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The Viability of Establishing a Knowledge, Innovation, Science, and Technology (KIST) Park in Isabela State University Echague Campus Philippines

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ABSTRACT

The spread out of the Special Economic Zone among universities will help elevate the level of knowledge among the students and imbibe employment opportunities. The top KIST component will be Entrepreneurial business with a 21.67% turnout, followed by the Information technology and BPO building which gathered 13.33% in consonance with the ISU Echague planning department to build Medical Hub as a part of its major component with telehealth online medical care. Hence, 11.67 % of business management concluded top 3 on its priority and lastly on agriculture from which the ISU Echague is known for its specialty and it shows the viability and acceptability of the respondents to cater to Agriculture and education with 10% of respondents agreeing. All of these major components are established with proper infrastructure to cater to both national and global economies integrated with sustainable development. It is recommended that all development shall not exceed its carrying capacity.

INTRODUCTION

The presence of an economic zone in the universities will hone the knowledge and skills of graduates and will generate job prospects for them. Isabela State University has great potential to be transformed into a special economic zone given its huge area of land property. Special Economic Zone (SEZ) principally aims to raise trade balance, employment, job creation, increase investment, and effective administration. Modern SEZs from other countries were established in the 1950s in some industrialized countries which are designed to fascinate foreign direct investments from multi-national corporations. In the Philippines setting, the Republic Act 7916 or Philippines Economic Zone Authorities (PEZA) is managing a globally competitive and ecologically sustainable environment for investment opportunities for different industries that serve as exporters of goods and services to the world market. It is an investment promotion agency that administers and oversees incentives to ecozone developers and locators and caters to environment-friendly and world-class secured and competitive economic zones that are ready to host export industries like manufacturing/ assembling, dismantling, Information Technology Business Processing Outsourcing, Medical Tourism, and Agro-industries. The Philippines' geographical location is situated in South East Asia. The Philippines is the fastest-growing economy among the six (6) countries in Southeast Asia (Planas, 2022). The education standards in the Philippines are quite high and there are many graduates from State Universities and Colleges (SUC) like the Isabela State University (ISU) who are capable and qualified in terms of human resources required in SEZ. Recently, the ISU system has been awarded as one of the top-performing SUCs in the Philippines by the AACUP or Accrediting

Agency of Chartered Colleges and Universities in the Philippines (AACUP) in the year 2021. This means that the majority of its curricular programs have been accredited. Accreditation fosters excellence and quality education in higher institutions. ISU graduates are expected to have a better opportunity to acquire skills, and knowledge in terms of employability. However, the ISU is not utilizing its land area for economic benefit in turn because numerous land holdings are not profitable, especially on campus like Echague. The Land Use Development Infrastructure Plan Act of the Philippine government mandates that all landholdings of government agencies especially SUCs shall have economic activity and one is the formation of the comprehensive land use development plan updates from various economic opportunities to be established within the campuses like the establishment of Knowledge Innovation Science and Technology SEZ. The establishment of a special economic zone is also in congruence with the directive of Administrative Order No. 18 from the President of the Philippines that the PEZA authority shall establish an economic zone within the landholdings of SUC and Local Government Unit along the countryside to somehow promote economic progress beyond the urban areas of metro Manila and other highly urbanized places in the Philippines. However, establishing SEZ is quite expensive and demands meticulous planning with precarious designing needed. It is meant to achieve a multi-policy objective that entices Foreign Direct Investment and promotes exports with industrialization or upgrading of the industry. The importance of sustainable and green development is significant, as many developing countries are highly vulnerable to climate change, especially in terms of water stress and air pollution. In recent years, the identification of the key success factors has been

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determined. This Special Economic Zone model will be helpful for the compliance of Isabela State University Campuses to promote development aligned with the LUDIP act, especially to its graduates for knowledge innovation and training centres including future employment with the industry locators. On the other hand, the LGU Echague will benefit from the revenues and investment opportunities due to the existence of the proposed economic zone.

Statement of the Problem

In the Philippines, all State Colleges and Universities are mandated to conform with RA 11396 to have a Land Used Development Infrastructure Plan (LUDIP) Efficient utilization of SUC's landholdings especially the idle lands shall be properly utilized like the ISU Echague Campus. Exploiting land resources and manpower resources can create economic activity along the ISU Echague campus through the existence of a Special Economic Zone An administrative order coming from President Duterte no 18 was created to bolster the establishment of ecozones along the countryside to boost potential economic growth in both local and international business endeavors Philippines is one of the nations who is located on the ring of fire where typhoons, earthquakes, floodings, and other calamities are often occurring, that is why the need to integrate architectural design solutions is needed to adapt to its tropical climate.

