

Macroergonomic approaches as a solution to local wisdom-based tourist village development planning

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Abstract. Tourist villages are among the tourist attractions which are often visited by tourists. The development of these tourist destinations is undertaken by referring to the data of the Ministry of Tourism and Creative Economy. Currently, there are a total of 978 tourist villages in Indonesia. This number has increased sharply since 2009, in which there were only 144 tourist villages. Unfortunately, the existence of tourist villages might result in a shift in land conversion, tourism use, and clothes. Moreover, this might cause damage to cultural assets which can be reduced only by rigorous rules of the local wisdom. This research tries to improve the system adopted in the development of tourist villages using the approaches of Kansai Engineering and Macroergonomic Analysis and Design (MEAD). Based on the research findings using Kansai Engineering, there are 3 kansai words found to cause problems to the development of tourist villages, which were then repaired using the approach of the MEAD concept so that the proposed work system design is to integrate the existing components by formulating and creating visions & missions, work instructions, and Standard Operating Procedures (SOP).

1 Introduction

In Indonesia, the tourism sector is one of the third largest contributors of foreign exchange income (Ministry of Tourism, 2016). Foreign tourists visiting Indonesia increase as reported by Statistics Indonesia (BPS) which recorded the growth in the number of foreign tourists visiting Indonesia by 3.71 (CNN Indonesia, 2016). Among the tourist destinations which they visited were tourist villages. Currently, there are a total of 978 tourist villages in Indonesia. This number has increased sharply since 2009, in which there were only 144 tourist villages (Ministry of Tourism, 2016). The term *tourist village* itself refers to rural tourism where a small group of tourists lives in or near the traditional atmosphere (Inskip, 1991).

The Province of the Special Region of Yogyakarta is one of the most successful areas in the development of tourist villages and Sleman Regency located in this area is one of the regencies that has 10 tourist villages and has always been a destination to host the international jamboree (*Pikiran Rakyat*, 2017). Unfortunately, the existence of tourist villages might result in a shift in land conversion, tourism use, and tradition which results in damage to cultural assets (Isnaini et al., 2015). Such a condition can be solved by reducing the rigorous rules of local wisdom (Hermawan, 2016). Among the methods that can be used to solve this problem is the concept of Macroergonomic Analysis and Design (MEAD). This method accommodates the whole aspects in the evaluation of a system (Hendrick et

al., 2001). Research on improving a working system using MEAD was conducted by Realyvásquez et al. (2015), Cahyaditha et al. (2013), Kazemi et al. (2017), and Purnomo et al. (2017). This method is also used to enhance work productivity (Robertson et al., 2017).

Based on the aforesaid problems, this research analyzes the MEAD approach that remains rarely applied in the development of tourist villages. It is expected that the findings of this research will provide an input for the government with regard to sustainable village development. In accordance with the mandate of the Law on tourism which stipulates that one of the objectives of tourism is to increase regional income in order to increase the welfare and prosperity of the people (UU, 1990).

2 Method

2.1 Data Collection

Data were collected by conducting interviews and distributing questionnaires. The interviews were conducted with Civil Servants of the Office of Tourism of the Province of the Special Region of Yogyakarta, and several village apparatuses and the management of tourist villages. Questionnaires were used to search for *kansai* words (Yuqing et al., 2013). The research sample consisted of 30 respondents (Nagamachi & Lukman, 2009) taken randomly using the following criteria: (a) male and female; (b) aged

20 to 50 years. As for the secondary data, they were obtained by studying literature and documentation on urban area planning.

2.2 Identification using Macroergonomic Analysis and Design (MEAD)

The steps of this research were then carried out based on the MEAD approach, namely the stages to obtain information so as to realize research objectives. The stages of the macroergonomic approach using the method of Macroergonomic Analysis and Design (Hendrick, 1997; Hendrick & Kleiner, 2001) among others are: (1) analyzing the environmental system and organizational subsystems; (2) defining the type of a production system and determining the level of performance expected; (3) defining operating units and work processes; (4) identifying variances; (5) creating a variance matrix; (6) creating a table of key variance control and the analysis of personnel's roles; (7) allocating functions and combining designs; (8)

analyzing stakeholders' perceptions and responsibilities; (9) redesigning support and combining subsystems; and (10) improving the system.

