead to mass poisoning and potentially affect the health of staff and patients. Therefore, it is necessary to take measures to manage, prevent, and respond to incidents.

- Countermeasures

To ensure the food hygiene and safety of employees and patients, it is necessary to contract with a reliable catering company that holds a certificate or license related to food hygiene and safety. The procedures must be strictly followed to ensure the safety and hygiene of food. Additionally, a safe and clean environment for food storage must be maintained to avoid any secondary contamination.

(4) Leaks of fuels and chemicals

- Risks

In the hospital's medical activities, various chemicals such as cleaning agents, sterilization agents, sample preservatives, and medicinal liquids are used, and leakage or spillage of these chemicals can have a chemical impact on staff and patients.

During the process of using, storing, and transporting materials such as diesel for power generators and chemicals (diagnostic reagent, wastewater treatment chemicals, etc.), breakdowns or leaks may occur. These issues often arise for the following reasons:

- Failure to comply with safety principles specified for each type of material or chemical during use and transportation.
- Strong impact causing spillage during storage and transportation.
- Improper storage of materials or chemicals in containers that do not match their quality or intended use.
- Improper use of fuel or chemical containers.
- When fuel or chemical leaks occur, they can have an impact on soil, water quality, and atmospheric environment (such as toxic gas emissions and evaporation of chemicals). In addition, oil products are easily ignited by heat sources, so leakage can lead to fire accidents that may cause damage to life and property.

- Countermeasures

In the hospital, liquid fuels such as machine oil, light oil (for generators), compressed air, drugs for medical examination and treatment, and chemicals for drainage treatment are used. As a result, there is a high risk of leakage or spillage of materials and chemicals. To prevent fuel leaks and respond to accidents, the hospital will cooperate with fire authorities, monitor warehouses, and create response plans in the event of an accident. At the same time, the following accident prevention measures must be taken:

- Store raw materials and liquid chemicals in the minimum amount (necessary for a certain period of use.)
- Store raw materials and chemicals in dedicated facilities, and seal and store containers in a dry and well-ventilated place.
- Store fuel tanks and chemical tanks in a well-ventilated separate warehouse, and install signs

with sufficient information about the types of chemicals and their safety precautions.

- Signs prohibiting smoking should be placed in areas where flammable fuels are stored, and lighters, matches, and other ignition tools will not be allowed.
- Requirements for protecting the environment and ensuring the safety of chemicals in accordance with national regulations should be complied with to prevent leaks during storage, operation, and use of chemicals.
- Safety regulations appropriate for the type of fuel should be followed using the correct technique.
- Gas tanks and containers should be transported appropriately (moved upright, not rolled, not subjected to strong vibrations), and containers will never be used for any other purposes.
- Conduct regular inspections of tanks and warehouses.
- Comply with and implement fire prevention measures.
- Organize personnel for incident prevention and response plans.
- Plan response measures in case of fuel or chemical leaks.
- Evacuate people, isolate them from the accident scene, and move to a safe place.
- Use appropriate personal protective equipment for spilled or leaked chemicals.
- Control the source of the spill and suppress the diffusion of the chemical.
- Collect fuel and clean up the accident site.
- Use appropriate recovery methods, such as sand, rags, and plastic brooms to prevent liquid spills. Lower the contamination level by using water. Also, use the ventilation fans in the area where the problem occurred.
- Investigate the cause and plan to improve the applied safety measures.

(5) Malfunction of septic tanks

● Risks

Factors that can affect the performance of a septic tank include the following:

- Over time, biofilm may grow and cause pipes to become clogged.
- Water may overflow from the tank.
- Sewage may leak from the piping.
- The flow of wastewater passing through an overloaded septic tank can affect its lifespan.
- If the septic tank's filter unit is not properly cleaned on a regular basis, it may become clogged.
- There may be an imbalance in the number of bacteria and enzymes in the septic tank.

● Countermeasures

- Regularly suction the sludge in the septic tank.
- Perform regular inspections of water pipes and promptly repair leaks and clogs.
- Create a timely action plan in case of septic tank problems.

(6) Issues with wastewater treatment systems

● Risks

There are various causes for issues with wastewater treatment systems, such as:

- Power outages

- System malfunction

Table 53: Equipment issues of wastewater treatment systems

	Device	Issue	Causes
1	Submersible pump	The pump is not operating.	Lack of electricity
			Fire fuse
			Loose electrical splices
			Jamming impeller
			Jumping heat relay
		The pump is running, but it cannot draw water up.	Not enough water in the tank
			Cloggage
			Jamming impeller
			Broken impeller
			Air in the water
2	Dosing pump	The primer pump cannot be used.	Solid objects are adhering to the ball of the valve when it's closed.
		Liquid leakage	The pump head and diaphragm are not sealed properly.
		The green lamp does not light up.	Incorrect voltage
3	Air blower	No spinning	Foreign objects in the blower
			Viscous dryness, lack of grease
			Damaged bearings
			The rotor is stuck in the housing or in the chamber due to axial deviation
			Overheating inside the blower
		Unusual noise	Foreign objects in the blower
			Loose bolts
			Rupture of bearings
			Loose climbing bolts anchor stand and blower anchor bolts
			Poor installation/foundation
			Poor pipe holders/racks
			Irregular puly correction
		Thrust pressure is too high	
		Reduced gas intake	Clogged filter
			Pipe occlusion
			Gas leaks through the distribution pipeline
			Open safety valve
			Inappropriate internal clearance
			The number of spins does not match
		Push pressure is too high.	Locked push valve
		The current is too high.	Clogged propulsion tube
		Vibration and noise	Safety valve malfunction
		Abnormal	Pressure meter malfunction
		Overload, high temperature	Friction between the rotor and the air blowing chamber or between the rotors
			Line gauge equipment problems
			Higher thrust pressure than standard
			Viscous leakage, grease or pipe occlusion
Viscous leaks	Damage to the viscous chamber cushion		
	Liquid viscous meter		

	Device	Issue	Causes
			Due to phosphorus friction
			Liquid viscous discharge button
			Too much viscous
		The blower doesn't function.	Excessive shock

Source: Report prepared by the contracted environmental consulting firm

- Countermeasures

- Comply with the design requirements and technical procedures for operating the wastewater treatment system, strictly adhere to the operational requirements to maintain and manage the wastewater treatment system.
- Perform regular inspections of piping and promptly repair any leaks or blockages.
- Prepare backup equipment for the treatment system, such as pumps and dosing pumps.
- In the event of equipment trouble, quickly troubleshoot and use backup equipment during troubleshooting.

(7) Leakage and rupture of pipes in water supply and drainage facilities

- Risks

Leakage and rupture of pipes in water supply and drainage facilities can occur due to the following reasons:

- Heavy traffic of vehicles in the area where water supply and drainage facilities are installed.
- Dropping large and heavy tools on the site.
- Water leakage caused by improper installation of pipes.

The impact of leaks or bursts in water supply pipes can lead to the loss of water supply. A rupture in a drainage pipe can cause leakage, leading to the discharge of wastewater with concentrations that do not meet the required standards into the environment, resulting in environmental pollution. This can damage the scenery, generate bad odors, and affect employees, patients, and nearby residential areas.

- Countermeasures

- Prevention of incidents
 - Use safe insulation wire for the supply and drainage pipes.
 - Perform regular inspections and maintenance of joint and lock valves in the pipeline system to ensure that all pipes have sufficient durability and the secure tightening.
- Response to incidents
 - In case leakage or pipe rupture is detected, immediately lock the branching valve and replace the damaged supply and drainage pipes. After the repair, either open the water supply valve or discharge the drainage.

5.4 Future policies regarding environmental impact assessment

Based on the initial evaluation survey, regarding wastewater treatment, dust/exhaust gas/odor control, waste management, etc., the following should be considered and addressed in order to obtain environmental

permits and approvals and minimize environmental impact in the future.

- Understand all environmental issues arising from the investment project (such as identifying all wastewater) and perform appropriate treatment.
- Consult and contract with appropriate operators according to laws and regulations for general waste targeted for treatment.
- Similarly, consult and contract with appropriate operators according to laws and regulations for hazardous waste.
- Collaborate with specialized agencies and local environmental management agencies to design and operate a wastewater treatment system that meets the standards set by Vietnam to ensure compliance with and avoid violations of international treaties, Vietnamese legal standards, and technical regulations, etc.

6 Formulation of business and operation plans

In this section of “Formulation of business and operation plans”, the international hospital's policies and business plan proposal based on research are reviewed. The international hospital, which highlights its collaboration with VNU-HCM as a feature, will be established within VNU-HCM's premises. VNU-HCM affiliated hospital is also planned to be established on the same site. Since VNU-HCM is an important partner of the project and the collaboration and role sharing with them are crucial, we will first review their overview and plan for the affiliated hospital. Then, we will explain the concept, services, implementation structure, personnel plan, and other related matters of the international hospital.

6.1 VNU-HCM and their plan for the affiliated hospital

6.1.1 About VNU-HCM

Vietnam National University, Ho Chi Minh City (VNU-HCM), established in 1995, is part of Vietnam National University (VNU), which is a leading institution in Vietnam. However, VNU-HCM operates independently from Vietnam National University located in Hanoi and has seven affiliated universities (University of Technology, University of Science, University of Social Sciences and Humanities, International University, University of Information Technology, University of Economics and Law, An Giang University), a medical school, and a research institute (Institute for Environment and Resources). It is one of the top comprehensive universities in Vietnam.

The medical school was established in 2009, followed by the pharmacy school in 2016, the dental school in 2019, and the traditional medicine and nursing school in 2022. The university is currently planning to establish a 500-bed affiliated hospital on its campus. The following is an overview of the design proposals for the buildings and hospital facilities based on the design report created in 2017.



