Windmill Techno Park for The Integrated Educational Tourism Model (Innovation of Field Trip Method for Vocational and Technology Education)

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***Abstract*—The tourism sector today requires a more specific developmental touch in order to have an impact and function in the development of educational models, especially the enhancement of the learning process through technology tours. This can be realized when regional resource endowments, such as the diversity of coastal resource potentials (coastal landscape and wind kinetic energy) can be combined in their use in the development of windmill techno parks. As for Indonesia as an archipelago and maritime nation, West Sumatera Province has both potentials that need to be developed through an integrated educational tourism model with the concept of learning "Co Edutourism System" especially technology tours and vocations through the introduction of Windmill Techno Park in the region beach. This paper is part of the research, related to information about the utilization of wind turbine technology for the development of methods and learning strategies of tourism works as educational media as well as reference in the implementation of learning and competency development related aspects of vocational and technology. The result of this research and development get the maximum impact of technical implementation of the field trip method so as to form hybrid learning strategy model with technical implementation in group or mastery learning group and educational tour model with 3 E's principles consisting of environmental factor, engagement factor, and exploration factor.**

Keywords— Windmill Techno Park; Integrated Educational Tour; Field trip Study; Vocational and Technology

I. INTRODUCTION

In Indonesia the tourism sector is still experiencing many problems and challenges, not least in the area of West Sumatra. A number of potential and variety of tourism resources that exist, does not continue to stretch and has not played a role as a trigger and a major driver of national economic growth. Places of visits and attractions still look stagnant and move slowly so it has not become the main choice for tourists from abroad [1], [2]. Though the tourism sector in many countries has developed into a major industrial sector contributing foreign exchange for economic growth and become the most important source for the increase & absorption of labor. It is disclosed in the 2009 World Travel and Competitiveness report that the contribution of this sector to GDP until 2019 will reach 187.3 billion dolars [3].

Moreover, when the Malaysian government successfully examines the success of the Malaysian government to package its educational tourism that is able to encourage inbound tourism in the early 2000s of the Ministry of Education cooperation, by running the field study of tourst Student Program through & forming an extra-curricular tourism in every school to encourage students and parents to tour domestic. In addition, the success is also not separated from the ability to integrate tourism to various related sectors, as well as establish cross-sectoral and cross-regional cooperation to build local tourism, such as the Ministry of Agriculture (for agro-tourism), the Ministry of Forestry and the Department of Wildlife through the attraction of the National Park (ecotourism), Department of Marine (coastal tourism), and so on.

In relation to the problem, there should be a breakthrough and solution to solve the problems faced, among others, is introducing an integrated tourism model of education (Integrated Edu-Tourism) through the concept of windmill techno park in coastal areas, especially on the objects potential tourism developed as beach & marine tourism (coastal tourism).

The educational tourism is intended in this case is a program where the participants of tourism activities to travel on a particular place with the main purpose of getting the experience of learning directly related to the location visited. Based on the aspect of the learning method, integrated tourism education is in the form of learning strategy under supervision / tutor or mentor to the field to the object visited (outside the school) where the participants will get information & knowledge about the object, then write down his experience and menyesiasatinya with attitude wisdom personality according to the demands of an academic program or curriculum objectives.

The purpose of writing this paper is sebahagian of research, related to the development of windmill techno park on the beach area that requires a solution how its

existence can be realized to be a reference (reference) for the development and implementation of integrated tourism education. The objective focus is oriented towards introducing a learning model through the "Co-Edutourism System" approach and enabling the existence of a windmill techno park as a reference for vocational learning process and technology, as well as developing relevant learning topics/topics that can be offered for support achievement of competence in vocational learning and technology through the reference of the windmill techno park.

II. METHOD

In achieving predetermined research objectives, a hybrid research method is applied, including engineering, exploration & field studies, literature and documentation, as well as laboratory experiments.

Methods of exploitation and field study focused on surveying wind energy potentials and observations of tourist sites / geomorphology of the region. The wind potential data is measured from anemometer equipment required for the design and modification of the construction of the windmill, while the potential / geomorphology of the region is required on the physical construction of the windmill techno park. While the aspects of literature study and documentation to support the development of theory related to the conceptual in the field of engineering, tourism, and education. The results of the design and subsequent modifications will be investigated through laboratory tests to obtain the characteristics of each model of the windmill.

III. RESULTS AND DISCUSSION

A. Integrated Tourism Education as the Learning Approach

Talk to the old saying while chugging downstairs boats, heating up cooked rice. Rather, the less understanding is to package two jobs simultaneously (multiple again). Such phenomena and demands of preference today in the midst of social life-social order began to be felt and developed. Such conditions need to be addressed by every development actor and various forms of service units, not least in relation to the development of tourism.

