International Research Journal of Advanced Engineering and Science
ISSN (Online): 2455-9024

Project Implementation Strategy for Environmental Limitations in TNBTS

Wahyudi[1], Mukhamad Nur Qoyum[2], Intan Febriana Nur Hamida[3]
[1]Department of Civil Engineering, University of Brawijaya, Malang, Indonesia-65154
[2]Department of Civil Engineering, Wisnuwardhana University Malang, Indonesia-65154
[3]Department of Civil Engineering, University of Brawijaya Malang, Indonesia-65154

***Abstract*—** *One of the spectacular international-scale tourist attractions visited by tourists in East Java, namely Bromo Tengger Semeru National Park (TNBTS). One of the main causes of the lack of development of tourism objects in the TNBTS area is the limited infrastructure, besides the current condition of tourism facilities and infrastructure which have been damaged. TNBTS is a construction project that has different characteristics from one project to another. The existence of unique and different natural conditions, the work carried out at the project location will be different. Accessibility to the project location is very difficult due to the steep road. The difficulty of the affordability of project locations is an obstacle for stakeholders when implementing development in the TNBTS area. Limited environmental conditions in the TNBTS area will affect the availability of project resources. Respondents in the study were contractors, consultant supervisors, planner consultants, other parties, BBTNBTS, and related agencies. The method used in solving the problem is SWOT. The strategy improvement proposal is in accordance with the SWOT analysis, namely, for stakeholders the ability of human resources to control environmental conditions in TNBTS and the use of local personnel that are suitable for qualifications. For service providers, it is necessary to conduct a field review first and understand the characteristics of environmental conditions in TNBTS, implementers must truly understand the existing work plan requirements (RKS), each service provider needs to learn and know the conditions that often hamper the project implementation in TNBTS. So, can have alternatives in planning and implementation related to environmental limitations in TNBTS.*

***Keywords*—** *Project Performance, SWOT, TNBTS.*

I. INTRODUCTION

TNBTS is a construction project that has different characteristics between one project and another. There are unique and different natural conditions so the work done at the project location will be different. The natural conditions in the TNBTS area are different from the others, because the area is a plateau consisting of the Tengger mountain complex in the north and the Gunung Jambangan complex in the south. The access that must be passed to reach the area is very difficult due to the steep road and very far from the city center. So, to reach the area takes longer than the project or development that is close to public or public access.

Different NTBTS areas require contractors to really have a mature calculation with these conditions. In addition, the limitations of environmental conditions in the TNBTS area will affect the availability of project resources. The influence of these environmental constraints is that there are significant difficulties in the form of availability of power resources in the form of materials, workers, and tools used. Access to workplaces also has difficulties and extreme weather constraints that affect the continuity of implementation compared to project locations in public places such as usually

Human resources, material, field management, management and natural and environmental conditions are factors that influence closed performance in building construction projects [4]. Ideal field characteristics will affect the development process of a project [3].

II. LITTERATURE STUDY

A. Characteristics of the TNBTS Area

TNBTS is one of the conservation areas in East Java, besides being a conservation area, TNBTS is also a tourism area. Geographically, TNBTS is between 70 54 '- 80 13' south latitude and 1120 51 '- 1130 04' east longitude, where locations are in four districts, namely Probolinggo Regency, Malang Regency, Pasuruan Regency and Lumajang Regency with a total area of TNBTS is 50,276.2 ha (BBTNBTS).

In this case the obstacles often found in the TNBTS area are:

- Material resources far from the job location
- Change of workers / Human Resources often occurs
- Extreme weather and natural conditions
- Heavy equipment cannot enter the location and only uses simple tools
- Material prices and workers' wages can reach double the normal price
- Material shunt is quite far away

The number of obstacles that occur during project implementation in the TNBTS area, there are several requirements that must be met by contractors who carry out work in the TNBTS area, namely:

- The company has experience working on projects in conservation areas
- The company must understand the conditions, terrain, and understand the technical requirements that have been made
- Recommended use of local labor
- Involving local people in the project (Procurement of materials)
- Estimating costs correctly
- Produce products according to the plan and expected technical specifications

B. Project Resources

Money

One of the main resources in implementing construction

Wahyudi, Mukhamad Nur Qoyum, and Intan Febriana Nur Hamida, "Project Implementation Strategy for Environmental Limitations in TNBTS," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 3, pp. 91-95, 2019.

projects is the cost (budget). Costs can be defined as the sum of all efforts and expenditures made to develop, produce, and apply an activity so as to make a product that is as planned. so the budgeted budget for wages is also different. Labor allocation costs are calculated based on (Utama, 2017) (a) The cost of maintaining labor, (b) Costs of adding labor (hiring) (3) Costs of stopping labor (firing).