3 Findings and Discussion

3.1 Establishment of the Problem Factor Tree

The problem factor tree was used to find out the cause of a problem. It was formulated based on interview and questionnaire results. Results of questionnaire validation using Cronbach's alpha by less than 0.7 (Eubank et al., 2016) discover the following words: (1) planning without community participation, 0.879; (2) implementation without community participation, 0.884; and (3) less strict rules, 0.873. The Problem Factor Tree developed in this research is presented in Figure 1.

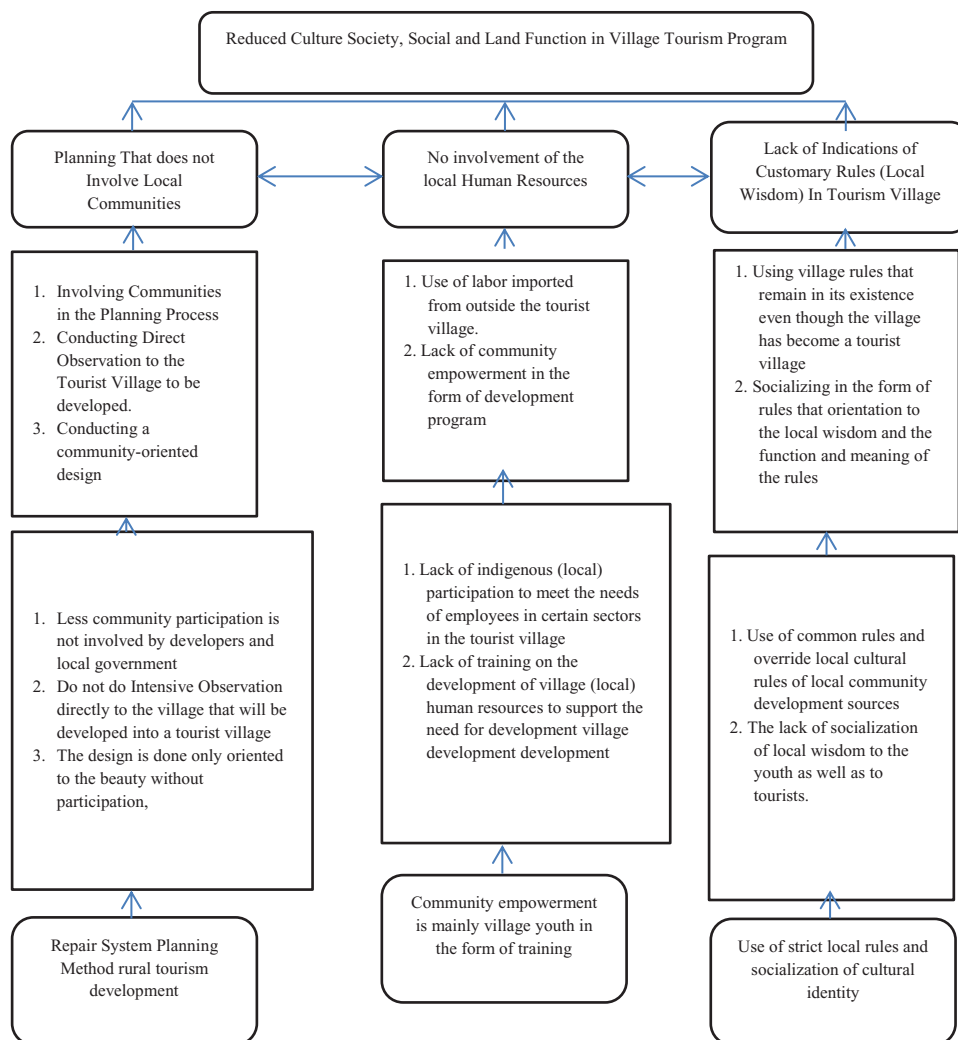


Fig 1. The problem factor tree

3.2 Macroergonomic Analysis and Design (MEAD) Identification

1. Analyzing the Environmental System and Organizational Subsystems (Step 1)
 During the development of tourist villages, the Provincial Government of the Special Region of Yogyakarta serves as a facilitator as well as a planner which is then in charge of holding an auction or making direct appointment in terms of the execution of village tourism development (Regional Regulation of the Special Region of Yogyakarta No. 3 of 2015). The regulation stipulates that the regional government shall work in conjunction with the developer to carry out the physical development of tourist villages.
2. Defining the Type of the System and Determining the Performance Level as well as Defining Work Processes (Steps 2 and 3)
 In the service-oriented production system, the Regional Government of the Special Region of Yogyakarta offers the tourism service concept where tourist satisfaction will serve as a vital parameter to measure the target

