

## Support system of self-assessment and gap analysis for new normal tourism standards

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### ABSTRACT

Tourism after the outbreak of the emerging epidemic of COVID-19 has drastically changed. Tourist attractions will be certified with Green National Park and New Normal Standards. Starting in the year 2021 onwards, Thailand's national parks are important tourist destinations, of which 155 nationwide will be subject to complying with such standards to ensure safety, hygiene and environmentally friendly service starting in the year 2021 onwards. This research aims to develop a support system for self-assessment and gap analysis based on Smart Self-Assessment for New Normal Tourism Standards to enable the national parks to assess themselves and be prepared for future actual assessments. The system development focuses on user data import design and report output, system performance test, self-assessment score percentage difference tests, and system performance evaluation by the experts. The percentage difference of self-assessment scores is found at 0.0 for all items after adding details in some of the work lists based on the experts' opinions, whereas, the performance testing indicates that the system developed is applicable and highly efficient (= 4.40, S.D.= 0.54).

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## 1. INTRODUCTION

In the global situation facing the spread of COVID-19, the number of foreign tourists has dropped by as much as 72% for reasons of safety and travel restrictions within the emerging epidemic [1]. The global tourism outlook for 2020 reflects a decline in tourism revenue from \$910 billion to \$1.2 trillion, as well as a decline in global GDP from 1.5% to 2.8% [2]. However, the studies have reported that during the COVID-19 pandemic, nature and ecosystems have been recovering from greenhouse gas emissions resulting in travel restrictions and changes in human living habits [3], [4]. Although the decline in tourism contributes to revenue in the tourism industry, it has helped the ecosystem recover from destruction and deteriorating conditions. As a result of this situation, a new way of living style known as "New Normal" [5] has been introduced and applied during the pandemic and beyond in which it is more widely accepted [6], especially a concept of sustainable tourism.

Sustainable tourism in the new normal is an approach adapted to tourism management. It can gain confidence from tourists who expect a safe tourism model under public health measures, while preserving the environment for the local community [7], [8]. Therefore, the preparation of tourist attractions in new normal that balances tourism with natural resource management, coupled with surveillance for safety from the Covid-19 outbreak is very challenging for them. In this regards, the World Tourism Organization (UNWTO), the United Nations and other agencies in the field of tourism, propose several guidelines such as green tourism business scheme (GTBS), global sustainable tourism criteria (GSTC), National Park Green Project Standard [9], Green Hotel Standard and various tourist attractions standards. These guidelines serve as the global advice and standards for sustainability in tourism in terms of awareness-raising, policymaking for responsible government agencies, and evaluation. In Thailand, the concept of 'go green' and 'sustainability' are also adopted in several fields including Green National Park, Green Industry, Green Hotel and Green Tourism. In many countries, public health measures are applied to tourism to control the spread of the disease [10], while Thailand has implemented measures of Thai Stop COVID+ and measures to support tourists in the new normal standards in the national parks [11], which will help tourist attractions manage safe tourism more flexibly and sustainably.

A national park is one of important natural attractions of Thailand. There is an increase in tourists from 4.3% to 12.5% visiting the national parks nationwide every year. From the studies, it is found that tourists in the national parks are aware of the importance and responsible for the environment. At present, under the new normal tourism, providing environmental information and epidemic safety information is necessary for those tourists [12], [13]. In addition, the agencies involved in tourism management within the national parks must adhere to the standard assessment principles and measures in accordance with the tourism policy of the country and the world. Starting in 2016, the national parks that are ready to be assessed for the "Green National Park" standards will help improve service levels and environmentally friendly management of national parks to an international level. In addition, the situation of Covid-19 contagion, the Department of National Parks, Wildlife and Plant Conservation responsible for tourist attractions, have set measures to accommodate tourists in the New Normal National Park [11] for the national parks to use as management guidelines and preparation for supporting the return of tourists.