Time

Time is a process that is needed in the completion of a job (project) in accordance with the planned time. Time is a unique resource because time cannot be played back or repeated in the execution of a construction project. So, in planning and controlling time must be done as well as possible, because bad time management can have an impact on the implementation of the construction project.

Human

Workers in this case can be interpreted as human resources. Implementation of construction projects requires human resources (workers) in completing a construction project work. Human resources (HR) in management and planning must be done appropriately so that it can produce an optimal product. Construction workers are divided into two types, namely providers or supervisors as well as workers or laborers. The number of providers is only 5-10% of the number of workers supervised [8].

Manpower needs in the implementation of construction must be fulfilled properly. In planning a realistic number of project workers it is necessary to pay attention to various factors, namely labor productivity, limited resources, the number of construction workers in the field and equalization of the number of workers to prevent sharp fluctuations. To meet the needs of the number of workers by balancing between the number of workers and the volume of work, generally contractors combine workers directly with contract workers [7],

Materials

From several studies stating that the material absorbs 50% -70% of the project budget, the budget does not include the budget for material storage[6]. So, material management techniques must be done well and appropriately in making material purchases, material storage, material distribution and material requirements calculations. Quality control of the quality of a material or work varies from one job to another. This is in accordance with what happened in the implementation of the construction project. There is a minimum value or level of material quality that must be fulfilled so that material is acceptable. When carrying out calculations (estimations) related to financing for the allocation of material resources must be relevant, as well as the fulfillment of adequate equipment.

Machines

Construction equipment is an important resource in supporting the achievement of a goal that must be achieved. In construction projects the use of equipment is between 7% - 15% of the project budget[1]. Equipment in the construction industry is a tool / equipment needed to carry out construction work mechanically. The tools used can be crine, grader, truck, back hoe, and others. the use of heavy equipment in a construction project can provide intensive efficiency and effectiveness at the stage of implementation of a construction project.

C. Performance

The performance of a construction project is about doing work and the results that can be achieved from the work[2]. Project performance measurements are mostly focused on the results orientation that is objective and easily measured [6]. Barriers or factors that influence project performance are [9]:

- Field work conditions
- Weather, seasons, disasters / natural disasters such as floods, earthquakes and more.
- Availability of resources, labor, material, equipment, funds / financial, and others.
- Dependence on other work / projects that preceded it and its continuation.
- Procedures in administration before work begins are incomplete.

D. SWOT

The SWOT matrix is a tool used to compile corporate strategy factors. This matrix can illustrate clearly how the opportunities and external threats faced by the company are adjusted to the strengths and weaknesses they have [5]. The following are the steps in the SWOT analysis [10] :

1. Stages determine the Internal Strategy Factor (IFS) matrix
2. Stages determine the External Strategy Factor (EFS) matrix

III. Results and Discussion

Proposed improvements in the performance of project implementation in TNBTS are carried out by conducting a SWOT analysis. SWOT analysis is a tool used to develop project implementation strategy factors, besides that SWOT analysis can clearly describe the opportunities and threats faced by the project and adapted to the strengths and weaknesses that exist in the project environment. the identification of internal and external factors in the performance of the TNBTS project implementation will be presented in table I.

Competitive Matrix Profile (CPM) is a matrix of identification of a project or company with the same field, viewed from several aspects, such as Strength, Weakness, Opportunities, and Threats. Determination of CPM value is based on the description of Chapter II regarding the "phase of SWOT analysis". Based on table the performance of the TNBTS project seen from its internal condition has a CPM value of 2.33, where the strength factor value is 1.91 and the value of the weakness factor is 0.43. This value can be said to be less good because the average value of internal factors is less than 2.5. This value is in accordance with the description in Chapter II point 4.e at the stage of the SWOT analysis method namely "if the value is below 2.5, the project position internally is weak, and if above 2.5 indicates the project position is internally strong" On the CPM value of internal factors less than 2.5, it can be said that the performance of project implementation in internal conditions is poor and weak because it is not able to minimize weaknesses in the TNBTS

Wahyudi, Mukhamad Nur Qoyum, and Intan Febriana Nur Hamida, "Project Implementation Strategy for Environmental Limitations in TNBTS," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 3, pp. 91-95, 2019.

International Research Journal of Advanced Engineering and Science
ISSN (Online): 2455-9024

environment which is the biggest obstacle that exists. The biggest obstacle in these internal factors is the incompatibility between the plan and the results.

TABLE I. Strategy for Proposing TNBTS Project Implementation Performance.