performance (Ramseook et al., 2010). Work operating units are the work operating units of the tourism officewith the following divisions: (1) Destination Development Division tasked with developing a tourist village concept and development of new tourist village; (2) Capacity Improvement Division tasked with improving the tourist visit capacity in the Province of the Special Region of Yogyakarta; (3) Marketing Division tasked with marketing tourist destinations situated in the Province of the Special Region of Yogyakarta; and (4) Regional Technical Implementation Unit (UPTD), which is an Implementing Unit that performs the functions of implementation and supervision.

3. Identifying Variances (Step 4).
 Here are some of the variances or problems which occurred in the process of designing tourist villages as mapped in the problem factor tree. Table1.VarianceData.
4. Creating a Variance Matrix (Step 5).
 This stage aims to examine the relationship between the variances found in the planning process of village tourists. This matrix was made to determine the relationship level between variances and their data type.

Table 1. Variance data

No	Process Stages	Variance	Possibility	Cause	Impact
1	Planning Does not Involve Local Communities	a. Planning does not match the demography of the village tourist areas	Only use data of similar project development experience	Previous projects may not necessarily have the same specifications	The existence of the design is not in accordance with the demographics of the community
		b.Planning does not do direct observation To the tourist village	Rely solely on subjective data without direct appraisal to Target rural tourism project	No direct observation and data collection	Error in determining the allocation of both capital resources and materials to be used
		c. Planning design is only developer oriented	The planning process is only profit-oriented	Pressing the amount of project cost	Less suitability of design results and wishes of the people in the tourist village
2	Not involved the human resources of the local community	Least Participation of local communities involved	The people around the tourist village do not have the skills	The level of community education around the village is still low	The existence of social turmoil that occurred between the developer and the community
3	Less stringent implementati on of the rules to local wisdom	Not in the socialization of local people's wisdom	The rules of Culture and local wisdom are perceived as a barrier to progress	The influence of western culture that is already deeply rooted in life	Reduced cultural rules of the original community will even disappear at a certain time

Table 2. The variance data matrix

Variance	Unit Operation	Variance data types		
		Significant Impacts	Has a lot to do with other variations	Has significant impact as a single variation
Planning does not match the demography of the village tourist areas	Destination Development Division	√	√	√
Planning does not make observations To the tourist village	Capacity Improvement Division	√	√	X
Design design is only oriented to the developer	Destination Development Division	√	X	√
Least Participation of local communities involved	UPTD	√	X	X
Not in the socialization of local people's wisdom	Marketing Division	√	X	X

Description:

√ = To indicate that a particular variable has an effect

X = To indicate that a particular variable has an effect

5. Creating a Table of Key Variance Control and the Analysis of Personnel's Roles (Step 6).

This section identifies the control of variance which already existed in the Tourism Office of the Province of

the Special Region of Yogyakarta and the roles of personnel in charge of the work unit where each variance occurred. Table 3. Key Variance Control and Personnel's Roles.

Table 3. Key variance control and personnel's roles.

Variance	Supevisor	Parties involved directly	Supporting activities that already exist
Planning does not match the demography of the village tourist areas	Head of destination development section	Field survey officer and developer.	Mapping the potential of tourist areas
Planning does not make observations To the tourist village	Head of destination development section	Employee of tourism and developer sections	Development of tourist villages with infrastructure support
Design design is only oriented to the developer	Head of destination development section	Field survey officer and developer	Design using software facilities and technical personnel of the developer
Least Participation of local communities involved	Head of UPTD	UPTD employees as technical implement	The use of local labor at the bottom of a working structure
Not in the socialization of local people's wisdom	Head of marketing development section	Employee of promotion and marketing	Development of tourist villages with infrastructure support

6. Allocating Functions and Combining Designs (Step 7).

This stage aims to make some alternative improvements and allocate functions so as to get a better alternative.