Objectives of the Study

This research undertaking aimed to determine the viability of establishing the Master Development Plan of the proposed Special Economic Zone in the university. Specifically, it aims to;

1. Identify Standards and Development Policies in an Economic Zone
2. Describe the feasibility of SEZ KIST development strategies in the ISU Echague Campus
3. Design a KIST special economic zone master plan in the ISU Echague Campus

Significance of the Study

The result of this study offers information about the approaches, strategies, and initiatives of the Special Economic Zone Development towards their goal of attaining sustainable development and employing economic drive to the community. This study will be useful in the realization of the Special Economic Zone in the Isabela State University Campus in the Cagayan Valley Region and later be given to the ISU and PEZA officials for implementation and as a basis for crafting policies and developments that are relevant and necessary to the ecozone. This study will also serve as a benchmark for future ecozone development plans to be established within the region and even internationally.

Limitations of the Study

The conduct of this study will conform to research

ethical standards and protocols. The proponent of the study will secure permission through emails and letters to the concerned authorities of the local government units.

1. Return on investments (ROI) and detailed investment costs are not included in the study but the financial experts within the areas of development will be consulted including economists.
2. The detailed engineering design and estimates will be thoroughly done by each Infrastructure Department of Campuses and will not be part of the study. This study is limited to the conceptual master development plan only,
3. Environmental Impact Analysis for ECC
4. Disputes on Land title are not part of the study including land use change applications

RESEARCH METHODOLOGY

The design of the research paradigm has been mixed methods both quantitative and qualitative methods were considered to come up with an exhaustive study on the vital considerations of SEZA development of plans and application for sustainability.

Study Site

The study site is in ISU Echague which has idle lands that have the potential for developing Special Economic Zone KIST development (Figure 1.)



Figure 1: Study Site

Instrument and Data Collection

Utilization of primary and secondary data both quantitative and qualitative analysis had been properly used. Sets of data have been disclosed from various agencies like ISU department heads, Local Government units Philippine Economic Zone Authority, and other agencies that will support the feasibility of the Special Economic Zone Development. Instrument gathering tools will be the cameras, on-site videos and interviews, online search on the internet, and drones.

Descriptive Method

Using the Descriptive method, the designer characterized the different factors to be established in the KIST economic zone including the standards and restrictions in both the PEZA and Government institutions to have a consensus crafting of a master development plan. Services offered in the KIST Development in ISU Echague have been properly discussed and characterized as a means of reference in the validation of the ecozone development. The identification of the design features and frameworks in various sectors involved in the SEZ was also done including its operations and describe the indicators that best justify its existence in the community where it is located. Evaluation of the geographical and geo-political features of the economic zone have been thoroughly evaluated and integrated with the desired features that will surely benefit the users like its richness in cultural aspects, social strength particular to its labor forces, amenities, and infrastructure development which has been useful acceptable in the development of the KIST economic zone. Through this, urban design development needed and technologies recommended has been achieved in the masterplan adapting planning strategies to a more vibrant design and effective ecozone development design of the master plan.

Personal Interview

An informal interview was conducted with the OIC PEZA Official in Baguio City and disclosed information on the standards of ecozone development. The ISU campus official together with the president of the ISU was also interviewed and shared the future vision of ISU on a long-term development. LGU officials and department heads and some sectors of the society were able to share their thoughts and possibilities in terms of development and policy restrictions in putting up an ecozone in ISU Main Campus Echague, Isabela. The project manager Architect in charge of Ecozone Development has been interviewed at Batangas State University for further understanding of the proposed SEZA. Since the BATStateU has been declared as one of the first KIST economic zones in the Philippines, the researcher chose to interview some of its key officials and part of the benchmarking team.

Case Study

An actual case study and site visit on comparable KIST economic zones has been done particularly in the Batangas State University which was designed by a renowned architect and urban planner Ar. Felino Palafox.

Conduct of Stakeholder Meeting

The conduct of stakeholder meetings in all sectors of society ensures that the development of the KIST economic zone is acceptable to the public and the users. This stakeholder meeting played an important role and

served as a basis to include some of the recommended developmental features and problems to be addressed in the proposals to please some of the possible solutions in the KIST master development. The composition of the stakeholder meeting is the residents, MENRO Department of LGU Echague, the Municipal planning office, ISU presidents and Vice-Presidents, and lastly, students.

Site SWOT Analysis

The conduct of a Site SWOT Analysis is beneficial in the crafting of the master plan due to its determination and analysis of the strengths, weaknesses, opportunities, and threats in the location of the SEZ zone. With the analysis of the strengths of the site, the knowledge in knowing the qualities of its neighboring site, land use, environmental impact, and sustainable development served as key information in the proper design of the development through maximizing its utmost potential. Dangers that are possible, hazards slopes, floods, and other weaknesses in the site were properly analyzed and documented to achieve less harm to the users. Identifying its weaknesses will surely mitigate its negative impact on the development. Opportunities were also part of its considerations in the assessment. An identification for possible PPP BOT and other economic funding sectors is also undertaken in this study to have the diversity of resources monetary assistance and involvement of other agencies in the said development for possible collaboration.