No	Factor	Item	bobot item (a)	Rating (b)	c= axb		∑ CPM
1	factor Internal *Strength*	Higher availability of funds	0,190	3	0,57	1,91	
2		Have experts	0,192	4	0,77		
3		Government policy	0,189	3	0,57		
4	Factor Internal *Weakness*	HR Ability to adapt to the Environment	0,084	1	0,08	0,43	2,33
5		HR capabilities handle delays / limited resources	0,085	1	0,09		
6		Limited accessibility to the project location	0,082	1	0,08		
7		Suitability of results with planning	0,090	1	0,09		
8		Lack of careful planning	0,088	1	0,09		
9	Factor Eksternal *Opportunities*	Availability of land	0,197	3	0,59	1,92	
10		Development of TNBTS infrastructure as a tourism area	0,190	4	0,76		
11		Improve the economy of local residents	0,190	3	0,57		
12	Factor Eksternal *Threat*	The environment of the TNBTS area	0,072	1	0,07	0,53	2,45
13		Weather conditions in the TNBTS area	0,073	1	0,07		
14		Compatibility of material prices	0,104	2	0,21		
15		Material availability	0,097	1	0,10		
16		Competition between contractors	0,076	1	0,08		

External conditions on the performance of the project implementation of TNBTS have a CPM value of 2.45, where the opportunity factor value is 1.92 and the threat factor is 0.53. This value can be said to be less good because the average value of internal factors is less than 2.5. This value is in accordance with the description in Chapter II point 5.e at the stage of the SWOT analysis method, namely "if the value is below 2.5, the project position internally is weak in responding to opportunities and overcoming threats, and if above 2.5 indicates the project position respond well to opportunities and overcome existing threats ". On the CPM value of external factors less than 2.5, it can be said that the performance of project implementation under external conditions is not able to take advantage of opportunities that are owned and unable to overcome the threats that exist in the TNBTS project environment. The biggest threat to external factors is the incompatibility of material prices, material availability and the environmental conditions of the TNBTS area project. Based on the value of the total weight of items obtained, the value will be included in the internal and external (IE) matrices which will be presented in figure 1.

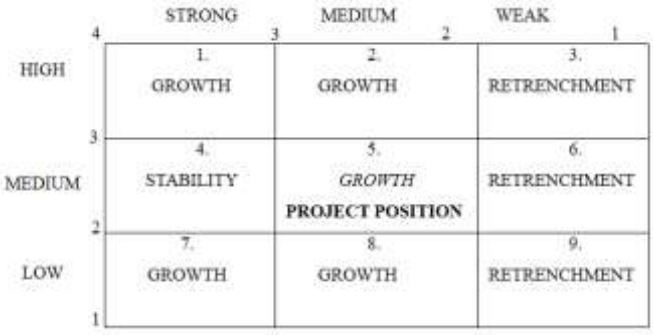

Fig. 1. Internal and External Matrix (IE) Performance of TNBTS Project Implementation

In Figure 1 describes the IE matrix that shows the position of the performance of the TNBTS project in cell 5. The position indicates that the project in TNBTS can apply the growth strategy through horizontal integration. The growth strategy through horizontal integration is an activity that improves performance in the implementation of the TNBTS project.

In accordance with Figure 1, the position of the project implementation performance of TNBTS is in cell 5 which has a value of less than 3, so it can be concluded that the performance of project implementation is in a moderate position and has a moderate chance. Identification of internal and external factors can create four main strategies, namely: SO strategies (strengths and opportunities), WO strategies (weakness and opportunities), ST strategies (strength and treats), and WT strategies (weakness and treats). The strategy description will be presented in table II.

1. Strategi SO (*strength-opportunities*)

   This strategy is carried out to utilize the strength of the company to capture the opportunities it has. With the existence of land in the TNBTS area, the government through UPT BBTNBTS provides a policy to develop sarpras as a support area in TNBTS. Development in the TNBTS area is carried out to facilitate visitors' comfort and safety. So that the construction of infrastructure facilities by using competent human resources is expected to be able to carry out development in accordance with the quality and quality that has been set. This is considering that the TNBTS area is a conservation area, where there are regulations that must be adhered to. The regulation is stated in RI Law No. 5 of 1990 concerning Conservation of Natural Resources and Their Ecosystems and Government Regulation No. 28 of 2011 concerning Management of Nature Reserve Areas and Nature Conservation Areas. The funds allocated can be utilized to the maximum, meaning that if they do a similar job in the TNBTS area (which has limitations) with the area that does not have a limited budget value. This is related to the TNBTS area which is a conservation area. Along with the increase in the development of the TNBTS area, it will attract visitors so that it can improve the economy of residents around the TNBTS area.