For information about the alternative generated, see Figure 2 which shows the possible alternative that can be implemented by the tourism office of the Province of

the Special Region of Yogyakarta. According to (Robertson et al., 1998), to allocate functions and combine designs, there are a number of alternative improvements that can be made with some adjustments to the existing conditions. According to (Mosard, 1982), to decide which alternative is better and can be applied

to the scheme presented in Table 4, scoring can be undertaken by giving four assessment criteria. Table 5 presents the assessment criteria for scoring to assess the three alternatives. Table 5. Assessment criteria for scoring.

Table 4. The problem solving scheme

Alternative	Implementation Technique	Solution	Goal
Alternative 1	a. Conduct a live survey in planning b. Provide Work Instructions and SOP	Improved work standards	
Alternative 2	a. Conduct FGDs with government, developers and communities b. There is an Official Report of the Meeting	Maintain and improve the quality of tourist villages with community participation	Improvement of Village Tourism Development Implementation Process
Alternative 3	a. Pemberdayaan Masyarakat b. Pelatihan Pemuda dan Masyarakat	Community empowerment	

Table 5. Assessment criteria for scoring

Criteria			
Access to the organization	Possible risks/obstacles to successful implementation	Benefits/effectiveness	The effect on the amount of spending
1. Helping to improve kinship within the organization	1. Employees are opposed to change	1. Help improve the quality of life in the workplace	1. Increase training costs
2. Creating effectiveness in the organization	2. The inability of employees to learn something new	2. Decrease in Absence	2. The cost of human resources
	3. Lack of support from management	3. Decrease Case of compensation	3. Cost reduction performance
	4. Training programs are lagging behind with current knowledge	4. Improved Quality of service planning for community satisfaction	4. Cost of ergonomic design work and training program.
	5. Lack of active employee participation	5. Increase work productivity	5. Cost reduction design quality
	6. The concept design is now incompatible with the new place design	6. Decrease in Interest Participation	6. Maintenance and replacement costs
	7. Stress due to organizational change	7. Decreased work stress	
	8. Failed to use Work Instructions	8. Improved Health and wellbeing	
	9. Lack of feedback from management	9. Decrease in the number of claims	
		10. Improve group calibration	

The scoring system for each criterion is described below:

- 1. Access to the organization = 1 to 2
- 2. Possible risks/obstacles to successful implementation = 1 to 9.
- 3. Benefits/effectiveness = 1 to 10.
- 4. The effect on the amount of spending = 1 to 6.

7. Analyzing Stakeholders' Perceptions and Responsibilities; (Step 8)

This stage aims to give a score to each alternative improvement so as to get an alternative which is better and can be applied by the Tourism Office of the

Province of the Special Region of Yogyakarta. The scoring of the three alternatives was undertaken by referring to Table 5 and results of this scoring are presented in Table 6.

Table 6. Table scoring alternatif

Alternative	Kategori				
	Organizational Reach (Table 5, Column 1)	Risks in Success (Table 5, Column 2)	Advantages / effectiveness (Table 5, Column 3)	Influence on costs (Table 5, Column 4)	Total Weights
Direct Survey of spaciousness, Preparation of SOP and WI	2	(-2)	5	(-2)	3
Bringing FGD Participation at the design stage with the Community	2	(-1)	5	(-2)	4
Community empowerment and training	1	(-2)	8	(-4)	3

In Table 6, a negative sign (-) was put on the categories *possible risks/obstacles to successful implementation* and *the effect on the amount of spending* because they potentially produce a negative effect. According to Mosard (1982), the assessment scale used ranged from 0 to 10, where a score between 0 and 3 indicates low preference, a score between 4 and 7 indicates moderate preference, and a score between 8 and 10 indicates high preference.

8. Redesigning Support and Improving the System (Steps 9 & 10).

Based on the scoring results in the previous stage, it is revealed that Alternative 2 has the highest score by 4, namely improvement by conducting FGD by involving the community in the planning and development of Work Instructions (WI) and meeting reports as requirements to decide whether physical work is allowed to be started or not as specified in the Standard Operating Procedures (SOP) and to formulate visions & missions.