Developing integrated tourism education (WTP) is an answer to the problem, where visitors (tourists) travel in a tourist destination (DTW) is not just getting entertainment & satisfaction, but also get information knowledge and skills. It is in line with Rodger's statement [4], edu-tourism is a program in which the travel aims as a group with the primary purpose engaging in a learning experience. This tourism model is not new, has long existed with a variety of terms, such as technology tours, agricultural tourism, cultural tourism, factory tours and so on, as noted which in recent years became popular to develop [5],[6]. Gaining direct experience in the field of visited objects is categorized as a lifelong learning concept, such as the European Commisson statement "Life Long Learning (LLL) is" all learning activity undertaken throughout life, with the aim of improving knowledge, skill and competence, within a personal, civic, social and / or employment related perspective"[7].

As it is known that, the acquisition of something learning outcomes among others will be related to the choice of methods and strategies implementation of the learning process. For the field of vocational education and technology technically achieving competence in learning objectives, more dominant choice of strategies for skills-shaped learning needs. Students are directly exposed to workpieces (through job sheets and industry internships), where the goal is for the establishment and development of motor skills or kinesthetic intelligence.

In terms of achieving the mission of vocational education and technology objectives, so far it seems less flexible to the development of scientific attitudes that will ultimately produce graduates who are less knowledgeable and cause them to have no wisdom and sensitivity analysis of the situation & on the changes / developments of science and environment. In this context, the application of a learning approach strategy through integrated tourism education a choice & inevitability. While there is still debate and question, how far this approach (the method of tourism work) in its implementation will be effective for vocational education and technology. Various opinions say that field trip study method can give and make learners learn full of energy (encouragement / spirit) and produce full experience and can make learners more creative. "Field trips are powerfull learning experiences. Maximizing the learning requires thoughtfull work done before and after the trip [8]. And field trips to create questions and research [9].

In the process of implementation, it is necessary compotensi teacher / lecturer to sort and design something learning materials or learning tools that require strengthening or support of field experience either in the form of research / observation / discovery or teamwork and project work. Thus, in the implementation of the method of tourism work to be more meaningful need to be combined with discovery learning (project based learning) and project based learning strategy or further called hybrid learning strategy through the development of group learning tactics / mastery learning group (mastery learning group). Moreover, during this time the tourism work methods are often categorized as extra-curricular activities / informal / study excursions, where there are a number of weaknesses in the achievement of targets / targets that have been planned.

The method of tourism is not just recreation, but is to learn or deepen the lesson (learners) by looking at the reality. Because it is said the technique of tourism works, is the way of teaching is carried out by inviting students / students to a place or a particular object outside the school to learn or investigate something. Therefore, it is necessary to take steps in packing the learning method of the field trip, among which are mentioned: (1) Tourism Planning, which covers the aspects of formulating the objectives of the field trip, determining the object of the field trip in accordance with the objectives to be achieved, establishing the duration

of the field trip. develop learning plans for participants during field trips, and plan learning supplies that must be provided. (2) Phase of implementation of activities under the guidance of lecturers / teachers or tutors / mentors directed to the objectives, (3) Implementation of the results of field trips / visits in the form of reports.

Then, Sharma [3] develops an educational tour model based on 3 E's principles, namely: Enviromental factor, Engagement factor, and Exploration factor as shown in Figure 1. Beginning with tutorial (both visiting and basic knowledge) about the site (the object of visit) and then followed by a field visit to complement and add reality / actual reality about the object. Through field visits, participants will gain more knowledge and detailed information about the object and its environment, which will then generate interest and interest in learning more. End of program activities should be given treatment in the form of practice / practice related to the competence of learning. Without the provision of exploration activities, the method of field trips through the integrated educational program is like "Exploration -Without it the education of tourism seems like a body without blood".

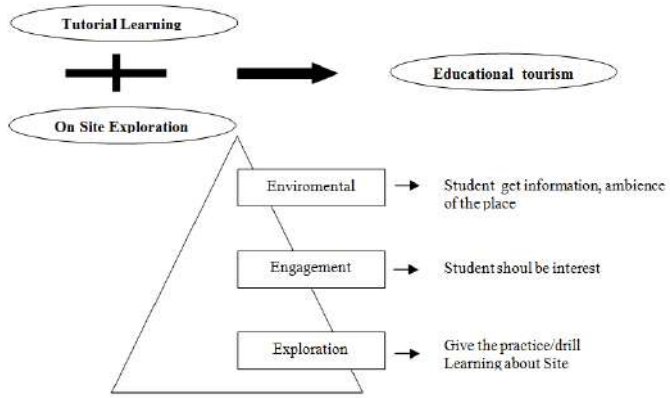


Fig. 1. Integrated Tourism Education Model [3]