Specialized employment opportunities and cooperative collaboration between the industry and the education division are the top precedence of development from which it seeks to look for relevant industries. This research, studied IT innovations and services to be part of the plan of development, opportunities for green building, and innovations in KIST Development are part of the development. Consideration of threats like waste proliferation, environmental degradation, typhoons, flooding, covid 19, and terrorism, were considered in doing the master development plan.

Survey Method

A purposive sampling survey method has been conducted for the Echague special economic zone, particularly on what are the criteria that are preferred and needed in the establishment of an economic zone according to the evaluation of the respondents. The said criteria seek to evaluate the different factors needed in the composition of a Special Economic zone educational level, transportation, resource reserves, structure, ecological protection, economic scale, business climate, external communications, development potential, and policy support. The respondents are composed of residents, ISU officials, ISU students, LGU, the business sector, etc. The proponent used a purposive sampling method with almost 60 respondents from different sectors of society.

Table 1: Distribution of Respondents

Location of Survey	Cluster of Respondents	Number of Respondents	Total
1. Isabela State University Echague, Isabela Campus	Isabela State University Key Officials and Students	30	30
	Local Government Unit of Echague Key Officials and local Residents	30	30
	Overall Total		60 Respondents

RESULTS AND DISCUSSIONS

Standards in Establishing Ecozones and Policies

Republic Act No. 7916 is an act for the provision of legal framework and mechanisms for the operation, creation, coordination, and administration of various special economic zones in the Philippines. This Act is the creation of the Philippine Economic Zone Authority under section 1 of this article. The policy declaration in section 2 is that there shall be a recognition of the unwavering role of the private sector, encouragement of private enterprises, and incentives for sectors who wish to invest. Under section 2, the promotion and preferential use of Filipino working force, goods that are produced locally, and domestic materials and provide strategies that help make them competitive. This policy encourages the government to actively promote, accelerate, and induce a viable and balanced economic, industrial, and social development of the Philippines to promote employment opportunities, especially in far-flung areas like the provinces and rural communities and cities. Its primary purpose is to increase the quality of standard living conditions of the community and capacitate it through the establishment of economic zones along the strategic and suitable locations in the country and create attraction of legitimate foreign investments. The criteria for Ecozone establishment shall be issued by the presidents of the Philippines subject to the evaluation and recommendation of PEZA, based on detailed feasibility and engineering study in conformity with the following criteria:

(a) Areas for the proposed economic zone must be in a regional growth center in the Medium-Term Philippine Development plan by the Regional Development Council. The municipality of Echague is an emerging growth center in the province of Isabela

(b) There must be an existing required infrastructure in the ECOZONE areas such as railways, airports, ports, telephones, roads, and capacity to absorb different improvements. All utilities in ISU Echague are well established and 30 minutes away from Cauayan Airport. However, the railway is not evident on the site.

(c) ECOZONE shall have the availability of an electric source and water supply source for use, The Echague Water District can supply the KIST SEZ development.

(d) The existence of lands for commercial, industrial, and future expansion as well as residential areas shall be

available for Ecozone workers. The location of the KIST is full of amenities for the workers' convenience.

(e) Labor force availability like skilled, semi-skilled, and non-skilled trainable workers shall be considered in ecozone development. Isua graduates and students are the possible priority workforce in the KIST SEZ.

(f) The development areas must have a noteworthy incremental benefit over the existing economic zones and its future profitability prospect can be established;

Future local and international investors will benefit from the development.

(g) Must be strategically located. The location is accessible by road and with a wide range of access to nearby institutional agencies in achieving services.

(h) The ECOZONE shall be so located where controls in terms of security can easily be detected especially to curtail smuggling endeavors. Police agencies and DENR are evident to prevent smuggling in the site.

Ecozone Interview of Experts in Special Economic Zone

Evaluation of Ecozone Establishment

The author chose to interview an expert who acted as an OIC Chief Zone Administrator, Baguio City Economic Zone Manager, and Ecozone Development Department. On July 19, 2022, The chief said in an interview with the researcher that the Economic Zone Development of the KIST Special Economic Zone establishment shall undergo a thorough evaluation by the PEZA Board Officials. There is only one PEZA-approved KIST economic zone which is the Batangas State University KIST and there are other two universities that are in the application stage. KIST's special economic zone purpose should have synergistic collaboration with the industry from which through research and development, both benefit especially in innovation, research, and development. Moreover, the KIST special economic zone can manufacture or produce proto-type or model research undertakings which can be subjected to mass production for the industry to use. The KIST special economic zone is limited only to the manufacturing of the research model and industry inside the special economic zone since the land use of the ISU is still an institutional land use however, the land use can still be changed as long as the municipal or city council will approve its change of land use.