Wahyudi, Mukhamad Nur Qoyum, and Intan Febriana Nur Hamida, "Project Implementation Strategy for Environmental Limitations in TNBTS," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 3, pp. 91-95, 2019.

Factor internal / Factor eksternal	Factor Internal *Strength*	Factor Internal *weakness*
	1. Higher availability of funds 2. Have experts 3. Government policy	1. HR Ability to adapt to the Environment 2. HR capabilities handle delays / limited resources 3. Limited accessibility to the project location 4. Suitability of results with planning 5. Lack of careful planning
Factor Eksternal *Opportunities*	**Strategi SO (*strength-opportunities*)**	**Strategi WO (*weakness-opportunities*)**
1. Availability of land 2. Development of TNBTS infrastructure as a tourism area 3. Improve the economy of local residents	Strategies that can be used to maximize strength and capture opportunities, namely, • With the existence of land in the TNBTS area, the government through UPT BBTNBTS provides a policy to develop sarpras as a support area in TNBTS. • So that the construction of infrastructure facilities is carried out by using competent human resources, with the funds allocated. • Increased development of the TNBTS area will attract visitors so that it can improve the economy of residents around the TNBTS area.	Strategy in overcoming regional weaknesses with opportunities namely, • The high opportunity in development development requires competent human resources and good understanding of the TNBTS area in its implementation. So, cooperation between the implementer and the local community is needed. The cooperation that can be done is by using local residents as workers. • In addition, there is land available in the TNBTS area but there are difficulties in accessibility, thus requiring proper planning and supervision of implementation. • In this case requires competent human resources and already knows the TNBTS area well as a planner and supervisor. So, product planning can be in accordance with the conditions at the TNBTS office
Factor Eksternal *Threat*	**Strategi ST (*strength-threat*)**	**Strategi WT (*weakness-threat*)**
1. The environment of the TNBTS area 2. Weather conditions in the TNBTS area 3. Compatibility of material prices 4. Material availability 5. Competition between contractors	Strategies that can be done, namely, • With the unpredictable condition of the environment and weather conditions in the TNBTS area, the executor must conduct a field review first. • Availability of funds can be more focused on adjusting material prices and the availability of materials to be used. • Contractor competition is high in demanding competent HR in their fields. and with uncertain environmental conditions and weather, the contractor must understand and understand the conditions of the National Park.	Strategies that can be done, namely, • With the unpredictable condition of the environment and weather conditions in the TNBTS area, the executor must conduct a field review first. • Availability of funds can be more focused on adjusting material prices in a strategic way, • High prices of materials caused by conditions and weather in the TNBTS area. Then there must be careful planning by adding analysis of unit prices according to the price and environmental conditions of TNBTS. • This is due to the difficulty of accessibility to the project location so that it requires higher funds to arrive at the location. • Availability of materials that do not cause quality or quality mismatches. then it is necessary to do testing first or check according to specifications. • The availability of materials to be used. • Contractor competition is high in demanding competent HR in their fields. and with uncertain environmental conditions and weather, the contractor must understand and understand the conditions of the National Park.

2. Strategi ST (*strength-threat*)
   This strategy is applied where the power possessed is used to overcome threats that may be faced. With the unpredictable state of the environment and weather conditions in the TNBTS area, the activities of Mount Bromo and Mount Semeru which are currently still active have caused frequent emergence of the earth, besides the erratic weather in the TNBTS area requires the executor to conduct a field review first. Increased development in accordance with government policies regarding the availability of funds can be more focused on adjusting material prices and the availability of materials to be used. In the TNBTS area the availability of materials is quite limited, so it requires to supply material from outside the TNBTS area. In the development of the TNBTS area the competition of contractors is high in demanding competent HR in their fields. and with uncertain environmental conditions and weather, the contractor must understand and understand the conditions of the National Park.
3. Strategi WO (*weakness-opportunities*)
   This strategy is applied when there are opportunities to overcome existing threats. The high opportunity in development development requires the existence of competent human resources and good understanding of the TNBTS area in its implementation. So, cooperation between the implementer and the local community is needed. The cooperation that can be done is by using

Wahyudi, Mukhamad Nur Qoyum, and Intan Febriana Nur Hamida, "Project Implementation Strategy for Environmental Limitations in TNBTS," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 3, pp. 91-95, 2019.

local residents as workers. So that, in addition to being able to increase the development of the TNBTS area, it can also open employment opportunities for local residents and can improve the economy of the surrounding community. Availability of land available in the TNBTS area but there are difficulties in accessibility, requiring proper planning and supervision of implementation. In this case it requires competent human resources and already knows the TNBTS area well as a planner and supervisor in the field. So, product planning can be in accordance with the conditions in the region. And the products produced are of good quality.