Figure 41: Image of the new campus (university/hospital)

Table 54: Estimated areas of the university and hospital

	Purpose	Required area (m ² /unit)	Total area (m ²)
I	Hospital (500 beds)	130	65,000
II	Students (3,000 people)	14 - 25	42,000 - 75,000
III	Basic infrastructure such as road network	12 - 15	36,000 - 45,000
IV	Green space and sports facility site	10 - 15	30,000 - 45,000
-	Total	-	173,000 - 230,000

Source: Ho Chi Minh City, “DESIGN REPORTSITE PLAN 1/500”, Jan. 2017

Table 55: Plans for the university and hospital by phase

Breakdown		Construction phase	
		Phase 1	Phase 2
University	Medical school	900 people	900 people
	Pharmacy school	500 people	500 people
	Oral hygiene and basic Science	500 people	500 people
	Public health	250 people	300 people
	Nursing	0	300 people
	Medical technology	0	250 people
	Traditional medicine	0	250 people
	Medical research center	TBD	TBD
	Staff	500 people	800 people
Hospital	-	200 beds	500 beds

Source: Ho Chi Minh City, “DESIGN REPORTSITE PLAN 1/500”, Jan. 2017

6.1.2 Plan for VNU-HCM affiliated hospital

A new affiliated hospital is planned to be built as an educational hospital within the new campus of VNU-HCM. The first phase involves constructing a hospital with a capacity of 200 beds, with plans to expand to 500 beds in the second phase.

Moreover, it has been recognized that in order to align with the strategic and regional development plans of Ho Chi Minh City, Binh Duong Province, and surrounding municipalities, a review and expansion of the functions of the affiliated hospital will be necessary. As a result, they have envisioned the development of a capacious campus and hospital with the potential for expansion. The following is an outline of the plan for the new affiliated hospital.

Table 56: Outline of the plan for the new affiliated hospital

Project name	Vietnam National University, Ho Chi Minh City, School of Medicine Affiliated Hospital
Planning and design company	CPG Vietnam Co., Ltd
Total planning area	20.6 ha
Total cost (planned)	1,982 billion VND
Functional composition	<ul style="list-style-type: none"> • Hospital area (500 beds) • Student area (3,000 students) • Research center area • Green and sports area

Development plan	Phase 1 (200 beds)	Medical department, dental department, pharmacy department, basic science department, administrative department, auditorium, library, laboratories, etc.
	Phase 2 (additional 300 beds)	Traditional medicine, medical technology, public health department, nursing department, medical research center, medical equipment training space

Source: Ho Chi Minh City, “DESIGN REPORTSITE PLAN 1/500,” Jan. 2017



Figure 42: Overall image of the university hospital

In the current discussions with VNU-HCM, it has been discussed that although the affiliated hospital aims to have 200 beds in phase 1, financial constraints may require them to start with 100 beds, and therefore, their initial focus will be on providing basic medical care that the community needs, with an emphasis on internal medicine and surgery. In Japan, university hospitals generally aim to provide advanced and specialized medical care as designated special function hospitals. However, in the current situation in Vietnam, it is not necessarily the case, and university hospitals place importance on providing quality medical care while conducting education. Therefore, the international hospital, which aims to respond to the needs of patients who cannot be treated locally or are not satisfied with existing medical services, can complement the role of the affiliated hospital and create synergy.

6.2 Business concepts and services of the international hospital

As mentioned earlier, rapid regional development, including the development of industrial parks, is taking place in Binh Duong Province, and further population growth is expected. As a result, there is a possibility of a shortage of medical resources, and the provincial government is planning to double the number of hospital beds in the province from about 5,000 to 10,000 by 2030. Especially in Di An City, there is a lack of medical resources (doctors and hospital beds) per capita. In view of this situation, it is meaningful to provide basic medical care to the community, just like VNU-HCM affiliated hospital is planning to do. However, the true meaning of the international hospital is to respond to the needs of patients

requiring advanced medical care that other hospitals cannot provide. Therefore, our policy is to focus on providing advanced and high-quality medical services that Vietnamese competitor hospitals do not or cannot provide.

Table 57: Basic concepts and overview

Concepts	Overview
A Japanese hospital that will have multiple departments with 120 beds at the time of the launch (aiming for a scale of 500 beds in the future)	It aims to provide medical services that cover major medical departments while delivering medical treatments that are difficult to find in current Vietnamese hospitals at the same level of quality and medical technology as in Japan.
The medical staff will consist of Japanese professionals who will continue to work to establish the medical system and maintain and improve the quality of services.	Contributing to the community through medical services is essential; since the core 'personnel' will be the key in providing high-quality medical care, key Japanese staff will play a significant role.
By collaborating with the affiliated hospital of VNU-HCM, we can reduce business costs, while Japanese staff members can focus on areas that provide high added value.	It is important to provide high-quality medical care at a reasonable price to the community, rather than targeting wealthy clients as a luxury hospital. Therefore, we should cut costs where possible and provide high-value-added services.
We also partner with university hospitals in Japan to maintain high-quality clinical capabilities that incorporate the latest knowledge and evidence-based practices. In addition, we differentiate ourselves from other hospitals in terms of education and research.	The international hospital will not only provide medical services, but also engage in initiatives aimed at developing local talent and conducting future medical research.

Based on the above concept, the following medical departments will be established. The initial plan for the international hospital included local medical services specializing in cardiology and neurosurgery. However, after conducting interviews with leading hospitals in Cambodia and considering the current situation of the international hospital establishment area, it was discovered that emergency medical care needs may not be high, and residents may seek not only advanced medical care, but also various other medical services. Additionally, expanding the portfolio of hospital operations can help manage risks more effectively. As a result, the hospital policy has been revised to expand the range of medical departments. However, as mentioned above, the medical department composition may change depending on the basic concept and how the roles will be shared with VNU-HCM.

Table 58: Planned medical departments

Medical department (initial plan)		Other related department
General internal medicine	Gastrointestinal surgery	Health checkup department
Cardiology	Orthopedics	Pharmacy department
Gastroenterology	Plastic and reconstructive surgery	Nursing department
Nephrology	Radiology	Clinical examination department
Pediatrics	Anesthesiology	Nutrition department
Obstetrics and gynecology		Radiology department
Medical department (expansion plan)		Rehabilitation department
Respiratory Medicine	Respiratory surgery	Clinical engineering department
Neurology	Cardiovascular surgery	
Rheumatology	Neurosurgery	
Dermatology	Urology	

Based on the on-site survey, we are considering the main medical areas for the international hospital and the role sharing with the university hospital as follows. We plan to continue discussions with VNU in the future. While it may not be easy to implement all of them from the beginning, we aim to gradually expand our functions to respond to the healthcare needs in Vietnam.

Table 59: Distinctive healthcare services

Medical department	VNU-HCM affiliated hospital	International hospital (including services after expansion)
General Internal Medicine	-	<ul style="list-style-type: none"> • Common infectious diseases • Lifestyle diseases • Health check-up and cancer screening • Diagnosis of untreated illnesses and referral to the appropriate department
Cardiology	<ul style="list-style-type: none"> • General cardiology • Catheter treatment for ischemic heart disease 	<ul style="list-style-type: none"> • Arrhythmia (ablation therapy) • Catheter aortic valve replacement surgery
Respiratory Medicine	<ul style="list-style-type: none"> • General respiratory medicine • Malignant respiratory disease 	<ul style="list-style-type: none"> • Diagnosis and treatment of rare respiratory diseases
Gastroenterology	<ul style="list-style-type: none"> • Upper gastrointestinal endoscopy • Lower gastrointestinal endoscopy • Endoscopic retrograde cholangiopancreatography 	<ul style="list-style-type: none"> • Diagnosis and treatment of rare digestive diseases • Endoscopic surgery
Nephrology	<ul style="list-style-type: none"> • Management of general chronic kidney disease • Hemodialysis 	<ul style="list-style-type: none"> • Diagnosis and treatment of rare kidney diseases • Blood cell removal, plasma exchange, and blood adsorption therapy
Neurology	<ul style="list-style-type: none"> • Diagnosis and treatment of cerebral infarction • Diagnosis and treatment of 	<ul style="list-style-type: none"> • Diagnosis and treatment of rare neurological diseases

Medical department	VNU-HCM affiliated hospital	International hospital (including services after expansion)
	neurodegenerative diseases	
Rheumatology	-	<ul style="list-style-type: none"> Comprehensive diagnosis and treatment of autoimmune diseases, autoinflammatory diseases, and rheumatic diseases
Pediatrics	<ul style="list-style-type: none"> General pediatric care 	<ul style="list-style-type: none"> Neonatal intensive care (NICU) Diagnosis and treatment of pediatric blood cancer and pediatric rare diseases
Obstetrics and Gynecology	<ul style="list-style-type: none"> Advanced perinatal care Obstetrics and gynecology screening Surgery for gynecological diseases 	<ul style="list-style-type: none"> Cases requiring complex surgery and management Infertility treatment Pain-free delivery Minimally invasive surgery (laparoscopy, robotic surgery)
Gastrointestinal Surgery	<ul style="list-style-type: none"> Surgery for benign gastrointestinal diseases Surgery for malignant gastrointestinal diseases 	<ul style="list-style-type: none"> Cases requiring complex surgery and management Minimally invasive surgery (laparoscopy, thoracoscopy, robotic surgery)
Thoracic Surgery	<ul style="list-style-type: none"> Surgery for benign respiratory diseases Surgery for malignant respiratory diseases 	<ul style="list-style-type: none"> Cases requiring complex surgery and management Minimally invasive surgery (thoracoscopy, robotic surgery)
Orthopedic Surgery	<ul style="list-style-type: none"> Knee joint formation surgery Hip joint formation surgery Spinal surgery Surgery for bone and soft tissue malignant tumors 	<ul style="list-style-type: none"> Cases requiring complex surgery and management Regenerative medicine
Plastic Surgery	<ul style="list-style-type: none"> Wound formation and reconstruction surgery Burn management Microsurgery 	<ul style="list-style-type: none"> Cases requiring complex surgery and management Aesthetic plastic surgery Gender reassignment surgery
Radiology	<ul style="list-style-type: none"> Radiographic diagnosis 	<ul style="list-style-type: none"> Radiation therapy
Emergency Medicine	<ul style="list-style-type: none"> Third-tier emergency care (For high-energy trauma, cardiovascular events, obstetric emergencies, and pediatric emergencies) 	-
Infectious disease	<ul style="list-style-type: none"> Diagnosis and treatment of specific infectious diseases (such as tuberculosis, HIV, and parasites) Infection control department for the entire hospital (observation and education on appropriate use of antibiotics, measures and responses to multidrug- 	-