General Description and Evaluation of Feasibility of Special Economic Zone on Knowledge Innovation Science and Technology (KIST) Development Approaches in the Isabela State University Campus

The KIST economic zones in Isabela State University were designed on a long-term development plan that is under the actual proposal of the planning department of the university. The designer integrated all the necessary KIST proposals in ISU Echague and conducted its survey to meet the needs and demands of the future users of the ECOZONE. The author visited and gathered all baseline data on the unique and different KIST proposals of the Echague Campus with large land holdings and integrated it into the master development plan of the ECOZONES. A site SWOT analysis was conducted in each area for development from which most of the required infrastructures are evident such as the existence of power supply, road networking, telecommunications and water supply, transportation access, and nearby airports are evident which is the primary requirement of the PEZA. The site is strategically located as the center for development growth from which the primary aim of the PEZA is to imbibe economic activity among the rural areas which would help in the capacity building of each community. The site characteristic is good for development which generally has flat terrain in Echague Campus, since it has large areas for development, the carrying capacity for KIST ecozone development is large and beneficial not only to the ISU but to its LGU and neighboring communities. According to the result of the survey conducted most of the respondents in the Echague campus agreed on the establishment of KIST park inside the ISU Campus. The majority of the respondents are low-income earners but college level and possible manpower for the KIST special economic zone. The development approaches were categorized by the following:

Development Potential

Biking and walking are the preferred means of transport of future users which was integrated into the site development plans of the master plan having bike lanes, bike parking, and ease of access among the PWD persons. The top component of major resource reserves on the survey conducted was IT/BPO, Business Management, and Agriculture however, with the result of the stakeholder meeting in Echague Campus it was proposed to have medical tourism as part of its major component as suggested by the VP ARA of the university. This is also in good intentions to serve the local and foreign fora to ensure public health and safety and create economic activity, especially catering to foreign customers from telehealth and actual medication in the facility at a lower cost but good quality of service since labor expenses in the Philippines is affordable comparing it to other countries. On its development potential, most of the respondents agreed to the establishment of

different types of buildings like commercial, institutional, and manufacturing buildings inside the Special Economic Zone. Green architectural technologies and designs that are part of the development are acceptable and agreed upon for integration. Rainwater harvesting, tropical design, and energy-efficient technologies that are part of the master plan are highly acceptable. Climate resilient building design in the KIST master plan is acceptable among the respondents. parapet walls, louvers, rainwater harvesting, swales, retention ponds, and efficient energy-saving building components are acceptable.

Special Economic Zone Structure

The modern design of buildings and built-in environment agrees with the respondents and most of them strongly agreed, however, they are neutral about having high-rise buildings which is why most of the buildings have a medium rise to the agreed and are more acceptable to the users. As part of imbibing a good design urban environment, the urban park has been the primary approach of the KIST ecozone to have a vibrant walk and ambiance for all the workers which will make it a more conducive place for working. Park will also be a way to introduce people interaction, especially during leisure time. Parks are also designed to serve as a natural cooling element to avoid urban island heat effects. Respondents are in favor of mixed-used development of its land use which will be adopted in the master plan of the KIST Ecozone. Fiber optics and internet connection are part of the recommendation of the owner wherein even people in the park shall have internet connectivity since it is envisioned to be a KIST place for the economy.

Ecological Protection

Acceptability of the use of renewable energies can be seen in the different rooftops of development like solar panels to maximize the energy coming from the sun. Green building principles were integrated through proper orientation, choice of environmentally friendly building materials, and tropical design principles through cross ventilation on some parts of the master plan. A flood retention pond and provision for flood tunneling devices will be part of the KIST master plan located along the parking area. Heat detector devices and automatic fire sprinkler systems are part of the master plan to ensure the safety of well-being and properties inside the special economic zone. MRF facilities, Sewage Treatment plants, and Hazard vaults ensure public health safety in the master plan. An existing group of trees in the site shall be preserved and some portions of it will be proposed for the National Greening Program of the Philippines to mitigate the impacts of climate change (Paguigan *et al*, 2024). Environmental Awareness and Participation among College Students of Mindoro State University like in Calapan City Campus Calapan Mindoro (Masongsong 2024) should also be done in the KIST economic zone during its operation to avoid environmental degradation.

Economic Scale

Part of the policy in the KIST economic zone is to create international linkages through research and development and develop a knowledge economy. Commercial establishment and knowledge of research and development industries are part of the development in SEZA KIST. Facilities like FABTECH and the convention center can be used by local researchers in the province which will house state-of-the-art facilities like 3d printers, laser cutters, mechatronics, etc. Most of the preferred locators had been foreign direct investments however provisions for local investors are also advised in the development. Small-scale eateries and merchandisers are part of the development along the highly populated areas to cater food and other goods and services which the local people may ignite its entrepreneurial upliftment for economic stability.