In particular, in 2021, Thailand has as many as 155 national parks [14] that will be assessed for the green national park (GNP) standards, of which at least 133 will be required to be certified in three levels of GNP: gold, silver and copper, a total of 17 main criteria and 91 sub- criteria with a validity period of 3 years [9]. These national parks must prepare their tourist attractions in accordance with the measures of new normal national park (NNNP), which specifies 5 main criteria and 8 sub-criteria [11] according to the tourism management guidelines. The GNP is a project to award the national parks complying with the environment-friendly management concept. All national parks in Thailand are encouraged by an audit of GNP criteria. However, many national parks may have different understanding and skills to be assessed according to these standards [15]. Therefore, the national park self-assessment process may shorten the time and help the national parks be more prepared when it comes to actual assessment. The self-assessment shows the gap between the existing attraction management processes and the established benchmark and let the tourist attraction managers know that there is something to improve including the correct management of tourist attractions.

This implementation can increase the likelihood of national parks achieving sustainable management goals in accordance with the established standards and measures. It can build confidence for tourists as well. In the previous studies, Chen *et al.* [16] proposed a self-evaluation system of quality planning for tourist attractions in Taiwan using analytic hierarchy process and Delphi (AHP-Delphi) approach. The application of AHP-Delphi analysis is to allocate weightings to the evaluation criteria regarding importance features of tourist attractions. Meanwhile, global sustainable tourism council SUSTAIN-T 2021 introduced the self-assessment which is a paper-based checklist in a series of multiple-choice questions about environmental management. The checklist is to assist on gap analysis towards the goal of being green organization. Global environmental management initiative (GEMI) developed the GEMI ISO 14001:2015 Self-Assessment Checklist using Microsoft Excel spreadsheet to support the concept of environment management system and evaluate the status of organization towards the concept with gap analysis. The consortium of the ERASMUS+ project developed guidance to self-assessment of sustainability performance, identification of resources for improvement and development of sustainability initiatives. In addition to the methods of self-assessment systems mentioned above, the previous studies expose the use of technology applying an ontology-based approach to explanations, relevant concepts and inference mechanisms of concepts within the scope studied correctly [17]-[19] which can be used to develop a self-assessment system to be more automated.

However, the existing self-assessment methods and tools do not cover the semi-automated self-assessment process and self-assessment, the adoption of modern technology. Therefore, it is one approach that may help solve the aforementioned problems [15]. This framework aims to develop a self-assessment

system to assist a national park to prepare for GNP audition and to comply with both GNP and NNNP standards. Due to a typical assessment, it has only a document that lists each work list (WL) that needs to be done. But in this study, the researchers identified each work management detail (WMD) and defined mapping rules between the work management details and the corresponding work list, allowing the tools designed to help analyze results and display assessment results more clearly. The present study has developed a support system that embeds knowledge of new normal tourism standards assessments that can analyze gaps between the attraction's existing management processes and established criteria. National parks can self-assess to prepare appropriately before undergoing routine assessments by applying engineering methods to develop knowledge within the scope of new normal tourism standards covering knowledge of 2 issues: Green National Park and New Normal National Park in an ontology which is a conceptual agreement between the experts, system workflow and database designers.

Thus, this paper aims to design and develop a support system of self-assessment and gap analysis for the smart self-assessment for new normal tourism standards and to test the effectiveness of the developed system. In addition, the findings also provide recommendations for improving management of the national parks, supporting work for inexperienced users or those lacking understanding of the green national park project standards and measures to support tourists in the national parks. It also includes the presentation of the evaluation results by using the score difference test and the system performance test by the experts using the smart self-assessment for new normal tourism standards developed.

## 2. METHOD

In this section, the researchers examine self-assessment models and methods in the areas of environmental management [16], [20] to conceptualize the study framework involved. The researchers also propose an ontology approach to building a knowledge base, which has been proven to be an effective method for presenting knowledge in the specific area studied [17], [21], [22] enabling software sharing among users. Thus, it allows the users to reuse their domain knowledge and expand the scope of knowledge. the researchers present the proposed framework which describes how a support system of self-assessment and gap analysis are worked out. Knowledge base, ontology design, work list and work management detail and green national park and new normal national park score calculation are discussed.

### 2.1. Proposed framework

In this research, it proposes a support system of self-assessment and gap analysis for the national parks based on new normal tourism standards covering two areas of knowledge, Green National Park and New Normal National Park by self-assessment through the developed user interface. The features to be evaluated from the standards are extracted into an ontology model as the knowledge based of the entire system. The provided details of the national park are then instantiated to the ontology and evaluated using ontological inference rules with the inference engine. The results of the system include assessment results and recommendations for improvement. A layered architecture of the framework is drawn out in Figure 1.