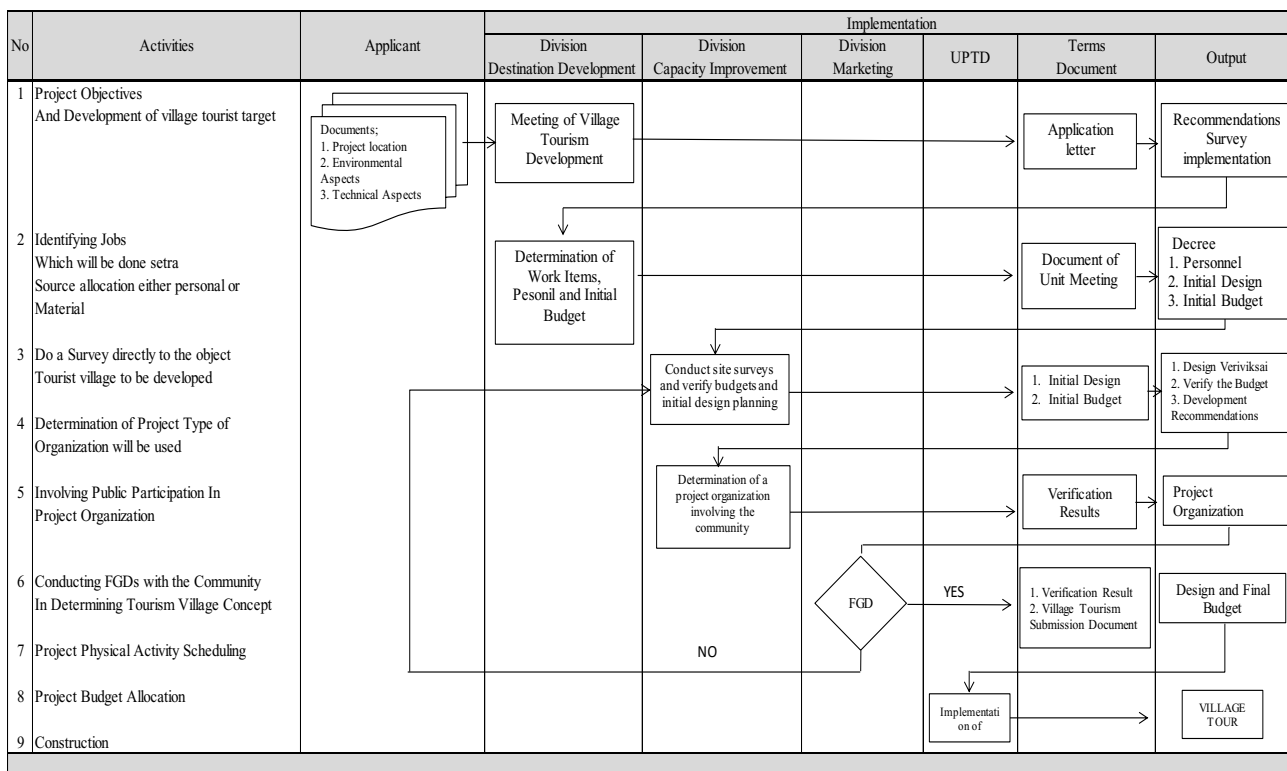


Fig 2. Below presents the scheme for tourist village development

4 Conclusions

Based on data processing and analysis results that have been conducted, the following conclusions are drawn:

1. Results of problem identification using the Macroergonomic Analysis and Design (MEAD) method suggest that the Tourism Office of the Province of the Special Region of Yogyakarta had not encouraged community participation properly.
2. The proposed improvement was obtained by selecting Alternative 2, i.e. improving the planning standards by conducting FGD with the government, the community, and the developer. This was done based on the four categories and their respective score, namely access to the organization (2), possible risks/obstacles to successful implementation (-1), benefits/effectiveness (5), and the effect on the amount of spending (-2).
3. The proposed work system design is to integrate the existing components by formulating and developing visions & missions, work instructions, and Standard Operating Procedures (SOP), which are expected to encourage the sustainability of local culture and community empowerment as well as development which suit the characters of a tourist village.

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