Business Climate

Most of the respondents agreed in terms of giving 4 to 6 years of tax incentives for starting businesses for giving tax holidays which will be part of the policy inside the SEZA. Tenants and locators who will practice green technologies will be given tax incentives as a part of the policy to be recommended in the ECOZONE. Export-oriented manufacturing and services-oriented products inside the economic zone are acceptable which means foreign direct investments are viable inside the KIST economic zone. People in the KIST locations agreed to work inside the Special Economic zone along KIST which means that the need to establish an ecozone is appropriate. Foreign employees are welcome in the KIST ecozone but certain restriction as per PEZA requirements is part of the employment process and policy.

External Communication

A fast internet connection from which fiber optics connectivity is evident and part of the master plan. The KIST Website will be produced by the ICT department of ISU specifically for the economic zone to provide knowledge and advertisement among other future locators and users. Part of the policy and process of information dissemination is the promotion through newspapers and publications for advertisement. Social media advertisement and TV networks in the KIST economic zone are part of the marketing strategy proposed.

Policy Support

Part of the master plan policy will be giving penalties for violators to ensure environmental sustainability and livability. Tax discounts for environmentally conscious businesses will serve as a policy for the LGU to implement and for approval. Businesses collecting waste for implementing 4rs are also given tax incentives. This will lead to a healthier and more environment-friendly community inside the economic zone. Budget allocation

for research and development is vital in the sustainability of the sustenance of the ecozone to ensure gaps that need to be addressed while it is in operation. In case the availability of funds needs more alternative BOT between investors LGU can be a source of funds from which the respondents agreed. If ever the availability of funds needs more substitute PPP between foreign and local investors LGU can be a source of funds. Participation of LGU to ensure peace and order inside the KIST master plan is the primary factor that will mitigate insurgencies along the areas that can hamper the economic activity within the special economy and gain full trust among the investors.

Green Architecture Development Approaches

The use of green architectural technologies like provision for rainwater harvesting in all buildings shall be installed at the lower basement of the structure and be re-used for flushing the toilet. This will also help in reducing the consumption of water, especially during the rainy season. Solar panels on rooftop provisions are part of the renewable energy usage to ensure a lesser impact on the environment, especially during the summertime, since the Philippines is a tropical country, maximizing the heat energy is one of the best strategies to get green energy on the master-planned KIST ecozones. Low-e glass on the glass curtain wall and tempered glass cause lesser heat gain in the building to reduce the amount of cooling requirement for air-conditioning during the hot season, however, the use of air-conditioning units is inevitable that is why it is recommended to use eco-friendly air-conditioning units that are available to the market. Cross ventilation and the use of natural daylight are part of the design to maximize the wind and control the sun to achieve proper thermal comfort inside the building. A green wall was also integrated into the design to mitigate the urban island heat effect of the building and attract more bio-diversity within the area. A retention pond was provided to catch the rainwater to prevent flooding within the master-planned KIST special economic zones. Bicycle lanes, bike parking, and e-trike were provided in the master plan to minimize the amount of carbon footprint within the development, a pleasant urban design of walks can create an ambiance that will make the users less stressed and enjoy the master-planned KIST development with good place-making in the design. The use of louvers can serve as wind shutters during a typhoon, particularly in areas of buildings with a large number of glass panels. All parking spaces have deciduous trees on their center island to create a natural sun shade among the parking areas and prevent the urban island heat effects. The center of the parking space is specified to have grass created to make it more permeable wherein rainwater can percolate at the center of the parking spaces. Automatic sprinkler systems, building maintenance, and utility digital monitoring systems are advised to be installed in all the buildings to ensure proper monitoring and data

bank management on the energy usage of the entire development plan including its protection during a fire and other catastrophes. Heat-detecting monitoring devices on all the workers are placed at the entrance and exits of the buildings in case the proliferation of COVID-19 and other viruses is easily detected. A designated quarantine room per building is designated to the design to make it less accessible to the public. MRF and Vermiculture will create a better waste management facility in the area and sewage treatment plants and hazard vaults will ensure good environmental quality in the KIST park wherein is one of the major requirements of the ECC or environmental compliance certificate from DENR. All large buildings shall have built-in STP in the area so that wastewater will be properly treated. The park will serve as an open space for evacuation during earthquakes and will serve as a lung of the entire KIST development. All paintings shall be low VOC paint wherein is naturally, a more sustainable solution and is less harmful to the environment than traditional paints. All paintings of institutional buildings are generally white and commercial buildings because white is an easy and effective way to help mitigate the effects of climate change by keeping spaces cooler than if they are painted in other colors. It can also cool surfaces by 8° Fahrenheit (4.4C) under strong sunlight during noon hours. Painting walls and roofs white to deflect heat has been done for centuries.