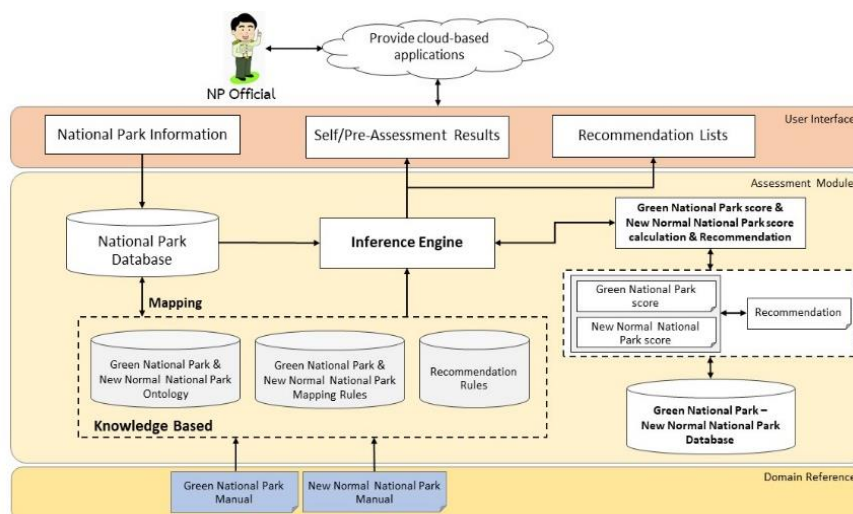


Figure 1. Layered architecture of new normal tourism standard as self-assessment support system

According to Figure 1, the system consists of 3 layers including domain reference, assessment module, and user interface. The domain reference is the source of domain knowledge for the knowledge base of the system. There are 2 references which are the manual of GNP assessment and the manual of NNNP. The references then are analyzed and extracted to form into concepts and relations for the designed ontology and rules. The ontology and rules are the core knowledge base in the assessment module which is the responses for evaluation of the national parks, generating the recommendations. The user interface is a medium for obtaining the data input from the user and displaying the evaluation result and recommendation.

## 2.2. Knowledge base

In this research framework, the knowledge base consists of two parts which are the ontology and inference rules. The ontology plays a role of representing domain knowledge related to national park and features from standards. The inference rules are split into two: a set of assessment rules and a set of recommendation rules. The features in rules are associated to the classes given in the ontology and values for evaluation are from the instances mapped to the ontology.

### 2.2.1. Ontology design

Ontology is a domain knowledge representation in a form of semantic network to define concepts and relation among them in a domain of interest [23]-[27]. A semantic network is a graph whose nodes represent concepts of an entity and whose arcs represent relations between these concepts [21]-[23], [28], [29]. The ontology also outlines the conceptual structure of a particular area of knowledge that is used to build the knowledge base of assessment and self-assessment systems [20], [22], [30]. The knowledge model in this research is, therefore, created in the ontology form. The source of knowledge includes the standards applied in the National Park Green Project [9], measures to support tourists in the national parks under the new normal concept [11], viewpoints of consultants, security officers at work and the certified environmental and occupational health academicians. The ontology is used as a common conceptual agreement between experts, system workflow and database designers throughout the operation of the system. The conceptual framework in the knowledge domain presented in Figure 2 relates to the criteria used in the assessment, comprising six key concepts of the national parks new normal tourism standards: National Park, Management, Activities, Coverage, Person/Things/Place and Conditions. The national park assessment is based on the management and activities assessment, where activities are related to Coverage, Person /Things/ Place and Conditions. The work list and work management detail are divided into two additional concepts proposed in the framework in this research. 'IS-A' link notation describes the taxonomy relation to define super class-subclass relationships of classes, while 'has' and 'relate' link notation refers to a relation across the taxonomy trees. Also, it connects the relationship between work list and work management detail by adding subclasses and properties of concepts. In addition, to keep the displayed image compact, the researchers only display some subclasses. The ontology presented in this paper is mainly used as a guide to database design and reports, as well as to user interface design.