Medical department	VNU-HCM affiliated hospital	International hospital (including services after expansion)
	resistant bacteria, and comprehensive guidance for preventing the spread of infections)	
Ophthalmology	<ul style="list-style-type: none"> • Cataract surgery • Glaucoma surgery • Other ophthalmic diseases 	-
Otolaryngology	<ul style="list-style-type: none"> • Diagnosis and surgery for general otolaryngological diseases (Tonsillectomy, Pearl tumor, inner ear tumor, and sinus surgery) • Surgery and management of head and neck cancer 	-
Urology	<ul style="list-style-type: none"> • Diagnosis and treatment of general urological benign diseases (Prostate enlargement and urinary tract stones) • Surgery for urological malignant diseases (Prostate cancer, bladder cancer, and kidney cancer) 	<ul style="list-style-type: none"> • Cases requiring complex surgery and management • Minimally invasive surgery (laparoscopy, robotic surgery) • Kidney transplantation
Cardiovascular Surgery	<ul style="list-style-type: none"> • Open-heart coronary artery bypass surgery • Open-heart valve replacement and formation surgery 	<ul style="list-style-type: none"> • Cases requiring complex surgery and management • Minimally invasive surgery (robotic surgery)
Neurosurgery	-	<ul style="list-style-type: none"> • Craniotomy for brain tumors or bleeding • Endovascular treatment for stroke or brain tumors
Dermatology	<ul style="list-style-type: none"> • General dermatology 	<ul style="list-style-type: none"> • Diagnosis and treatment of rare skin diseases • Aesthetic dermatology
Anesthesiology	<ul style="list-style-type: none"> • General anesthesia during surgery 	<ul style="list-style-type: none"> • General anesthesia for cases with difficult airways • Pain management clinic

Furthermore, we aim to highlight the features of the hospital facilities and functions, such as the collaboration with VNU-HCM, the internationally competitive hospital management, and the innovative use of digital technology, in order to become a competitive hospital with a meaningful presence as a regional medical institution.

Table 60: Distinctive hospital features and functions

Features	Description
Collaboration with Vietnamese national university/hospital and utilization of their facilities and human resources	<p>Since the competing hospitals in Vietnam have not established deep collaborations with national universities and hospitals, we will promote active collaboration.</p> <ul style="list-style-type: none"> • By collaborating with a national hospital, we can provide medical care to a wide range of patients, from the poor to the wealthy. • We aim to share and standardize resources and practices between our hospital and the national hospital, which will lead to lower service unit costs. • Centering around the core pillars of clinical care, education, and research, which are objectives at the university hospital, we will also collaborate with Japanese university hospitals to offer opportunities for training, knowledge and technology sharing, with the goal of improving our staff quality. We will also conduct joint research and share our findings. • Given the high level of trust that Vietnamese people have in public hospitals, we believe that collaborating with VNU-HCM will complement our reputation, particularly among the Vietnamese population.
International standard hospital management	We will operate the hospital based on JCI accreditation and Japan's hospital function evaluation, etc.
Advanced system and digital utilization	<p>We will construct a smart hospital using electronic medical records and IoT devices, among others. The specific items under consideration are as follows:</p> <ul style="list-style-type: none"> • Remote communication and telemedicine with Japan (advice from Japanese specialists). • Active use of medical AI. • Improving the quality of medical services and reducing staff workload through DX such as electronic medical records, PACS, and inventory management systems. • Reducing waiting times for consultations (appointments) and payment through system implementation.

Based on the above features, the expected target client goals are as follows. Please note that the specific target client image in the region and the idea of role sharing with VNU-HCM are described in "2.4 Simplified forecasting of target demand."

Table 61: Target client

Domestic/abroad	Nationality	Target patient
Within Vietnam	Vietnamese	Patients who cannot receive adequate treatment at existing local medical facilities
		Patients receiving medical treatment in overseas hospitals such as in Thailand and Japan
		Patients utilizing local private hospitals but seeking higher-level medical care and service quality (high-income individuals and those using corporate welfare)
		Patients seeking a second opinion after receiving medical treatment at Vietnamese hospitals
	Foreigners (Japanese, etc.)	Patients using overseas medical facilities or foreign-owned medical institutions
		Tourists visiting Ho Chi Minh City
Outside of Vietnam	Japanese (expatriates in Cambodia, Laos, etc.)	Patients residing in Cambodia, Laos, and other nearby countries who cannot receive adequate medical care locally
	Foreigners (Cambodians, Laotians, expatriates from neighboring countries, etc.)	Patients residing in countries such as Cambodia and Laos, who cannot receive adequate treatment from existing local medical services.
		Affluent individuals living in Cambodia, Laos, and other nearby countries
		Foreign expatriates, etc. in neighboring countries

Regarding the concept of pricing, the hospital policy for medical services provided in Vietnam is to have a price level equivalent to other private hospitals in Vietnam. For medical services not provided by hospitals in Vietnam, the policy is to ensure a price level that can secure a gross profit margin similar to or slightly higher than other services. While it is important to secure profits, the hospital's objective is not to maximize profits, but to set appropriate price levels that can ensure a reasonable profit margin while providing necessary medical care. Please refer to "9. Business income and expenses" for more details.

In addition, from the perspective of contributing to the local community, the hospital provides free medical services such as medical courses and consultations to the general public, including the impoverished population. Within the range of profits generated by the hospital's business, the hospital conducts medical courses and consultations to contribute to the improvement of the nation's health. Specific activities being considered include the following:

- Implementation of medical courses for citizens
It is being considered to implement medical courses for citizens, which will be held regularly by Japanese doctors for the general public. These courses will cover various topics such as prevention of major infectious diseases like AIDS, tuberculosis, and malaria, prevention of lifestyle diseases such as diabetes, reproductive health, and mental health, which are familiar and relevant to citizens.
- Implementation of health checkups for citizens
It is being considered to offer free health checkups for the general public, including the impoverished population. The details will be decided upon in collaboration with the government and VNU-HCM, but the activities under consideration include free mammography screenings and breast cancer

awareness campaigns on Pink Ribbon Day, free HIV testing on World AIDS Day, and regular free blood sugar measurement events to detect and raise awareness about diabetes.

- Implementation of medical consultations and surgeries in rural areas
It is being considered to conduct regular free medical consultations and surgeries for general citizens, including the impoverished population, in rural areas and agricultural communities by dispatching doctors and healthcare professionals from the international hospital. It is also under consideration to donate some surgical instruments and implants that are implanted in patients' bodies during surgeries.

6.3 Business implementation structure

The current assumed business implementation structure is as follows. The base of the main activities in Vietnam will be a joint venture company to be established in Vietnam. Ishiikai and IDCJ will also carry out business planning and fundraising at the time of the hospital establishment, and dispatch major personnel to the joint venture company. LEOCLAN will leverage its procurement capabilities for medical equipment in Vietnam and negotiate prices with Japanese medical equipment manufacturers in particular.

Table 62: Related corporations and their roles

Corporations and organizations	Roles
New JV in Vietnam	Overall management and business entity of the project Obtaining various licenses in the local area Establishing a system for collaboration with Japanese university hospitals and others
Ishiikai	Dispatching management personnel and key medical staff Providing advice on hospital management
IDCJ	Dispatching management personnel and providing business development support Offering knowledge and expertise in various development projects, including overseas medical projects
LEOCLAN	Supporting the selection, procurement, and maintenance of medical equipment
VNU-HCM	Management of the university hospital collaborating with the international hospital Supporting the acquisition of licenses for Japanese medical personnel
JICA	Offering finance support
Japanese university hospital	Dispatching medical personnel, providing advice on medical technology, joint research
Various vendors and subcontractors	Clinical testing company: handling tests that cannot be handled in-house by the hospital Accounting firm: supporting tax filings and settlements for the JV Cleaning company: cleaning facilities and washing linens Advertising agency: supporting marketing and patient recruitment Waste disposal company: handling the final disposal of waste from facilities Law firm: providing support for regulatory compliance

6.4 Personnel plan

Regarding personnel structure, Japanese doctors with specialist qualifications in each medical field will be gathered. Japanese nurses will ensure coordination between Japanese staff and Vietnamese

nurses. In professions other than doctors, one Japanese staff member will be assigned to each specific responsibility. In addition, remote interpretation for radiology will also be considered.

The assumed personnel structure below represents the initial staffing structure, and until the business stabilizes after its launch, an abundance of experienced Japanese staff members will be assigned. As the business progresses, the plan is to transfer major positions from Japanese staff members to Vietnamese staff members, increasing the local ratio.

Furthermore, regarding the recruitment of Japanese personnel, we will not only utilize the existing resources of Ishiikai but also widely recruit and employ Japanese specialist doctors and medical professionals. Ishiikai has a track record of recruiting medical personnel externally in Myanmar and Thailand for their healthcare businesses, and recognizes that sufficient applications can also be obtained for this business. It is believed that it is possible to secure Japanese medical staff for this business. As a basic policy for recruitment, we aim to gather specialist doctors and occupations that correspond to the above medical departments.

In regards to the recruitment of Vietnamese personnel, the project plans to use recruitment tools such as referrals from Vietnamese personnel services companies or VNU, as well as social media. As for education, Ishiikai has a track record of providing training for Myanmar and Thai medical staff in Japan before continuing employment in their home countries. Therefore, they plan to conduct training for Vietnamese medical staff for this project as well.

Table 63: Assumed personnel structure

Staff	No. of Japanese	No. of Vietnamese	Total number
Doctor	12 ¹⁷	24	36
Nurse	12 ¹⁸	40	52
Pharmacist	1	2	3
Radiology technician	1	2	3
Clinical laboratory technician	1	2	3
Rehabilitation staff	1	7	8
Registered dietitian	1	-	1
Clinical engineer	1	-	1
Administrative staff	2	12	14
Nursing assistant/interpreter/other support staff	0	50	50
Total	32	139	171

6.5 Overseas business track record of Ishiikai

Since 2020, Ishiikai has been operating nursing care facilities in Thailand, and since 2021, they have been operating a clinic business in Myanmar. Prior to establishing the international hospital, they are also preparing for a clinic business in Vietnam.

¹⁷ The following specialists are expected: cardiologists, general internists, gastroenterologists, nephrologists, pediatricians, obstetricians, gynecologists, gastrointestinal surgeons, orthopedic surgeons, plastic surgeons, radiation therapy specialists, and anesthesiologists. Additionally, support from Japanese radiologists for reading and interpreting radiographic images will be outsourced.