Kist Construction Management Strategies

A construction project management team shall be devised by the ISU management to ensure good quality of the buildings from design to bidding to construction and operation just like what Batangas State University. A soil test must be conducted in all areas of construction so that proper structural design will be designed in all buildings to value engineering.

In terms of construction management, the author concludes the use of an excavated foundation to backfill all the needed areas for backfilling so that it will no longer get soil from other places. Hence, the excavated water retention pond shall be used to backfill especially in Echague KIST where it needs a lot of backfilling. Good coordination with LGU especially during road maintenance of highways, and retaining wall excavation of its nearby creek to conserve fees for the backfilling to be provided by the DPWH to have their road debris to be delivered inside the KIST zone during its construction phase. The use of I-beams wide flanges, and metal deck on its structural system would make it faster to finish than the conventional construction which needs 28 days for every structural system that needs to be poured with concrete, this will create less noise, especially in areas with extreme biodiversity and ecologically declared as sanctuary area near the KIST sites.

Pre-cast concretes, Pre-engineered steel frames,

Prefabricated SRC wall panels, and EPS Panels systems that are earthquake resistant are the suggested construction methods on the wall for faster, more efficient, and well-insulated panels suited for countries in a tropical climate. This will lessen the amount of heat gain inside the building and easier to install. A water system using wind-powered and solar system pumps will be used in the KIST development since Echague already has an established wind-powered water system to supply the entire development plan. Automatic transfer switches in all electrical systems shall be installed to make them more efficient in terms of loss of power. Emergency lights and emergency alarming devices shall be installed in the development plans to save the life, health, and property of the ecozone development. All master planned KIST zones shall have provision for future expansion which is why most of the developments are provided with open spaces for development.

Profile of the Respondents Echague

The respondent profile consists of the stakeholders like residents, LGU officials, ISU officials, Environmental Planners, MENRO, students, and other key officials that had been helpful in the designing of the master plan and viability of this study. There is a high educational qualification among the respondents which is 100 percent college level graduates and also that denotes that they are future contributory and possible economic zone workers in the SEZ. The result of this study was a compilation of respondents that are interviewed and part of the survey has been beneficial in the overall realization of the viability of the Special economic zones among the three campuses through consensus consultation and the conduct of a survey.

Profiling on site was conducted by the author which is composed of the natural, educational, and social factors that had helped craft the master development plans of KIST parks the following are listed below. Most of the respondents are into strong cultural significance in agriculture and are abreast in modern technological innovations.

Typhoon and Earthquake

The ISU ECHAGUE KIST Ecozone is located in a tropical country and is often visited by at least 20 typhoons every year 5 of which are the most devastating ones. The designer took into consideration this and most of the buildings were provided with wind shutters and louvers and used low-e glass to ensure thermal comfort inside the buildings. Flood retention ponds and flood tunneling devices were provided in the master plan. The earthquake fault line is quite far from the sites and it is very safe from the devastating effects of the earthquake wherein the author recommended having soil tests and structural analysis in all buildings before designing its components (Figure 2).

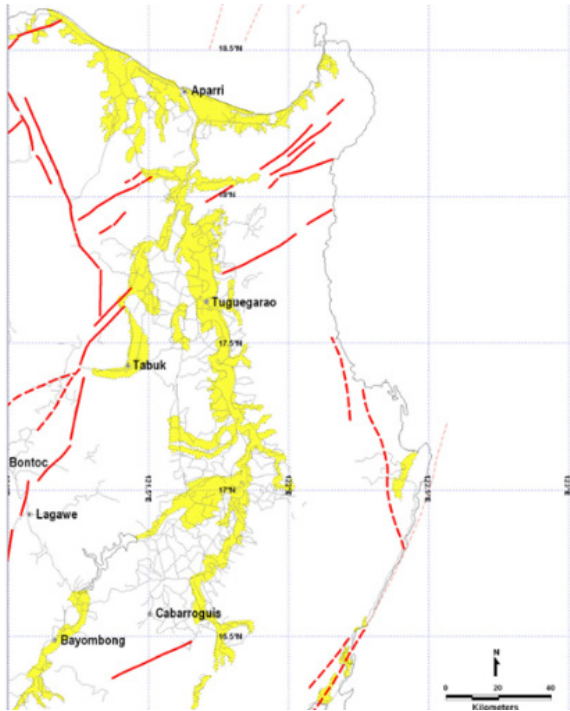


Figure 2: Earthquake fault line map

Source: http://provinceofisabela.ph/PDRMC/hazard_map_region2fault.html

Presentation of Kist Special Economic Zone in Isu Echague Campus

The Proposed KIST Special Economic Zone in ISU Echague is designed to be a Business Intelligence, Technopreneurship, and IT BPO KIST Special Economic Zone. Business is one of the top components of Echague KIST Park with 21.67 % of respondents agreeing, and IT BP Innovation Center. It has approximately 23.6 ha. lot for development and located on the frontage of ISU Main Echague Campus. The preferred locators will be composed of Businesses, Industry research Firms, Technology Tech Companies, and BPO Companies (Figure 3). KIST Park is located along the National