#### 2.2.1. Work list and work management detail

The researchers have constructed a knowledge segment in the self-assessment support system according to the new normal tourism standards by pulling out the work of national parks from the knowledge base. To create objective assessment criteria defined with the concept, the researchers defined work list (WL), work management detail (WMD), and their relationships, where WL is a list of tasks to be performed in the new normal tourism standards which are taken from the criteria specified in the GNP and NNNP standards. Each WL contains the associated GWL and NWL where the first letter G stands for Green National Park. Just as the letter N stands for New Normal National Park, GWL and NWL are also associated with WMD, which details the main issues related to Management and Activities that are analyzed by the experts according to the required standards. Each GWL and NWL is associated with one or more WMDs, which encourages users to review performance related to each GWL and NWL as well as provide recommendations for improving the quality of national park management in each list. In this study, 91 GWL and 8 NWL are assigned to 22 WL, and more than 188 WMD are identified. In addition, the researchers defined mapping rules between each GWL and NWL and WMD over 760 relationships. The example of relationship is also described in Table 1.

From Table 1, it is found that GWL3.1 "having a procedure of waste reduction using 3Rs principle" is not only related to WMD1.2 "policy / measures / guidelines / plan management" but also related to WMD1.3.1.1 "Waste Reduce Management", WMD1.3.1.2 "Waste Reuse Management", WMD1.3.1.3 "Waste Recycle Management" and WMD2.4 "Persons in charge assignment". GWL3.4 "Having reports on the amount of monthly waste used for recycling" relates to WMD1.3.1.3 "Waste recycle management", WMD2.8.3 "Carry waste to recycle" and WMD2.13.4.2 "Recycling Report".



Furthermore, Table 1 shows the complexity of the relationship between GWL3.2. There may be more than one form of association with WMD (row) in the OR conditional format. If a national park operates on either of the patterns, it is deemed to have fulfilled the predetermined conditions. Here are some examples of GWL3.2:

- GWL3.2 relates to WMD1.3.1.1 “Waste reduce management”, WMD2.6.2 “To education”, WMD2.6.3 “To invite participation” and WMD2.6.4 “To publicize” or;
- GWL3.2 relates to WMD1.3.1.2 “Waste reuse management”, WMD2.6.2 “To education”, WMD2.6.3. “To invite participation” and WMD2.6.4 “To publicize”, etc.

The GWL and NWL, WMD and mapping rules are stored in a separate sheet as shown in Table 1 and automatically imported into the system's knowledge base, which is used as a decision-making table in the system in research studies. Stored outside the system, further knowledge can be updated from the experts in that knowledge domain separately from the program.

The framework is designed for self-assessment. Thus, the data to be assessed are provided by the responsive officials of a national park. The rules for assessment are designed according to the criteria given in the Manual of Green National Park assessment and the manual of New Normal National Park Standards. The rules are written in a form of IF-THEN constructing as follows:

IF [condition(s)], THEN [statement(s)]

The IF-part is called the body of a rule, while the THEN-part is called its head. The ontological rules are designed to match the facts given by users and formalized with the designed ontology schema. Once the given facts are matched to all conditions declared in the body of a rule, the heads of rule will be derived as a new fact or a conclusion of the given facts.

Rules for assessment are based on the matrix table between WL and WMD. Thus, the rules are designed accordingly. Examples of GWL and NWL rules are given in Table 2. The results of self-assessment are finalized for both GWL and NWL and return to the user. The results are given separately based on aspects so users can see what aspects pass and fail clearly.