¹⁸ Assumed placement in ICU, operating room, internal medicine ward, surgical ward, and outpatient clinic.

- Nursing care business in Thailand: Ishiikai operates multiple nursing care facilities in Thailand under the brand name Ishii Stroke Rehabilitation Center, in collaboration with local partners. The staff working in these facilities are mainly nurses, physical therapists, and caregivers.
- Clinic business in Myanmar: Ishiikai operates an internal medicine clinic within an office building using a local corporation that is 100% foreign-owned. Doctors, nurses, radiological technologists and other staff work in the clinic.

Furthermore, Ishiikai has been conducting the following survey and consulting services as well as human resources development programs.

Table 64: Ishiikai's track record of business operations overseas

Country	Operations	Client	Year
Myanmar	Business survey of a hospital (market research, design)	JICA	2018-19
	Verification survey of a clinic (design, medical verification)	Medical Excellence Japan	2018-19
	Human resource education project for orthopedic surgeons in Myanmar	NCGM	2019
	Human resource education project for gastrointestinal surgeons in Myanmar	Japanese medical device manufacturer (listed)	2019-20
Thailand	Study support for establishing a comprehensive community-based care center	Japanese caregiving service provider	2018-19
	Examination of medical services for local smart city development	Japanese consulting firm	2019-20
	Development cooperation for remote rehabilitation systems in Thailand	Japanese IT company (listed)	2021-23
	Investigation of the strengths of Japanese-style nursing care services	Medical Excellence Japan	2021-22
	Market research on dysphagia-adjusted foods in Thailand	Japanese nutritional food manufacturer (listed)	2022
	Survey on caregiving-related IT in Thailand	Medical Excellence Japan	2021-22
Bangladesh	Study of physical therapy services in a Japanese hospital project	Japanese medical-related business operator (listed)	2018-19

6.6 Related services

Although it is not included in the current revenue plan, in addition to the medical services mentioned above, it is possible to provide the following related services. Ishiikai has confirmed the demand for these services in its business in Myanmar and Thailand.

- A service that connects Vietnamese patients who wish to receive medical care at Japanese hospitals with Japanese medical institutions.
- Consulting services and providing feedback on sample medical products for Japanese companies that wish to sell medical-related products in Vietnam.
- Healthcare services for Japanese schools, including providing a school nurse's office.
- Home visit nursing and rehabilitation services for patients.

7 Procurement plan for medical equipment, etc.

This section will organize information regarding the necessary medical equipment for the hospital operations, procurement methods, estimated costs, and key points to consider when establishing and maintaining the equipment.

Based on the initial investigation and considering the medical equipment available in the market, there are no significant concerns regarding the procurement of medical equipment. It is possible to obtain medical equipment with the necessary specifications as long as the hospital is not fixated on a particular manufacturer, and there seems to be no need for import or new registration procedures. Additionally, it is expected that the cost will not be a significant issue since, except for Japanese-made products, the prices of medical equipment are slightly cheaper in Vietnam compared to their distribution prices in Japan.

7.1 List of procurement equipment

The proposed list of equipment to be procured under this project is as follows. Please note that the contents may change depending on the review of the medical departments and services to be provided due to the role-sharing with VNU-HCM.

Table 65: List of procurement equipment

Department	Name of equipment	Quantity
Outpatient examination room		
Common in examination rooms Outpatient treatment room	Schaukasten (X-ray film illuminator), wall-mounted	10
	Examination table	10
Cardiology department	Electrocardiogram monitor	1
	Electrocardiogram machine	1
Gastroenterology department	Anoscope	2
Obstetrics and gynecology department	Gynecological examination table	2
	Colposcope	4
	Transvaginal ultrasound machine	1
Orthopedics department	Plaster cutter	1
Pediatrics department	Nebulizer	2
	Electrocardiogram monitor	1
	Vascular visualization device	2
Emergency treatment room	Surgical light (ceiling-mounted and movable)	1
	Ultrasound diagnostic device, 3/4D	1
	Electrocardiogram (ECG) monitor	3
	Electrocardiogram (ECG) machine	1
	Artificial ventilator	1
	Defibrillator	1
	Patient monitoring system	3
	Delivery monitoring system	1
Blood glucose meter	1	

	Blood gas analyzer	1
	Back valve mask	2
	Stretcher, slide-type	3
	Medical refrigerator	3
Chemotherapy room	Reclining chair	10
Pharmacy	Water dispenser	2
	Dust collector equipped compounding table	2
	Powder medicine packaging machine	1
	Tablet medicine packaging machine	2
Internal medicine diagnosis		
Electrocardiogram examination room	Holter monitor	1
	Treadmill	1
	Electrocardiogram (ECG) machine	2
Ultrasound examination room	Ultrasound machine, 3/4D	1
	Ultrasound machine, Doppler	1
Electromyogram examination room	Electromyography (EMG) machine	1
Electroencephalogram examination room	Electroencephalogram (EEG) machine	1
	Electric hospital bed	1
Respiratory function examination room	Spirometer	1
Imaging department		
Radiology department	MRI equipment	1
	CT	1
	PET-CT	1
	X-ray fluoroscopy imaging equipment	1
	General X-ray imaging equipment	2
	Mobile X-ray imaging equipment	1
	Mammography	1
Angiography room	Vascular imaging equipment	1
Endoscopy room	Upper gastrointestinal endoscope for adults	2
	Lower gastrointestinal endoscopy	2
	Endoscope monitor	4
	Light source	4
	Endoscope storage cabinet	1
	Automated endoscope washer	1
	Reclining chair	2
Clinical laboratory		
Common clinical examination equipment	Centrifuge	3
	Microcentrifuge	2
	Capillary centrifuge	1
	Clean bench	2
	Incubator	1
	Distiller	1
	Medical refrigerator	5
Freezer	2	

	Deep freezer	2
Biochemical examination	Automated biochemistry analyzer	1
	Blood gas analyzer	2
	Electrolyte analyzer	1
	Immunoassay analyzer	1
	Hemoglobin meter	2
	Bilirubin meter	2
Blood examination	Blood cell counter	2
	Coagulation measuring device	2
	Rotator (for blood samples)	1
	Staining device	1
Immunological examination	Erythrocyte sedimentation rate analyzer	1
	Vertical shaker	2
Bacterial examination	Urinalysis test strip analyzer	2
	Urinalysis device	2
Microbial examination	Blood culture device	2
	Anaerobic bacterial culture device	1
	Carbon dioxide culture device	1
	Culture device	1
	Rotating culture device	1
	Dry heat sterilizer	1
	Sterilizer	1
Pathological examination	Cryostat (freezing microtome)	1
	Automatic tissue processor	1
	Embedding center device	1
	Paraffin melting device	1
	Paraffin stretching plate	1
	Cell centrifuge	1
	Fluorescence microscope	1
	Specimen photography table	1
	Microtome	1
Cleaning room	Laboratory washer	2
	Sterilizer	2
	Dry heat sterilizer	2
	Pipette washer	1
Medical business support department		
Mortuary	Mortuary refrigerator	2
Central material sterilization room	High-pressure steam sterilizer	2
	Automatic jet ultrasonic cleaning device	2
	Manual sterilization sealer	2
	System sink	1
	Tube dryer	1
	Workbench with air gun	1
Hospitalization department		
Common to each ward	patient bed	120

	Stretcher	8
	Examination table	8
Internal medicine	Electrocardiogram (ECG) monitor	2
	Non-invasive positive pressure ventilator	2
	Portable ultrasound	2
Surgery	Traction device	2
	Cervical traction device	2
	Electrocardiogram (ECG) monitor	2
	Portable ultrasound	2
Obstetrics and gynecology department	Baby cot	2
	Electrocardiogram (ECG) monitor	2
	Delivery table	2
	Gynecological examination table	2
	Delivery monitoring device	2
	Transvaginal ultrasound	2
	Neonatal table	2
Pediatrics department	Stethoscope, pediatric	4
	Nebulizer	2
	Electrocardiogram (ECG) monitor	2
	Vascular visualization device	2
Operating room	Surgical imaging device	1
	Surgical shadowless lamp, ceiling-mounted	3
	General surgical table, electrically operated	3
Hemodialysis room	Personal hemodialysis device	10
	Reverse Osmosis (RO) water production device	1
	Dialysis bed (with scales)	3
	Dialysis bed	7
Rehabilitation	Mat platform	6
	Parallel bars	2
	Tilt table	2
	Ergometer	4
	Training stairs	1
System-related	Electronic medical record system	1
Common in the hospital	Complete set of medical equipment (wheelchairs, stainless steel carts, etc.)	As needed

7.2 Confirmation of local procurement availability and procurement costs

Based on the actual distribution situation, it has been confirmed that major medical equipment can be procured locally, so it is believed that there is little need to procure directly from Japan. In addition, the prices of medical equipment are generally slightly cheaper than in Japan.

7.3 List of local suppliers

We surveyed dealers in Vietnam for approximately 170 major medical equipment manufacturers,

both global and Japanese. We confirmed that almost all of the manufacturers surveyed had dealers, and that products that could be handled in the project were generally available. The dealers identified in this survey are as follows.