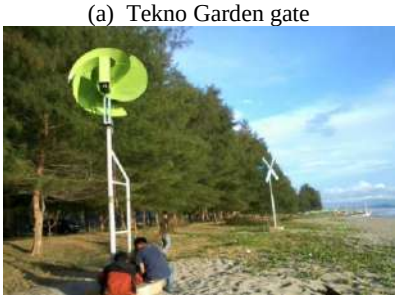
The concept of windmill gardens is based on the terms wind farms and wind parks in offshore and ocean areas, which are related to the area of wind / cultivation power station which is found in the Netherlands, Denmark, England, China, Japan , and other developed countries. In this case, the existence of the installation of wind turbine installation unit / wind turbine can be different if it is packaged and interpreted from the point of view as a medium for learning or education incorporated into the tourism aspect.

From various information mentioned that the windmill contained in the Netherlands neatly arranged so as to produce an impression of interesting scenery for every visitor. Many paintings and photography can be made at the location of the windmill because it is so beautiful to see especially at sunset. No doubt the windmills in the country are owned by families / individuals, where on every first Saturday of each month or every May 13 (the day of the windmills), they will open their windmills to the public. However, the average owner of windmills in the country opens it every day, because they are proud of their own windmills and each owner usually gives information on the workings and functions of the windmill.

Technically the conversion of energy to the windmill system will work through the rotation of the rotor blown by the wind blowing on the blades. The varied shape and model of the various windmill faces, the rhythm of the rotor blade of the blades, and their mounting arrangements will create an attraction. The configuration not only gives the impression of scenic charm but also generates the passion of each visitor to gain knowledge information and learn more about it. Visitors can find out and see the road map of technology (Road Map of Technology) about the windmill, especially for students and students.

Understanding the park as a forum for the ongoing activities of educational process has long existed in the history of national education, which was raised by the Education Fathers of Indonesia (Ki Hajar Dewantara), namely "Taman Siswa" which introduced the concept of Taman Madya for junior secondary level and Taman Adult for education equivalent to high school. Thus, the windmill techno garden can be interpreted as a container for the ongoing implementation of the educational process, utilizing the creation of technology / technology in the form of a windmill as a medium / educational tool as well as for tourism attraction.

(a) Tekno Garden gate



(b) Some Windmill Model

Fig. 2. Techno Park Windmills for Integrated Tourism Education on the Tourist Destination of Ketaping Beach - Padang. Pariaman

Supposing a garden can be planted with a variety of plants / trees then through the existence of this technological park windmills can also be planted with millworms by every student, and anyone they (visitors) who love the creation of energy conversion of windmill mediation. The beauty and completeness of the contents of the park will inspire and give birth to imagination / fantasy psychology, especially

among children / students who are still in the stage of growth & development process and the formation of mental personality and wisdom. Figure 2 shows the results achieved through research activities that have been done through funding Kemenristek Dikti for PUPT Scheme for 3 years budget with technical implementation until 2019 [10].

The term techno park has actually existed for a long time, beginning in the 1950s in the United States. However, in Indonesia rampant discussed and become the program of national development plan RPJMN in 2015 - 2019, which is one form of container to connect the institution of universities with the industry. Another definition of Techno park or Science park is an integrated area that combines industry, universities, research and training centers, entrepreneurship, banking, central and local government in one location that enables the flow of information and technology more effectively and efficiently and faster.

The development of techno park or science park is one of the efforts to strengthen the innovation system by increasing the interaction and collaboration between the centers of science and technology activities, productive activities and community movement. The mastery, advancement and utilization of science and technology (science, technology and innovation) is essential to support the enhancement of regional competitiveness (nation) through more progressive, inclusive and sustainable regional development efforts. The following policy directions of science and techno park development nationally by the government issued by Bapenas Ministry of National Development Planning (2015) are [11]:

1. *Development of National Science Techno Park (N-STP) is directed to serve as:*
   - Center for advanced science and technology development;
   - A new entrepreneurship growth center in advanced technology;
   - echnological service centers advanced to the business and industry.
2. *Development of Science Park (Science Park) in Provinces directed to serve as*
   - Providers of advanced technology knowledge to the public;
   - Provider of unfinished technological solutions in techno park;
   - As an advanced technology application development center for the local economy.
3. *Development of Techno Park in Regency / City is directed to function as:*
   - Center of technology implementation to encourage economy in regencies / municipalities
   - Training venues, apprenticeships, technology dissemination centers, and business advocacy centers to the wider community;

The existence of windmill techno park is also intended in the future to act as a forerunner of the establishment of tehno tourism (tourism techno park) as the direction of the policy & national goals. the initial stage of its function is as a tourist park combines learning and tourism process, especially nuances of vocational tourism and technology. Furthermore, for the purposes of the engineering design process and modification of the windmill construction models, it is necessary to provide information on a number of design parameters, including the potential data of wind speed at the location of the placement (Table 1).