### 2.3. Green national park and new normal national park score calculation

It is part of the assessment module, calculated according to the mapping rule between WL and WMD, and calculated as the scores of each GWL and NWL from the formula. After that, the GWL and NWL scores are processed into the scores of WL. To make it easy to understand, the researchers have set reference codes accordingly. For example, GWL1.1 has a score reference code 1.1, where the first 1 is the reference code of the 1st WL in the GNP standard, and NWL can be considered in the same format as GWL1.1. GWL, but references the NNNP measure instead. The GWL and NWL scores will be calculated as the complete score of WL refer to (2), for example the score of GWL1.1, GWL1.2, GWL1.3 and GWL1.4 will be calculated as the complete score of WL1. In addition, the researchers calculated scores of group key activities assigned to WL grouped according to the experts' recommendations, such as environmental management, divided into electric power management (WL2), waste management (consisting of WL3, WL4), WL5 and WL6) and water management (WL7). For this type of grouping, the researchers calculated scores from (4). The results obtained would benefit the national parks in order to improve their management in the areas where performance has not yet met the established standards. In addition to group score calculations, WL scores are calculated and the overall national park self-assessment results are based on the New Normal Tourism Standards: NNTS, as shown in (1). Calculate the assessment score according to the GNP standards [9] in (1).

$$NNTS = \frac{\sum_{i=1}^n WL_i \times 100}{n} \quad (1)$$

Where NNTS is a score that reflects the environmental management results according to the new normal tourism standards of the national park as a whole, and WL is the score for work to be performed in the national parks new normal tourism standards  $i$ ,  $i$  1 to  $n$ ,  $n$  is the total number of work to be performed. After that, the NNTS score obtained (expressed in percentage) will be processed in order to categorize the results into 4 levels: Gold, Silver, Copper and Not pass, according to the conditions. Where a score of 0-60% is Not Pass meaning that the national park has not passed the specified criteria. A score of 61–70% is Copper, meaning the national park has passed the rating criteria for copper. A score of 71–80% is Silver, meaning the national park has passed the silver level assessment criteria, and a score of more than 80% or more is Gold meaning that the national park has passed the assessment criteria at the gold level. Calculate the score of each WL in the GNP standards [20] in (2):

$$WL_i = \frac{\sum_{j=1}^m GWL_{ij}}{m_i} \times 100 \tag{2}$$

where  $WL_i$  is the sum of the  $i$ -score required to operate in the national park new normal tourism benchmark (values from 0 to 4 points),  $GWL_{ij}$  is the score for environmental activity  $j$  that national parks must undertake under task  $i$  (see formula 3), whereas  $m_i$  is the total number of environmental activities that a national park must undertake under task  $i$ . Subsequently, the total  $WL$  scores obtained (expressed in percentage) are processed in order to classify the performance of item  $i$  in 3 levels: 0–60% i.e. Red/Failed, 61–80% is Light Green/Passed and more than 80% is Dark Green/Excellent. Calculate the score of Each  $GWL$  in the  $WL$  under the GNP standard [26] in (3):

$$GWL_{ij} = \prod_{k=1}^{n_{ij}} WMD_{ijk} \tag{3}$$

where  $GWL_{ij}$  is the score of  $j$  environmental activity to be undertaken by a national park under task  $i$  (equal to 0 or 1),  $WMD_{ijk}$  is a subcomponent in part  $k$  detailing the main points related to Management and Activities analyzed by the experts and is related to the environmental activity  $j$  under task  $i$ .  $WMD_{ijk}$  will be equal to 1 if evidence of park operation is found and is equal to 0 if no evidence of park operation is found, and  $n_{ij}$  is the number of all sub-elements associated with the  $j$  environmental activity under the  $i$  task. Thereafter, the total scores of environmental activity  $j$  under task  $i$  are processed into two levels:  $n_{ij}$  equal to Green/Passed and is not equal to  $n_{ij}$  is Red/Failed. Calculate core activity scores based on organized groups based on the NNTS standards in (4).

$$GWL_i = \frac{\sum_{i \in A_l} WL_i \times 100}{|A_l|} \tag{4}$$

Where  $GWL_i$  is the park performance score covering group  $l$  main activity obtained as a sum of all scores corresponding to group  $l$  main activity (expressed in percentage),  $A_l$  is the set of all work items corresponding to group  $l$  and is the total number of work items corresponding to group activity  $l$ . The results of the scores are graphed.