Table 66: Major medical equipment dealers and manufacturers they handle in Vietnam

Dealer names	No. of dealing companies	Major manufacturers handled
IDS Medical Systems (Vietnam) Ltd.	65	Hill-Rom, Philips, ZOLL Medical Corporation, Medtronic, Hogy Medical, Merit Medical Systems, Omron
NIPON CORPORATION	28	Atom Medical, OG Wellness, Kubota Corporation, Shin-Ei Industries, Daiichi Medical, Takara Belmont, Chest, Toitsu, Nihon Kohden, Fujifilm Healthcare, Yamada Shadowless Lamp, Rion
ALFRESA CODUPHA HEALTHCARE VIETNAM	27	Acoma Medical Industry, Sakura Seiki, Sakura Finetech, Saraya, Sysmex, Shimadzu, Daiken Iki, Takazono, Tanita, Nagashima Medical Instruments, Nipro, Paramount Bed, Fukuda Denshi, Yuyama
BCE Vietnam	27	Eppendorf, Beckman Coulter
Phuong Dong Medical Equipment	24	SIEMENS Healthineers, Behnk Elektronik

Other identified retailers and sales agents are as follows:

2H SAIGON, APT Vietnam, ALC Viet Nam Investment and Trading Company, An Binh Medical Equipment Import and Export, Analytik Jena Vietnam, An Ha Telecommunications, Art Care Trade and Service Company, B. Braun Viet Nam, BHQ Vietnam, Biocare Vietnam, Biomedic, BlueLight Company, Brain Lab Vietnam, Branch of Pacific Dental, BTL Vietnam, Charles Wembley, Đại Nha, Dau Tu Phat Trien Thai Ha, Roche Viet Nam, San Xuat Va Thuong Mai Truong Thuy, Thuong Mai & Dich Vu Ky Thuat Ngay Mai, Thuong Mai Tin Thanh Phat, Trang Thiet Bi Dung Cu Y Khoa Tan Mai Thanh, Deltech, Development Company Limited, Digi Medical, Dong Huu, EMIN Vietnam, Duc Nguyen Trading and Service, Fresenius Medical Care Vietnam, Greentech Environment, Ha Huy Services Commercial and Medical Equipment, Hai Khoa Medical Company, Hettich Vietnam, Hai Minh Trading and Service Company, IETS, KCB Technology and Invest Company, Japan Vietnam Medical Instrument, Khanh Gia, Khoa Tin Instrument and Furniture Company, Measuring and Testing Equipment, Mien Nam TPT, MINEXPORT, Minh Tue, Nam Hung, Mitalab Company, Namdo Export - Import, Namhung, Phuong Dong Medical Equipment, Pozitronics, Quang Duong, Sinh Nam, SISC Vietnam Instrumentation, SLC Vietnam Trading investment and Development Technology, Sysmex Vietnam, T.S.I VIETNAM, Tai Loc Technology Service and Trading, Tâm Hợp, TASUCO, Tan Long Medical, TB TECH, TD Medical Company, Thach Phat, THAI HA, Thanh An – Hanoi, Thien Hoa An Equipment and Sparepart, Thimed Vietnam, Thien Truong Corporation, Thuong Mai Huong Dong, Trung Son T. S. S. E, Truong Long Technology Equipment, TMC Technology Vietnam, Vat Tu Thiet Bi Va Khoa Hoc Ky Thuat, V.K.

Scientific, Viet Duc Med, Viet Gia Medical, Viet Phan, Viet Thai, Viet Thai trading company, VIETCAN, Vietmedical, Vietnam Korea Medical Cooperation, Vietnam National Minerals Export - Import, Vietnamese Line Trading Technology, Vietphan, Vikomed, VIMEDIMEX Bing Duong, VINATECH, World Trade

In addition, the major medical device manufacturers with offices in Vietnam are listed below.

Canon Vietnam, Terumo Vietnam, Maruse Engineering, A&D Vietnam, Thelong Airtech, Olympus Vietnam, Fukushima Galilei Vietnam, Carl Zeiss, Konica Minolta Business Solutions Vietnam, Fujifilm Vietnam, Shimadzu Vietnam

8 Initial design and technical plans

The outline of the project facility plan is as follows. Note that out of the approximately 5 hectares of land, about 1 hectare on the south side will be utilized in the first phase. As stated in section 3.5, in addition to conforming to Japanese standards as a hospital building, it will be designed with consideration for private hospitals that attract many patients in Southeast Asia.

Table 67: Overview of the international hospital plan

Site area	Approx. 5 ha * About 1 ha on the south side will be utilized in the 1st phase
Scale	9 floors above ground, 0 below ground
Structure	Reinforced concrete (earthquake-resistant construction)
Building area	Approx. 2,980 m ²
Total floor area	Approx. 15,000 m ²
Number of hospital beds	120 beds

8.1 Main functions of the international hospital

The main functions of the international hospital in the first phase are as follows:

Table 68: Main functions of the international hospital

Item	Description	Remarks
Medical specialties	Respiratory Surgery	
	Otorhinolaryngology	
	Anesthesiology	
	Cancer Screening and Treatment	
Center	Medical Check-up Center	General health check-ups: 40 people/day, Comprehensive health check-ups: 10 people/day
Number of beds	120 beds	General ward: 115 beds, isolation ward: 5 beds
Number of staff members	36 doctors	12 Japanese staff members
	52 nurses	12 Japanese staff members
	19 other medical staff	6 Japanese staff members
	14 administrative staff	2 Japanese staff members
	50 nurse assistants, interpreters, and others	
Number of outpatients	Approx. 300 patients/day	
Number of inpatients	Approx. 4,000 - 5,000 patients/year	

8.2 Configuration plan

The configuration plan is to arrange the building on the east-west axis relative to the site, with a main rotary entrance and a service entrance located on the east side internal road. The following points are to be noted in the configuration plan:

For details, please refer to the attached outline design diagram.

- The main rotary entrance and emergency entrance are separated from the front road to ease traffic congestion, improve user accessibility, and ensure safety.

- The plan does not include a separate building, etc. on the north side of the main building, in order to secure free planning of future use for the north side of the site.
- The main rotary is planned on the east side, taking into consideration the approach route for users in the future second phase of development on the north side of the site.

8.3 Building plan

The central part of the building will have two elevators for general use, two elevators for transportation and logistics use, staircases, and equipment shafts arranged in a consolidated manner to create a clear and easy-to-understand floor plan. In addition, one elevator for infection and emergency use will be planned at the end of the building to separate the flow of people as much as possible. Furthermore, windows will be installed at the end of the corridors to let in natural light and create a bright and open space. The layout will also consider minimizing the distance from each patient room to the staff station in the center of the ward.

The layouts of main departments for each floor and the main rooms for each department are shown below.

Table 69: Main departments on each floor

Floor	Major departments
9 th	Machinery room, outdoor equipment storage area
8 th	General ward (30 beds): 4-bed rooms x 2, 1-bed rooms x 22
7 th	General ward (30 beds): 4-bed rooms x 2, 1-bed rooms x 22
6 th	General ward (30 beds): 4-bed rooms x 2, 1-bed rooms x 22
5 th	General ward (30 beds): 4-bed rooms x 2, 1-bed rooms x 22
4 th	Administration department, machinery room
3 rd	Surgery and central materials, examination, chemotherapy, hemodialysis
2 nd	Outpatient, rehabilitation, physiological examination, blood and urine collection, health checkup center
1 st	Entrance hall, cafe/convenience store, medical affairs, waiting room, diagnostic imaging, endoscopy, emergency, pharmacy, kitchen, storage/linen

Table 70: Main rooms for each department

Department	Room	Number of rooms	Remarks
Outpatient clinic	Examination room	10	
	Explanation room	2	
	Intravenous drip/treatment room	1	4 beds
Chemotherapy	Chemotherapy room for outpatients	1	10 beds
Hemodialysis	Hemodialysis room	1	10 beds
Emergency department	Emergency room	1	
	Examination room	2	
Surgery	Operating room	3	
Endoscopy	Endoscopy room	2	
	Pre-procedure/recovery room	1	2 beds
Rehabilitation	Rehabilitation room	1	Approx. 200 m ²
Radiological examination	General X-ray room	2	
	Mammography room	1	
	X-ray/TV room	1	
	CT scan room	1	
	MRI room	1	
	Bone density testing room	1	
Physiological examination	Ultrasound room	2	
	Electrocardiogram room	2	
Laboratory examination	Blood collection room	1	2 booths
	Urine collection toilet	3	Men, women, universal
	Laboratory room	1	
Pharmaceuticals	Pharmacy	1	
	Chemotherapy preparation room	1	
	Aseptic preparation room	1	
Nutrition	Kitchen	1	Providing meals for 120 beds
Health checkup center	Examination room	2	
	Blood collection room	1	2 booths
	Testing room	2	Men, women
	Instruction room	2	
	Chest X-ray room	1	
	Mammography room	1	
	Ultrasound room	1	
	Electrocardiogram room	1	

8.4 Electrical facilities plan

The outline of the electrical facilities is as follows. Please note that full discussions with various parties, including the government, have not been completed, and the description is based on current assumptions.

Table 71: Main rooms for each department

Facility	Specifications	
Service entrance	Electric power supply	Overhead and underground installation for one line (separate work) * Service voltage, etc. TBD
	Communication lines	Overhead and underground installation for the site (separate work) * TBD
Lighting equipment	Lighting fixtures	LED main lighting system
	Emergency lighting and guidance lights	Compliant with legal regulations
	Lighting control equipment	Restrooms: motion sensor lights; common areas: timer lights
	Outdoor lighting fixtures	LED pole lighting system
Main line equipment		Mostly general cables
Lightning protection equipment	Protection level	Compliant with legal regulations
Substation equipment	Type	Located inside the building on the 3rd floor in the electrical room
	Voltage	Power reception is assumed to be 33 KV/400-230 V.
	Transformer capacity	1,500 KVA transformer x1; space for future updates
	Transformer specifications	Molded - dry
Emergency power generation equipment	Specifications	Located outside on the rooftop.
		500 KVA power generator x2, low noise, possible to operate continuously for 72 hours
Power storage equipment	Uninterruptible power supply	Used as the main power source for medical and server equipment (the isolation transformer is part of the building).
On-site information and communication network equipment	Exchange equipment, telephones	(Separate work) The installation of equipment, wiring, and modules are separate.
	Terminal board	Only the piping is included in this work.
Audiovisual equipment	Video equipment	(Separate work)
	Audio equipment	(Separate work)
Public address equipment	Public address system	Compliant with legal regulations.
Induction and guidance equipment	Intercom system	Used for nighttime reception and other communication purposes (Examination-related communication is separate).
	Toilet and other calling equipment	Has a call display system.
	Waiting room call microphone equipment	Waiting rooms for patients and medication distribution.
	Waiting room display equipment	(Separate work) Only the primary power source and piping are included in this work.
	Nurse call equipment	Includes board-type master units, wall-mounted microphone speakers as sub-units, and representative corridor lighting.

Shared TV reception equipment		Outlets are installed in patient rooms (one location per four-bed room).
Security camera equipment	Security camera equipment	Only for security purposes (medical and observation cameras are separate).
Security and access control equipment	Entrance and exit management equipment	(Separate work) The installation of equipment, systems, and wiring is separate.
	Electric locks	Only the piping is included in this work.
Fire alarm equipment	Automatic fire alarm system	Building construction.
	Automatic closing device	Compliant with legal regulations.