TABLE I. POTENTIAL WIND SPEED OF PADANG BEACH AREA AND PADANG PARIAMAN

No	Name of Location / Village	Measurement Time & Wind Speed (m/s)			Average Speed (m/s)
		Morning (8 - 10)	*Day (10 - 14)*	*Afternoon (14 - 18)*	
1.	Manggopoh Ulakan	0,0 - 1,5	2,0 - 5,0	5,2 - 6,9	2,4 - 4,46
2.	Tiram Ulakan	0,5 - 2,0	2,2 - 5,5	5,5 - 6,3	2,7 - 4,60
3.	Ketaping Bt Anai	1,0 - 2,2	2,5 - 5,8	6,0 - 6,5	3,2 - 4,83
4.	Purus Padang	0,0 - 1,8	2,0 - 4,5	4,7 - 6,0	2,2 - 4,10

[j.] Source: Survey Results 2017 [12]

Related to its function as an integrated educational tourism reference, visitors gain knowledge through a book entitled "Taman Tekno Kincir Angin" which contains more information about the construction model and the characteristics of windmill design / modification. In addition, there are also developed learning modules such as Windmill Pumps entitled "The Making of Wind Wind Rope Pumps" and "Simple Archimedes Windmill Techniques", where the physical results are shown in Figure 3.

(a) Wind Water Pumps (b) Wind Electricity

Fig. 3. Design Results For Integrated Tourism References Education

B. Development of Learning Material Through Techno Park Windmill

The ancestors of the Indonesian nation were sailors, where the use of wind power through ships / sailboats has long existed. So is the incarnation of Minangkabau's realm, "Alam Takambang Jadi Guru (*Nature exposed So Guru*)" is probably not just a tip, but the meaning is applicable in the midst of life, moreover its essence as a thought for a learning material. The potential of wind derived / existing in nature has not been thought of packing it into a blend of concepts for the development of tourism and education.

The widespread nature is the largest reservoir of energy destined for all creatures, all of which, among other things, the potential of wind power not only serve as a source of energy but also can serve as a learning material. In this context, we need an intermediary means in order to play a role and make the wind resource as educational media, that is in the form of windmill which is packed in the form of landscaping facilities with the content of learning & technology as well as is also a research park.

The concept of windmill techno park with its physical completeness consists of a number of models of the wheel is a learning medium, which is a teaching-learning process tool that allows simplify the process of communication delivery of scientific messages to learners. They get the impression and learning experience that is more meaningful, interesting, and difficult to forget. As an information material for the planning and development of learning materials that may be obtained through the windmill techno park facility, or can be used as a reference in the context of the implementation of integrated tourism education and simultaneously realization of the field trip method through the windmill garden.

Some topics / sub topics of achievement of learning competency that may be developed through techno park facilities for the manufacture of modules or toturial materials in the implementation of field trip method, among them (1) Introduction of Windmills Archimedes, (2) Techniques and Processes Making Windmills Archimedes, (3) Introduction to the Four Winds of the Sudu With Transmission Planetary Gearing System, (4) Inner Rodagigi Making Techniques for System Gearing Planetary Trains, and so on.

In addition, the purpose of learning or achievement of competence can be adjusted to the demands in the curriculum, both concerning aspects / domains of knowledge and skills aspects. Or develop learning concepts that require investigation / discovry learning and case methods through the utilization of the contents of park facilities as a medium to build applied competence in research treasures (developing a research park as an open laboratory)

IV. CONCLUSION

Based on the results of research and description of the focus of the discussion in this paper can be concluded several things:

1) *Windmill Techno Park, need to be equipped with a number of physical models of windmills and other facilities, so that can be used as reference / development in the development of integrated tourism education through the method of learning field trip.*

2) *In obtaining the maximum results of technical implementation of the method of field trips can be combined with other strategies / methods so as to form hybride learning strategy model with the technical implementation of the group or group learning (mastery learning group)*

3) *Educational tour model with 3 E's principles offered by Anukrati Sharma can be used / considered in developing or organizing learning strategy of field trip, consisting of: environmenntal factor, engagement factor, and exploration factor.*

4) *While in the windmill techno windmills can be found several models of windmills and their functions as a reference visit that consists of: type of windmill transmission planet rodagigi ring, archimedes, multiblades, Savonius with stage blades, Darrieus-Savonius hybride, and hemi- savonius multilevel blade.*

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