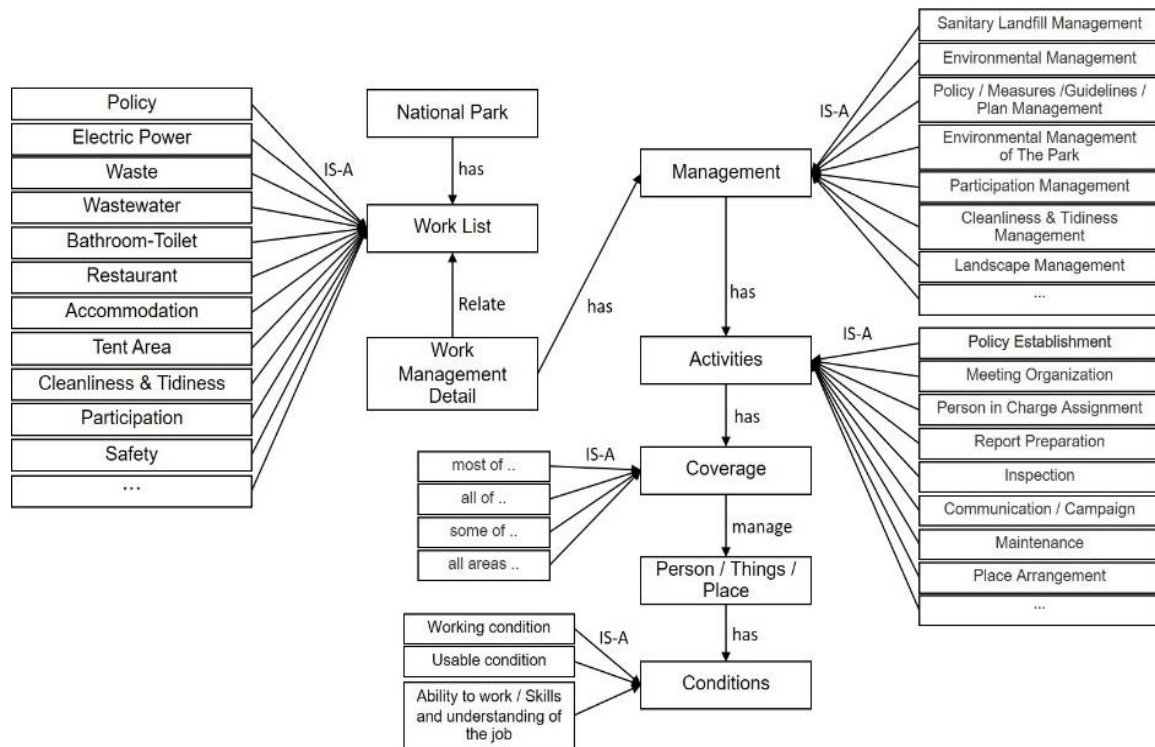


Figure 2. Domain ontology of new normal tourism standards



### 3. RESULTS AND DISCUSSION

#### 3.1. Results of the self-assessment support system based on the new normal tourism standards

##### 3.1.1. User data import and report output

The self-assessment support system based on the new normal tourism standards developed by the researchers is designed to make it easy for all users that they can simply access the service at <https://app-archae.su.ac.th/nationparkevaluation/Login.aspx>. On first use, users must be logged into the system before they can begin their self-assessment, and the users can repeat the self-assessment more than once by working through a program interface that allows the users of the national parks to add information with an easy-to-use checklist. From Figure 3, Part 1 is the main tasks that must be implemented in the national parks based on the new normal tourism standards according to the criteria specified in the GNP and NNNP standards. Part 2 is a WL, or task list based on the main tasks that need to be assessed as GWL or NWL. Finally, Part 3, WMD, describes the tasks that national parks must perform, drawn from the objective-based knowledge base set forth with the concept developed.