8.5 Image perspective

Below is an image perspective. It is intended only for the purpose of confirming the building volume and construction cost, and the appearance of the building may change with future design..



Figure 43: Image perspective

8.6 Schematic design drawing

Based on the current discussion, the schematic design drawing is as follows.

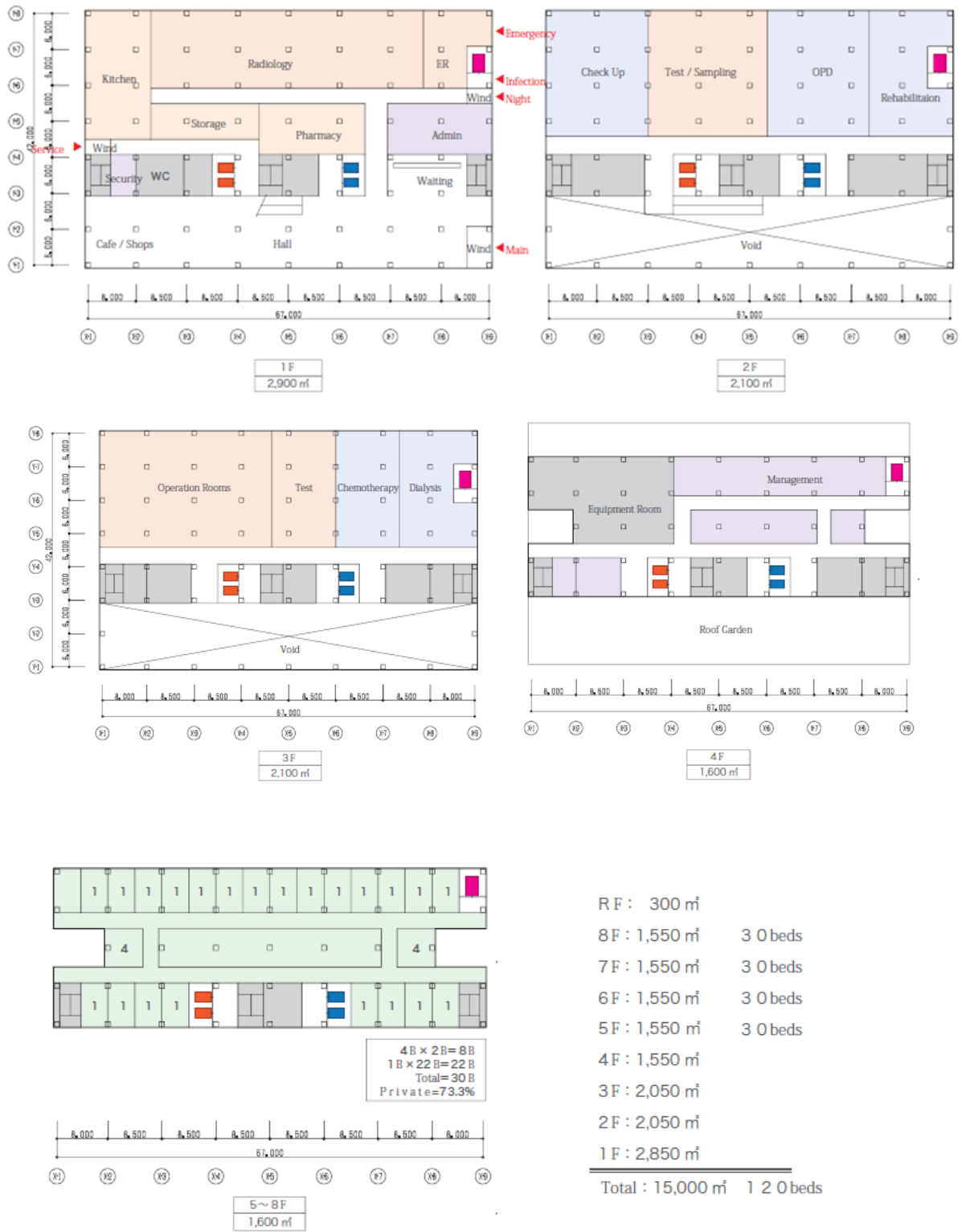


Figure 44: Schematic design drawing

8.7 Major finishes

The major finishes for both the exterior and interior are as follows:

Table 72: Exterior finishes list

Part	Finishes
Roof	Concrete base, asphalt waterproofing, Styrofoam insulation, topped with a concrete finish
Exterior walls	Concrete base, spray-on tiles
Building fittings	Aluminum curtain wall, aluminum frames, stainless steel frames

Table 73: Interior finishes list

Room	Finishes			
	Floor	Skirting board	Wall	Ceiling
Entrance hall	Non-slip tile	Floor material	Applying decorative sheets EP	Rockwool sound absorption board
Common area	Vinyl floor sheet	Vinyl baseboard	Applying decorative sheets EP	Rockwool sound absorption board
Examination room, treatment room, etc.	Vinyl floor sheet	Vinyl baseboard	EP	Decorative gypsum board
Patient room	Vinyl floor sheet	Vinyl baseboard	Vinyl cloth EP	Vinyl cloth EP
Operating room	Vinyl floor sheet	Raised flooring	Decorative calcium silicate board	Decorative calcium silicate board
Office, etc.	Tile carpet	Vinyl baseboard	EP	Decorative gypsum board
Restroom, waste treatment room, etc.	Vinyl floor sheet	Raised flooring	EP-G	EP-G
Machine room, etc.	Dustproof coating	Raised flooring	Applying glass wool sound-absorbing panels	Applying glass wool sound-absorbing panels

8.8 Estimated construction costs (excluding tax)

The estimated construction costs (excluding tax) are as follows:

Table 74: Estimated construction costs

Item	Amount (USD)
Construction work (including elevators)	9,500,000
Electrical equipment work	2,450,000
Mechanical equipment work	3,850,000
External work (only for the first phase)	1,750,000
Total direct construction cost	17,500,000
Indirect construction cost (common temporary facilities, miscellaneous expenses)	3,500,000
Total (excluding tax)	21,000,000

9 Business income and expenses

Based on the above survey results, we have calculated the business income and expenses using various assumptions. The sales prices were determined using various references, including the prices in foreign-owned Columbia Asia Hospital in Binh Duong Province and Vinmec Hospital, a high-end private hospital. Cost estimates were based on statistical data from listed hospitals in Vietnam and hospitals in Japan.

9.1 Equipment investment plans

As the land acquisition is subject to PPP results, it has not been included in the plan.

Table 75: Business income and expenses: Investment in land and buildings

1. Investment amount	568,199	Million VND
Land	-	Million VND
Hospital building (EPC and design cost)	568,199	Million VND

The facility and equipment expenses include design costs. It should be noted that all medical equipment (totaling 274 .6 billion VND) is assumed to be leased, and therefore not included in the investment amount.

Table 76 : Business income and expenses: Investment in facilities and equipment

2. Equipment-related expenses	274,630	Million VND
Facilities and equipment expenses	35,512	Million VND
Equipment-related reserve expenses	18,940	Million VND
Medical equipment	220,177	Million VND

9.2 Scenario-based simplified business income and expense plans

(1) Revenue

The revenue-related conditions are set separately for inpatient medical revenue, outpatient medical revenue, and other medical business revenue.

Table 77: Business income and expenses: Inpatient medical revenue

1. Inpatient revenues		
Hospitalization revenue per day	1,600,000	VND
Ratio of pharmaceutical sales to hospitalization revenue	25%	
Examination-related unit price	300,000	VND
Number of tests	2	Time
Surgery unit price	39,800,000	VND
Number of surgeries/day	8.5	Times/day
Average length of hospital stay	5.3	Day
Occupancy rate	75%	
Number of beds	120	Bed
(Reference) Number of new inpatients	6,198	person

Table 78: Business income and expenses: Outpatient medical revenue

2. Outpatient Revenues		
Cost per consultation	500,000	VND
Ratio of pharmaceutical sales to outpatient revenue	25%	
Examination-related unit price	300,000	VND
Ratio of laboratory tests to outpatient revenue	50%	
Unit price of treatment	1,000,000	VND
Ratio of procedures to outpatient revenue	20%	
Number of outpatients	300	Person/day
Number of business days	250	Day
Number of outpatients per day / number of emergency patients	15	Person/day
Number of days emergency response teams are on duty	115	Day

Table 79: Business income and expenses: Other medical business revenue

3. Other medical revenues		
Average unit price of health checkups	2,500,000	VND
Number of persons / day	10	Person/day
Number of business days	250	Day

(2) Expenses

The expense-related conditions are set on a per-item basis.

Table 80: Business income and expenses: Japanese personnel salary expenses
(Monthly salary: in VND)

Average salary of Japanese employees	
Doctor	269,291,679
Nurse	102,981,112
Pharmacist	127,221,408
Radiologist	114,083,471
Clinical technologist	109,643,396
Rehabilitation staff	92,772,844
Dietitian	84,877,929
Clinical engineer	109,643,396
Administrative staff	125,040,432

Table 81: Business income and expenses: Vietnamese personnel salary expenses
(Monthly salary: in VND)

Average salary of Japanese employees	
Doctor	40,000,000
Nurse	11,000,000
Pharmacist	9,000,000
Radiologist	14,000,000
Clinical technologist	14,000,000
Rehabilitation staff	14,000,000
Administrative staff	8,000,000
Nursing assistants, interpreters, etc.	8,000,000

Table 82: Business income and expenses: Pharmaceutical expenses

Pharmaceutical expenses	19.9%
Ratio of Pharmaceuticals to Sales in Japan	8.7%
Ratio of Pharmaceuticals to Sales in Vietnam	31%

* Based on the average for Japan and Vietnam.

Table 83: Business income and expenses: Meal ingredient expenses

Meal ingredient expenses	0.6%
Ratio of food costs to sales in Japan	1.1%
Ratio of food costs to sales in Vietnam	0%

* Based on the average for Japan and Vietnam. In Vietnamese hospitals, the cost is included in the medical expenses and therefore 0%.

Table 84: Business income and expenses: Medical supplies, medical consumable equipment and supplies

Medical supplies, medical consumable equipment and supplies	4.1%
Ratio of medical supplies and consumables cost to sales in Japan	8.2%
Ratio of medical supplies and consumables cost to sales in Vietnam	0%

* Based on the average for Japan and Vietnam. In Vietnamese hospitals, the cost is included in the medical expenses and therefore 0%.