4. Strategi WT(*weakness-threat*)
   Strategies can be implemented to overcome weaknesses in the TNBTS area to avoid the threats that will be faced. The high price of material caused by conditions and weather in the TNBTS area. Then there must be careful planning by adding analysis of unit prices according to prices and environmental conditions in the TNBTS area. This is due to the difficulty of accessibility to the project location so that it requires higher funds to arrive at the location. Availability of material that lacks quality or quality mismatch. Then it needs to be tested first or check according to the specifications and quality that has been determined. Competition between contractors must always be balanced with competent human resources. Many contractors feel loss because they do not have competent human resources and understand the TNBTS area.

IV. CONCLUSION

Proposed improvement strategies that can be given based on SWOT analysis, namely:

a. For stakeholders
   - HR's ability to master environmental conditions in TNBTS
   - Use of local labor according to their qualifications

b. For Service Providers
   - Service providers need to conduct a field review first and understand the characteristics of environmental conditions in TNBTS before making an offer.
   - Implementers must fully understand the existing work plan requirements (RKS), this is because the project area or area has specific environmental characteristics and natural conditions.
   - Every service provider (consultant planner, supervisory consultant and contractor) needs to learn the conditions that often hinder project implementation in TNBTS. So, it can have alternatives in planning and implementation related to environmental limitations in the TNBTS area.

V. SUGGESTIONS

1. It is necessary to improve the performance of construction projects by making major improvements to the top priority.
2. It is expected that for further research activities, it is necessary to evaluate repairs after making a proposed improvement.
3. In this thesis a performance evaluation of project management has been carried out in the TNBTS area, for further research it can be taken the object of research in several conservation areas in Indonesia. So, evaluation can be applied in general.
4. There are many obstacles in the TNBTS area due to limited environmental conditions and human and material resources, so there are several requirements that must be met by contractors who carry out work in the TNBTS area, that is, companies have experience working on projects in conservation areas, companies must understand the conditions and and do a field review before bidding.

REFERENCES

[1] Fahan and Tengku, "Analisis Efisiensi Peggunaan Alat Berat," UII. Yogyakarta, 2005.
[2] Irianie. "Analisis Pengaruh Ketersediaan Sumber DayaTerhadap Kinerja Kontraktor DalamPelaksanaan Proyek Konstruksi (Studi Kasus Proyek Di Kabupaten Kapuas)". *Universitas Lambung Mangkurat.*Vol 1, issue 1. 2009
[3] Mangare. "Kajian Proporsional Model Sumber Daya Pada Proyek Konstruksi Gedung". *Junal Ilmiah Media Engineering*. Vol. 2, issue 3, 2012
[4] Priana & Carlo & Yulius. "Analisis Faktor-Faktor Yang Mempengaruhi Kinerja Mutu Pada Proyek Konstruksi Gedung Di Kota Padang Panjang".*Pascasarjanah Universitas Bung Hatta,* 2012
[5] Setyawan, R. "Penerapan Analisis SWOT Sebagai Landasan Merumuskan Strategi Pemasaran Usaha Jasa Sewa Mobil "AMAN-AMIN"" *Transport Tours and Travel* Ambarketawang Sleman Yogyakarta. Skripsi. *Universitas Negeri Yogyakarta*. 2015
[6] Sobirin. "Kinerja Proyek Konstruksi Bangunan Gedung Di Pengaruhi Oleh Beberapa Faktor Seperti Sumber Daya Manusia , Sumber Daya Alat Dan Sumber Daya Material" .*Teknik Utama*. Vol XI, issue 2. 2016
[7] Soeharto, I "Manajemen Proyek Dari Konseptual Sampai Oprasional Jilid 2" .*Erlangga*.Jakarta 2001
[8] Sugiyono. "Metode Penelitian Bisnis, Cetakan Ketiga" .*Alfabeta.*Bandung. 2001
[9] Syah, M S. "Manajemen Proyek Kiat Sukses Mengelola Proyek". Jakarta : Gramedia. 2004.
[10] Yosephine, L. "Kajian Terhadap Kekuatan, Kelemahan, Peluan, Ancaman (*Strengths, Weaknesses, Opportunities, Threats*) Developer Perumahan Dalam Mengahadapi Era Pasar Bebas". *Universitas Sebelas Maret,* 2013

Wahyudi, Mukhamad Nur Qoyum, and Intan Febriana Nur Hamida, "Project Implementation Strategy for Environmental Limitations in TNBTS," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 3, pp. 91-95, 2019.