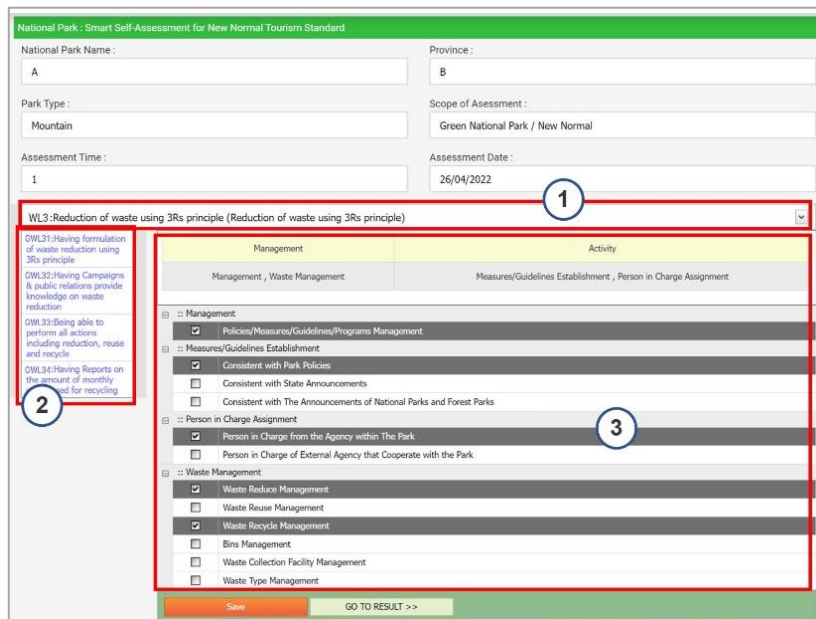


Figure 3. Users interface that allows adding information for self-assessment

The assessment results are shown in the form of tables and graphics as shown in Figure 4, based on the new normal tourism standards. In this regard, the assessment results consist of Part 1 GWL, NWL level, which the system will process and report the performance into 2 formats: Fail meaning not completing the main activities (Red bar) and Pass meaning having complete the main activity (Green bar). Part 2, WL Level, the system will process and report the performance into 3 formats (Refer to formula 2): Fail meaning not pass (Red bar), Pass meaning pass at an acceptable level (Light green bar) and Very Good meaning pass excellently (Dark green bar). Part 3, NNTS Level, the system will show results in this Section in 4 formats: Not Pass, Copper, Silver and Gold (Refer to (1)). Part 4 presents two types of graphs: a pie graph (See overview tab), which is the national park performance covering the main activities and a bar graph (See list tab), which is a self-assessment based on WL scores. Finally, Part 5 is of the system that provides advice to national parks. It clearly outlines the activities the park has to do, categorizing as what the national parks have already done and recommendations for improving work to meet the required standards.

##### 3.1.2. Preliminary system performance testing

To ensure that the developed system is useful and functional, the researchers have tested the efficiency of the system, using a list of tasks at WL2, WL3, WL4, WL5, WL6, WL7 based on new normal tourism standards in order to test the difference between the scores obtained from the self-assessment experiments of system users and the baseline scores by the experts (Environmental and occupational health scholars). From the information that the users added to the system according to (5) is as shown in:



$$\%Score_{different} = \frac{|Score_{self-Assess} - Score_{base}|}{Score_{base}} \times 100 \tag{5}$$

Where %Score<sub>different</sub> is percentage difference of scores obtained, Score<sub>self-Assess</sub> is the user's self-assessment score through the system, and Score<sub>base</sub> is the base score.

The researchers tested the system by a group of users selected using the Purposive Sampling method, adding the self-assessment data into the system in the experiment process via the website of the Smart Self-Assessment for New Normal Tourism Standards (<https://app-archae.su.ac.th/nationparkevaluation/Login.aspx>). After that, the researchers calculated the scores obtained from the system with the baseline scores (5). The test results for the percentage difference of scores are shown in Table 3.

From Table 3, the percentage difference of self-assessment scores is found between 0.0 – 9.5. The scores obtained by the user self-assessment system are greater than the baseline score. The investigation reveals that the work items at WL5 have a difference in the occupational health items. Based on the experts' opinion, there should be more details than what is available in the system developed by the researchers by adding the details of work related to occupational health. Likewise, the list of tasks of WL6, the job description of sanitary disposal of waste should be added. In addition, although the assessment scores obtained from the research system does not differ from the baseline scores, the researchers are further advised for the list of tasks at WL3, by adding the details of document arrangement used in the national parks, such as reports on the amount of recycled waste collected, etc. The researchers, therefore, improved the work list in the knowledge base within the system developed with the advice of experts. The researchers then reinstated the system for users to test the revised list again and used the results to calculate the percentage difference between the scores of the self-assessment and those of experts'. As a result, the percentage difference in scores is 0.0 for all items.