Highway with great access to roads, electricity, internet connection, and commercial spaces. It has an existing drainage system and waiting sheds that can be maximized. The lot is relatively flat and vegetation on its back portion is good for preservation to add more cooling effect and ensure existing bio-diversity preservation within the area. It is also comprised of the convention center for all the researcher's meetings, events, and other occasions for the industry partners and students. Information technology and Innovation and technology hub are the vital buildings located at the center of the development signifying that it is one of the key services and facilities that will serve as a landmark and iconic building in the development. Research industry firms shall have their facility with a fab lab building to have a proper venue for crafting, manufacturing, and designing pro-to-type research outputs. An added building for medical tourism and Livestock and agriculture was integrated into the design since it was suggested in the stakeholder meeting by VP ARA Dr. Boyet Batang that this shall be a vital component in the master plan, seconded by Dr. Naiga of the College of Agriculture. The livestock center aligns with the dairy industry project approved in ISU Echague. Collaboration with the Department of Trade and Industry (DTI) and the Department of Science and Technology (DOST) is also part of the shared facilities for the FABLAB (Figure 4). The park in front of the KIST will serve as a place for the leisure time of the employees and students to promote good health and well-being among the workers, this will also serve as an evacuation area. The park will serve as the lungs of the development and avoid the urban island heat effect which causes heat and discomfort to the users, especially during summer. Proper circulation of roads and enough parking spaces for PWD, bike lanes, bike parking, bus parking, and public parking were strategically located in the design to make it more accessible and convenient to go to. Rainwater harvesting in each building will be recycled to flush toilets and used for watering the plants to lessen the consumption of water resources together with the

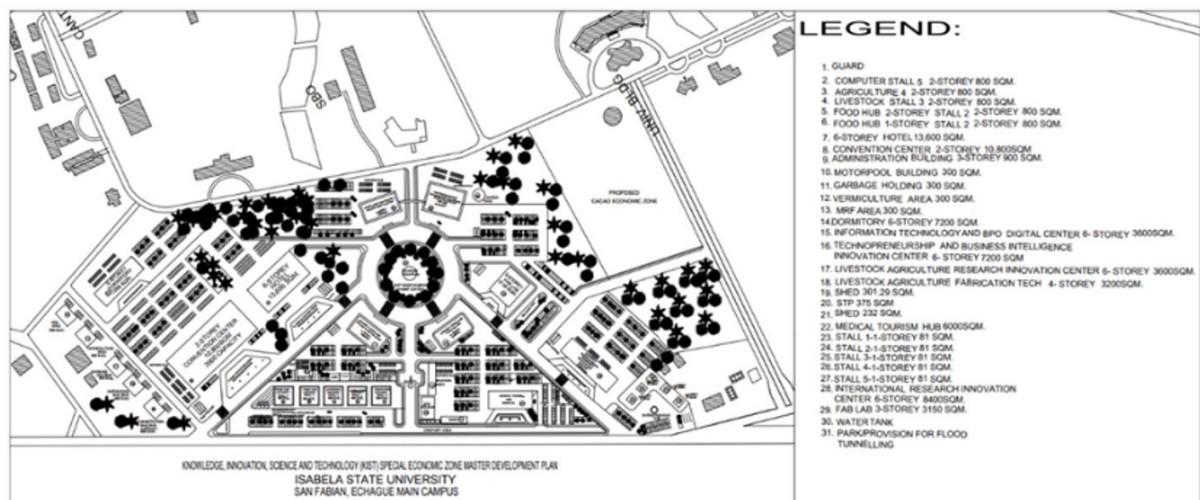


Figure 3: ISU Echague Master Development Plan

use of solar panels for street lights and solar panels as a means of energy on top of the roof of the buildings. The orientation of buildings and the design of their facades is integrated with tropical design intervention to lessen the

absorption of heat and absorb enough wind flow in the building to achieve proper cross-ventilation, louvers for sun shade, roof garden, vertical garden, etc.