Table 85: Business income and expenses: Outsourcing costs

Outsourcing costs	13.4%
Ratio of outsourcing costs to net sales in Japan	5.8%
Ratio of outsourcing costs to sales in Vietnam	21%

* Based on the average for Japan and Vietnam.

Table 86: Business income and expenses: Depreciation expenses

Depreciation expenses	-
Hospital Facilities	50 years
Medical Equipment	10 years

Table 87: Business income and expenses: Equipment-related expenses

Equipment-related expenses	-
Facilities & Equipment	10 years
Medical Equipment	10 years

Table 88: Business income and expenses: Other expenses

Other expenses	7.6%
Ratio of other expenses to sales in Japan	9.2%
Ratio of other expenses to sales in Vietnam	6%

* Based on the average for Japan and Vietnam.

(3) Other

In addition to the investment of 20 million USD, it is planned to borrow another 20 million USD from JICA, etc. The conditions are as follows.

- Loan amount: 20 million USD
- Loan period: 20 years
- Grace period: 6 years
- Fixed interest rate: 1.75% per year

As shown in the business income and expense plan below, we assume that we will secure funds with a margin of safety.

In developing the business plan, we assumed an annual inflation rate of 3.40%, which is the average inflation rate of the past 10 years. We also assumed that sales in the first year of operation would be half of the target, 80% in the second year, and 100% from the third year onward. On the other hand, we assumed that personnel expenses would be 75% in the first year and 90% in the second year.

(4) Income and expenses

The projected income and expenses based on the above conditions are as follows:

Table 89: Business income and expenses: Projected income and expenses under full operation

	Amount		Composition
	Mn VND		%
I. Medical revenues	332,831		100.0%
1. In-patient medical revenues	239,495		72.0%
2. Out-patient medical revenues	87,093		26.2%
3. Other medical revenues	6,243		1.9%
II. Medical and nursing care costs	279,348		83.9%
1. Salary expenses	89,083		26.8%
2. Pharmaceutical (drug) costs	66,067		19.9%
3. Food service material costs	1,831		0.6%
4. Medical materials and medical consumables costs	13,646		4.1%
5. Outsourcing costs	44,599		13.4%
6. Depreciation	11,364		3.4%
	Depreciation of buildings	11,364	3.4%
7. Equipment-related expenses	27,463		8.3%
	Facility and equipment rents	3,551	1.1%
	Medical equipment and other rents	23,912	7.2%
8. Other expenses	25,295		7.6%
III. Profit and loss difference (I - II)	53,483		16.1%
IV. Interest Expense	8,286		2.5%
V. Operating income (III-IV)	45,197		13.6%
VI. Taxes	9,039		2.7%
VII. Profit/ Loss after tax (V-VI)	36,157		10.9%

(5) Business income and expenses (in million VND)

Table 90: Business income and expenses: Projected income and expenses and simplified cash flow forecast (through FY8)

	FY-1	FY0	FY1	FY2	FY3	FY4	FY5	FY6	FY7	FY8
I. Medical revenues	0	0	177,924	294,358	380,458	393,393	406,768	420,599	434,899	449,686
1. In-patient medical revenues	0	0	128,029	211,811	273,766	283,074	292,698	302,650	312,940	323,580
2. Out-patient medical revenues	0	0	46,558	77,026	99,556	102,941	106,441	110,060	113,802	117,671
3. Other medical revenues	0	0	3,337	5,521	7,136	7,379	7,630	7,889	8,157	8,435
II. Medical and nursing care costs	0	0	215,026	271,242	313,766	323,114	332,779	342,774	353,108	363,793
1. Salary expenses	0	0	95,244	98,482	101,830	105,293	108,873	112,574	116,402	120,360
2. Pharmaceutical (drug) costs	0	0	35,318	58,430	75,521	78,089	80,744	83,489	86,327	89,263
3. Food service material costs	0	0	979	1,619	2,093	2,164	2,237	2,313	2,392	2,473
4. Medical materials and medical consumables costs	0	0	7,295	12,069	15,599	16,129	16,678	17,245	17,831	18,437
5. Outsourcing costs	0	0	23,842	39,444	50,981	52,715	54,507	56,360	58,276	60,258
6. Depreciation	0	0	11,364	11,364	11,364	11,364	11,364	11,364	11,364	11,364
7. Equipment-related expenses	0	0	27,463	27,463	27,463	27,463	27,463	27,463	27,463	27,463
8. Other expenses	0	0	13,522	22,371	28,915	29,898	30,914	31,965	33,052	34,176
III. Profit and loss difference (I - II)	0	0	-37,102	23,116	66,692	70,280	73,989	77,825	81,791	85,892
IV. Interest Expense	8,286	8,286	8,286	8,286	8,286	8,286	8,286	7,694	7,102	6,511
V. Operating income (III-IV)	-8,286	-8,286	-45,388	14,830	58,406	61,993	65,703	70,131	74,689	79,382
VI. Taxes	0	0	0	2,966	11,681	12,399	13,141	14,026	14,938	15,876
VII. Profit/ Loss after tax (V-VI)	-8,286	-8,286	-45,388	11,864	46,725	49,595	52,562	56,104	59,751	63,505
Simplified free cash flow model	FY-1	FY0	FY1	FY2	FY3	FY4	FY5	FY6	FY7	FY8
Investment related	473,499	0	0	0	0	0	0	0	0	0
Borrowing related	473,499	0	0	0	0	0	-33,821	-33,821	-33,821	-33,821
Investment (construction-related)	-284,100	-284,100	0	0	0	0	0	0	0	0
After-tax profit (loss)	-8,286	-8,286	-45,388	11,864	46,725	49,595	52,562	56,104	59,751	63,505
Depreciation and amortization	0	0	11,364	11,364	11,364	11,364	11,364	11,364	11,364	11,364
Simplified FCF	654,613	-292,386	-34,024	23,228	58,089	60,959	30,105	33,647	37,294	41,048
Simplified cumulative FCF	654,613	362,227	328,203	351,431	409,519	470,478	500,583	534,230	571,523	612,571

Table 91: Business income and expenses: Projected income and expenses and simplified cash flow forecast (FY9 - 18)

	FY9	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18
I. Medical revenues	464,975	480,784	497,131	514,033	531,510	549,582	568,267	587,588	607,566	628,224
1. In-patient medical revenues	334,582	345,957	357,720	369,882	382,458	395,462	408,908	422,811	437,186	452,050
2. Out-patient medical revenues	121,672	125,809	130,086	134,509	139,082	143,811	148,701	153,757	158,984	164,390
3. Other medical revenues	8,721	9,018	9,325	9,642	9,969	10,308	10,659	11,021	11,396	11,783
II. Medical and nursing care costs	374,842	386,267	413,031	425,246	437,876	450,935	464,438	478,401	492,838	507,766
1. Salary expenses	124,452	128,683	133,058	137,582	142,260	147,097	152,098	157,270	162,617	168,146
2. Pharmaceutical (drug) costs	92,298	95,436	98,680	102,036	105,505	109,092	112,801	116,636	120,602	124,702
3. Food service material costs	2,557	2,644	2,734	2,827	2,923	3,023	3,125	3,232	3,342	3,455
4. Medical materials and medical consumables costs	19,064	19,712	20,382	21,075	21,792	22,533	23,299	24,091	24,910	25,757
5. Outsourcing costs	62,307	64,425	66,616	68,880	71,222	73,644	76,148	78,737	81,414	84,182
6. Depreciation	11,364	11,364	11,364	11,364	11,364	11,364	11,364	11,364	11,364	11,364
7. Equipment-related expenses	27,463	27,463	27,463	27,463	27,463	27,463	27,463	27,463	27,463	27,463
8. Other expenses	35,338	36,540	37,782	39,067	40,395	41,768	43,188	44,657	46,175	47,745
III. Profit and loss difference (I - II)	90,133	94,517	84,099	88,787	93,634	98,647	103,829	109,188	114,728	120,458
IV. Interest Expense	5,919	5,327	4,735	4,143	3,551	2,959	2,367	1,776	1,184	592
V. Operating income (III-IV)	84,214	89,190	79,364	84,644	90,083	95,687	101,461	107,412	113,545	119,866
VI. Taxes	16,843	17,838	18,873	19,929	21,017	22,137	23,292	24,482	25,709	26,973
VII. Profit/ Loss after tax (V-VI)	67,371	71,352	63,492	67,715	72,067	76,550	81,169	85,930	90,836	95,893
Simplified free cash flow model	FY9	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18
Investment related	0	0	0	0	0	0	0	0	0	0
Borrowing related	-33,821	-33,821	-33,821	-33,821	-33,821	-33,821	-33,821	-33,821	-33,821	-33,821
Investment (construction-related)	0	0	0	0	0	0	0	0	0	0
After-tax profit (loss)	67,371	71,352	63,492	67,715	72,067	76,550	81,169	85,930	90,836	95,893
Depreciation and amortization	11,364	11,364	11,364	11,364	11,364	11,364	11,364	11,364	11,364	11,364
Simplified FCF	44,914	48,895	41,034	45,258	49,609	54,092	58,712	63,472	68,378	73,435
Simplified cumulative FCF	657,485	706,380	747,414	792,672	842,281	896,373	955,085	1,018,557	1,086,936	1,160,371

Table 92: Business income and expenses: Projected income and expenses and simplified cash flow forecast (FY19 - 25)