The researchers also tested the system's performance by the experts in various fields including computer and information technology experts, measurement and evaluation Researchers, security officers at work and certified environmental and occupational health academics using the Black Box Testing method. The performance test uses a 5-level system performance evaluation form (1 = the system is least efficient to 5 = the system is the most efficient) by dividing the questions into 6 areas: Function Requirement Test, Function Test, Content Test, Usability Test, Security Test, and Performance Test. The researchers analyzed the data with Mean and Standard Deviation statistics. Interpretation of the five-point average scores of the Likert Scale are 0.00 – 1.49 meaning least effective, 1.50 – 2.49 meaning low efficiency, 2.50 – 3.49 meaning moderate efficiency, 3.50 – 4.49 meaning very effective and 4.50 – 5.00 indicating the most efficient. In relation to the system performance test results by the experts with the smart self-assessment form for new normal tourism standards, it shows that the overall level is at a high level ( $\bar{X} = 4.47$ , S.D. = 0.54) as shown in Table 4.



Figure 4. Tables and graphs of self-assessment report results obtained from the system

Table 3. Results of the self-assessment scores for the percentage difference of self-assessment

Assessor	Method	Rating									
		1	2	3	4	5	6	7	8	9	10
Sample group	Developed work system	24	17	24	22	15	18	16	19	20	15
Experts	Manual	22	17	22	20	15	17	16	18	19	15
	%Score <sub>different</sub>	8.7	0.0	8.7	9.5	0.0	5.7	0.0	0.0	5.1	0.0

Table 4. Results of system performance evaluated by the experts

Assessment items	$\bar{X}$	S.D.	Interpretation
Usability Test	4.70	0.48	Highest
Performance Test	4.70	0.50	Highest
Content Test	4.50	0.55	High
Function Requirement Test	4.38	0.56	High
Function Test	4.27	0.56	High
Security Test	4.24	0.57	High
Total average	4.47	0.54	High

The system test results reflecting the percentage difference between the user self-assessment scores through the developed system and the baseline scores are first found at the range of 0.0 – 9.5. Then, based on the experts' advice, the researchers have updated the task list in the knowledge base and brought the system back to the users to test on the works lists that have again. It is found that the percentage difference of scores is equal to 0.0 for all work items. In conclusion, the system developed from this research can help support users to make an accurate self-assessment based on the new normal tourism standards. The results of system performance testing by the experts indicate that overall, the system is efficient, functional and very useful ( $\bar{X} = 4.47$ , S.D. = 0.54). It is evident that the new self-assessment based on the new normal standard developed for the national parks for them to get prepared for the post-Covid 19 tourism is more applicable for them. AHP-Delphi approach [16] which is a paper-based checklist provides less detail which the new tool developed from the present study is more applicable since the existing epidemic is an urgent measure for business operators.

#### 4. CONCLUSION





This paper presents a framework of self-assessment system to assist the national parks to comply with Green National Park and New Normal Standards. The green nation park is a standard towards the concepts of becoming environment-friendly in internal management and providing tourist services of the national parks, while the new normal stands is a measure against the Covid-19 pandemic. The concepts related to criteria for standards are extracted and composed into an ontology knowledge representation. Since the guidance given in the standards can be vague and ambiguous, the ontology representation helps to conceptualize the necessary features given in the evaluation criteria. Thus, the concepts can map the features of activities and management plans of the national parks into a checklist. By expressing in the conceptual structure, the confusion from 'and' and 'or' in criteria is clarified. Furthermore, the ontology schema helps to simplify the checklist into easier version with simple question types such as True-False question, Number question, and Choice question instead of open-ended question, so a user can realize on what to look for and answer the questions more accurately. The result of the framework does not only provide the assessment result, but also the recommendation to improve the assessment score from gap analysis. The test results reveal that the percentage difference of self-assessment scores compared with baseline assessment scores is 0.0 for all items after adding details to some task items based on the experts' opinion, while performance testing viewed by the experts indicates that the developed system is applicable with high efficiency ( $\bar{X} = 4.47$ , S.D. = 0.54). Thus, this framework is expected to sustainably increase the number of the certified national parks regarding going green and new normal measure against Covid-19.

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