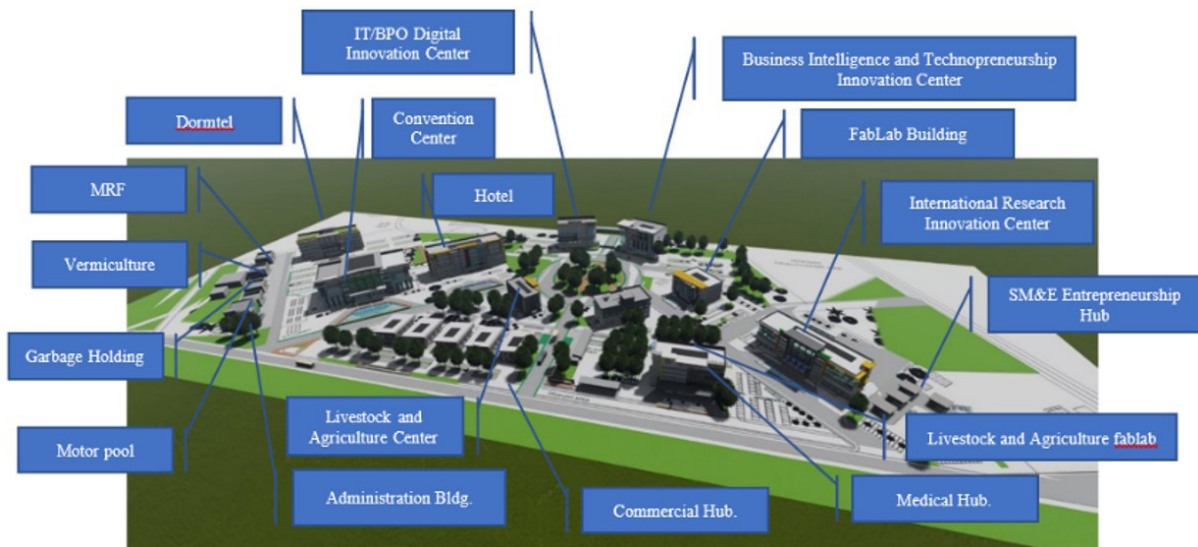


Figure 4: ISU ECHAGUE Aerial Perspective

Summary

The KIST Special Economic Zone establishment in Isabela State University Campus plays an important role in honing the knowledge of the ISU students and changing the countryside communities to be sustainable and self-reliant in terms of imbibing economic activity. The social, cultural, natural, and educational profile of the possesses a great potential to become an economic zone since it has good manpower resources generation, neighboring sites and land uses are mostly agricultural and livestock dependent and it has an existing proper utility infrastructure that is the number one requirement of PEZA. The master plan which consisted variety of job opportunities will create a big impact in terms of uplifting the lives of the community and making it more sustainable. The recommendations for policies aligned with the sustainable development goals is one of its primary objectives to somehow look into possibilities that all sectors of sustainable development will be addressed and empowered. To ensure that Isabela State University will deeply benefit from its existence part of the recommendation of the author recommends that there must be a higher economic benefit from the locators that will be established as a policy in the development in line with its approved development having in mind not exceed it carrying capacity to avoid urban sprawl and causes destruction to the environment. Locators using green technologies and doing industrial symbiosis concepts shall be part of tax incentives. Finally, the KIST Special Economic Zone is a testament that the university's mission and vision to be a leading research university is achievable with the existence of the blueprint in compliance with the required LUDIP act to maximize

the best use of land among the SUCs. Through this study, more universities of ISU campuses and other SUCs will have a great idea of how to establish economic zones and maximize their resources through proper resource management and design for the next generation to come. A comprehensive and more sustainable development that is inclusive in all sectors of society is benefited from this master development plan.

CONCLUSIONS

This study concludes that the KIST economic zone's existence is highly acceptable among the residents and will create job opportunities through the synergistic collaboration of locators and the ISU management to attain most of the sustainable development goals that will improve the quality of life in the Province of Isabela. The viability of establishing the KIST economic zone is viable wherein the university president is eyeing its realization together with the university officials who wish to establish a team for the ecozone development pool of experts to come up with the proposal's approval of the ISU Board and PEZA administrations. Through this, the vision and mission of the university to be research leading institution in the ASEAN region will be strengthened and given value through the shared knowledge and resources that are going to be done inside the special economic zone. A more sustainable and more vibrant architectural design master planned with a live, work, and play concept makes it more conducive to a learning and working environment for the users through compact development and green architecture integration. This study will be a good way to imbibe knowledge economy among the other universities in the Philippines to benchmark as a sample of prototype development.

RECOMMENDATIONS

The author recommends future enhancement of SEZs in the KIST establishment. The following are:

1. Tenants and locators who will practice green technologies are part of the recommendation of the author to give tax incentives as a policy since most of the respondents agreed.
2. A more thorough environmental impact assessment shall be given priority to ensure environmental sustainability
3. It is highly recommended to create a team that will manage the operations of the KIST establishment
4. Green architecture development is highly advisable.

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