	FY19	FY20	FY21	FY22	FY23	FY24	FY25
I. Medical revenues	649,583	671,669	694,506	718,119	742,535	767,781	793,886
1. In-patient medical revenues	467,420	483,312	499,745	516,736	534,305	552,472	571,256
2. Out-patient medical revenues	169,979	175,758	181,734	187,913	194,302	200,908	207,739
3. Other medical revenues	12,184	12,598	13,027	13,470	13,928	14,401	14,891
II. Medical and nursing care costs	523,202	539,162	572,505	589,569	607,213	625,457	644,322
1. Salary expenses	173,863	179,774	185,886	192,206	198,741	205,499	212,486
2. Pharmaceutical (drug) costs	128,942	133,326	137,859	142,547	147,393	152,405	157,586
3. Food service material costs	3,573	3,694	3,820	3,950	4,084	4,223	4,366
4. Medical materials and medical consumables costs	26,633	27,538	28,475	29,443	30,444	31,479	32,549
5. Outsourcing costs	87,044	90,004	93,064	96,228	99,500	102,883	106,381
6. Depreciation	11,364	11,364	11,364	11,364	11,364	11,364	11,364
7. Equipment-related expenses	42,415	42,415	59,254	59,254	59,254	59,254	59,254
8. Other expenses	49,368	51,047	52,782	54,577	56,433	58,351	60,335
III. Profit and loss difference (I - II)	126,382	132,507	122,001	128,550	135,322	142,324	149,564
IV. Interest Expense	0	0	0	0	0	0	0
V. Operating income (III-IV)	126,382	132,507	122,001	128,550	135,322	142,324	149,564
VI. Taxes	25,276	26,501	24,400	25,710	27,064	28,465	29,913
VII. Profit/ Loss after tax (V -VI)	101,105	106,006	97,601	102,840	108,258	113,859	119,651
Simplified free cash flow model	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Investment related	0	0	0	0	0	0	0
Borrowing related	-33,821	0	0	0	0	0	0
Investment (construction-related)	0	0	0	0	0	0	0
After-tax profit (loss)	101,105	106,006	97,601	102,840	108,258	113,859	119,651
Depreciation and amortization	11,364	11,364	11,364	11,364	11,364	11,364	11,364
Simplified FCF	78,648	117,370	108,965	114,204	119,621	125,223	131,015
Simplified cumulative FCF	1,239,019	1,356,388	1,465,353	1,579,557	1,699,179	1,824,402	1,955,417

(6) Scenario setting

The most difficult point to estimate is sales, which is expected to have the highest volatility. In particular, hospitalization revenue accounts for over 70% of sales, so parameter variations can have a significant impact on revenue. By putting a load on the hospitalization revenue parameters, we simulated the value at which operating profit becomes zero.

Table 93: Business income and expenditure: Simplified simulation

	Current plan	Value results in operating income ± 0
Hospitalization Occupancy Rate	75%	52.5%
Unit price of surgery (VND)	39,800,000	22,300,000

10 Action plans

10.1 Review of this survey

The preliminary survey was conducted with three main objectives in mind: confirming the presence/absence of bottlenecks, verifying the business concept and profitability, and clarifying the business structure. Through the survey, important issues became clear, and it is believed that all three objectives were achieved.

Regarding the first objective, "confirming the presence/absence of bottlenecks," critical obstacles that could affect the implementation of this project were confirmed to be absent through the legal, tax, and environmental surveys. The main points that were confirmed through the preliminary survey are as follows.

Table 94: Survey results regarding the presence or absence of bottlenecks

Category	Matters confirmed in the preliminary survey
Law	<ul style="list-style-type: none"> • Laws, regulations, and permits related to hospital establishment and operation. • The need to acquire land from the government rather than the university and the need for a PPP project company. • There are no critical bottlenecks from a legal perspective, including licenses for Japanese medical practitioners.
Tax	<ul style="list-style-type: none"> • Tax matters related to hospital operation. • Applicable preferential tax systems. • There are no critical bottlenecks from a tax perspective.
Environment	<ul style="list-style-type: none"> • Environmental and social conditions and related regulations in Vietnam. • Risks and countermeasures expected in hospital establishment and operation. • In consideration of environmental impacts, there is no significant deviation from the JICA Environmental Guidelines (April 2010). • The project is not categorized as Category A with the land expropriation ended.
Medical equipment	<ul style="list-style-type: none"> • Medical equipment that was planned for installation is generally available in the domestic market in Vietnam, and procurement is possible without new import applications, etc. • Domestic supplier lists and the pricing of major equipment (high-priced equipment).

Regarding the second objective, "Verifying the business concept and profitability," it was confirmed through the preliminary survey that the region lacks medical resources and infrastructure while the income level of the residents is high because the large number of the residents work in industrial parks. Therefore, there is a significant rationale to establish a hospital in the area, which is also expected to be profitable. The main points confirmed through the preliminary survey are as follows.

Table 95: Survey results regarding the business concepts and profitability

Category	Matters confirmed in the preliminary survey
Market	<ul style="list-style-type: none"> • There are significant medical needs in Binh Duong Province, and the demand is expected to continue to increase. • The target region is a rapidly developing area, but medical resources and infrastructure are not keeping up. • A large number of the working population are employed in industrial parks, and the income level is higher compared to Ho Chi Minh City and other areas.
Competition	<ul style="list-style-type: none"> • There is a shortage of hospitals in the region. • The available medical facilities are limited, and there are no hospitals providing advanced medical care. • Although there are plans to establish new hospitals, it will not meet the demand.
Medical care to be provided	<ul style="list-style-type: none"> • Demand for advanced medical care
Business income and expenses	<ul style="list-style-type: none"> • Hospital profitability. A profit-and-loss model based on the prices of listed hospitals and competitors. • The quality of hospital management varies depending on individual circumstances, but there are also multiple hospitals with high profitability, with operating profit margins exceeding 30%.

Regarding the third objective, "clarifying the business structure," it became clear that it was necessary to acquire the land from the country, not from the university. As a result, we revised the initial SPC scheme. Through discussions with VNU-HCM, the direction in role sharing and synergy effects with VNU-HCM affiliated hospital also became clear. In addition, we have been exploring additional investors both domestically and internationally, and have been reviewing the plan since its inception. The main points confirmed through the preliminary survey are as follows.

Table 96: Survey results regarding the business structure

Category	Matters confirmed in the preliminary survey
Structure	<ul style="list-style-type: none"> • Based on the survey of legal matters, the scheme was reviewed and it has been decided that a joint venture company (PPP project company) will be established instead of an SPC.
Role sharing with VNU and concepts	<ul style="list-style-type: none"> • In addition to patient preferences for hospitals, the direction in role sharing with VNU became clear; the international hospital will handle rare cases and special procedures, among other things. • The international hospital aims to provide advanced medical services in a one-stop manner, rather than focusing on surgical departments in the initial plan.
Local investors	<ul style="list-style-type: none"> • A public fund has shown interest in investing in the project.
Japanese sponsors	<ul style="list-style-type: none"> • Two Japanese companies are interested in investing in the project, and along with local investors, there is a prospect of raising the necessary funds.

10.2 Action plans moving forward

Based on the results of the preliminary survey, it has been revealed that the consideration of this project is progressing towards formal investment decisions. In order for each company to make investment decisions, it is necessary to accurately and concretely grasp the feasibility of the project, taking into account

the necessity of the international hospital in the region, the role-sharing with VNU-HCM affiliated hospital, the PPP project company scheme, and other factors revealed by the preliminary survey results. By doing so, it will be possible to secure the investors and partners necessary to make the project successful. The path to realizing the project is now visible, and we believe that further in-depth survey, as described below, will be necessary as part of the process.

- Survey items for the full-scale survey

Based on the findings in the preliminary survey, we will conduct a more detailed and concrete survey to verify the feasibility of establishing and operating the hospital and to develop a detailed plan. Through this, we aim to lead each company to their formal investment and financing decisions. The following items will be subject to investigation in the full-scale survey:

Table 97: Future survey items to be investigated

Major items	Sub-items	Detailed items
Detailed market analysis	Detailed demand forecast	Setting of demand segments
		Demands survey by segment
		Future forecasting based on scenarios
		Evaluation of potential project sites
	Competition benchmarking analysis	Investigation of hospitals in the same medical service area
		Detailed investigation of benchmark hospitals in the country
Analysis of hospital operations	Competition operation analysis	Understanding operations of benchmark hospitals in the country (medical-related)
		Understanding logistics operations of pharmaceuticals, medical devices, etc.
Hospital building design and estimation	Surveying and geological investigation	-
	Infrastructure condition investigation	Power, water supply, sewage, gas, and information communication
	Basic design drawing and perspective creation	Configuration plan, building plan, basic design drawings
	Cost estimation	Calculation of construction-related costs and project costs
Detailed legal investigation	Detailed investigation of regulations and permits related to medical institutions	Understanding investment laws and regulations related to real estate and medical institutions
	Land acquisition and detailed investigation of PPP projects	Calculation of tax risk amount for each item Beginning negotiations with authorities for scheme construction
	Organization of related contracts	Identification and organization of contract-related documents required for hospital establishment
Detailed tax investigation	Understanding of related tax systems based on business structure	Various tax simulations
	Identification of tax and risk items that may become incidental liabilities	Organization of items and calculation of tax risk amount for each item
Implementation and evaluation of	TOR (Terms of Reference) for scoping and environmental and	—

Major items	Sub-items	Detailed items
environmental survey	social considerations	
	Environmental impact assessment	—
Business concept and medical services provided	Detailed clarification of business concept	—
	Organization of service contents to be provided	Solidification and organization of medical service content by department Detailed division of roles with VNU affiliated hospital
	Significance of medical services to be provided	Significance of service implementation and provision based on development effects, etc.
	Medical collaboration including VNU-HCM	Organization of cooperation objectives and partners by purpose
	Procurement plan for pharmaceuticals and medical devices	Specification of necessary equipment and model numbers of pharmaceuticals, etc.
	Hospital management plan	Organization structure for the new hospital
Establishment of operation rules		Establishment of internal rules
Personnel plan		Organization of departmental personnel and necessary skills, hiring, and training plans
Income and expense plan	Income and expense forecast by medical department	Profit and loss forecast by medical department
	Income and expense forecast based on scenarios	Analysis based on accumulated forecast results, identification of concerns, and consideration of countermeasures
Business scheme	Detailed clarification of business scheme	Start of scheme construction process
	Organization of investment partners and their roles	Identification of partners
	Funding scheme	Identification of procurement sources and amounts
Business risks and responses	Risks and countermeasures related to hospital business	—
	Risks and countermeasures related to medical operations	—
	Risks and countermeasures related to country risk	—
Significance of hospital establishment and development effects	Verification of the social significance of hospital establishment	Contribution to the regional economy and community
	Clarification of the future vision	Future outlook of the hospital and future development centered around the hospital

11 Appendix
 11.1 Map of Vietnam



Figure 45: Map of Vietnam and project site (Binh Duong Province)
 Source: Created from an image on the Japan-Vietnam Exchange Promotion Center website