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ส่วนประกอบของบทความ (In general)

- Title
- Abstract
- Introduction
- Literature review
- Problem definition (if so)
- Method
- Result
- Conclusion and discussion.

HOW TO NAME ARTICLE'S TITLE

- Short
- Represent whole article
- Interesting
- Generally should compose of 2 parts : problem, method
- Can be main contribution focus or
- Research question

EXAMPLE

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Marcin Michał Mirończuk | Jarosław Protasiewicz

Improving sentiment analysis via sentence type classification using BiLSTM-CRF and CNN

Tao Chen | Ruifeng Xu | ...

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Samira Karimzadeh | Sigurdur Olafsson

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Knowledge-Based Systems, Volume 163, 1 January 2019, Pages 241-251

Tanmoy Chakraborty, Saptarshi Ghosh, Noseong Park

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Evaluation and Program Planning, Volume 73, April 2019, Pages 111-115

Roxann McNeish, Khary K. Rigg, Quynh Tran, Sharon Hodges

ABSTRACT

- Problem definition
- Research method
- Result

A B S T R A C T

This paper presents the ALNS metaheuristics, employing the idea of DE to solve the mechanical harvester assignment and routing problem with time windows (HARPTW) to maximize the total area serviced by a mechanical harvester under a sharing infield resource system. The effective ALNS is designed to solve large-scale problems integrating the mechanical harvester assignment problem (HAP) and the mechanical harvester routing problem (HRP). The newly developed destroy and repair methods are unique and effective. Additionally, four new formulas have been developed to calculate the probability to accept the worse solution using linear and parabola functions instead of the exponential function that is used mostly in the literature. The numerical results show that the parabola function, which uses the information about the solution quality, outperforms all other proposed heuristics. This demonstrates that the proposed heuristics are very efficient and are not only useful for reducing the infield operations costs of small growers, but also for efficient management of the inbound logistics equipment and machinery of the sugarcane supply system.

Problem

Method

Result

Abstract: The power fluctuations of grid-connected photovoltaic (PV) systems have negative impacts on the power quality and stability of the utility grid. In this study, the combinations of a battery/supercapacitor hybrid energy storage system (HESS) and the PV power curtailment are used to smooth PV power fluctuations. A PV power curtailment algorithm is developed to limit PV power when power fluctuation exceeds the power capacity of the HESS. A multi-objective optimization model is established to dispatch the HESS power, considering energy losses and the state of charge (SOC) of the supercapacitor. To prevent the SOCs of the HESS from approaching their lower limits, a SOC correction strategy is proposed to correct the SOCs of the HESS. Moreover, this paper also investigates the performances (such as the smoothing effects, losses and lifetime of energy storage, and system net profits) of two different smoothing strategies, including the method of using the HESS and the proposed strategy. Finally, numerous simulations are carried out based on data obtained from a 750 kWp PV plant. Simulation results indicate that the proposed method is more economical and can effectively smooth power fluctuations compared with the method of using the HESS.

Problem

Method

Result

Keywords: photovoltaic (PV); power fluctuation; hybrid energy storage system; power curtailment

Problem

Method

Result

Abstract

In this paper, we present an ant-based algorithm for solving unconstrained multi-level lot-sizing problems called ant system for multi-level lot-sizing algorithm (ASMLLS). We apply a hybrid approach where we use ant colony optimization in order to find a good lot-sizing sequence, i.e. a sequence of the different items in the product structure in which we apply a modified Wagner–Whitin algorithm for each item separately. Based on the setup costs each ant generates a sequence of items. Afterwards a simple single-stage lot-sizing rule is applied with modified setup costs. This modification of the setup costs depends on the position of the item in the lot-sizing sequence, on the items which have been lot-sized before, and on two further parameters, which are tried to be improved by a systematic search. For small-sized problems ASMLLS is among the best algorithms, but for most medium- and large-sized problems it outperforms all other approaches regarding solution quality as well as computational time.

Keywords: Ant colony optimization; Multi-level lot-sizing; Wagner–Whitin algorithm; Material requirements planning

INTRO

- How the article relate to the journal
- How important of the problem (Motivation)
- How the problem impact to the real world (Motivation)
- Research question
- What is the contribution of the article
- Paper structure

Motivation, research questions

1. Introduction

Sugarcane is an important crop for Thailand's economy. Presently, the Thai sugar industry is faced with difficulties of increasing production costs. They are thus searching for solutions to improve the profitability for both sugarcane growers and the sugar mill industry. In Thailand, the cost of sugarcane harvesting and transportation comprises a large portion of the Thai sugarcane total production cost, with the average cost of harvesting accounting for 66% of the total labor cost, or equivalent to 35% of the total cost. The average cost for sugarcane transportation was 2.79 US$/ton in 2003 (Office of Agricultural Economics, 2003). Nearly half of the total cost is devoted to harvesting and transportation.

Presently, infield machinery use, particularly in harvesting operations, has increased, since labor wages have risen greatly, and less labor is available for manual infield work (Neungmatcha and Sethanan, 2015). In many parts of the world where sugarcane production is steadily increasing, the harvesting mode has switched from manual harvesting to the use of mechanical harvesters (Salassi and Champagne, 1998). This is likely to be the most crucial factor in reducing future sugarcane production costs (Ahmed and Alam-Eldin, 2015), since it can complete the harvest faster with more sugarcane harvested per unit of time than manual harvesting and loading. However, a mechanical harvester is very expensive. The fuel costs have risen significantly faster, over the past many years, than the growth in the sugarcane price paid to growers for sugarcane delivered to the mill (Sethanan and Neungmatcha, 2016).

Most sugarcane growers in Thailand (approximately 80%) are small-scale growers. Since most of them do not normally possess mechanical harvesters, at present these growers rent a mechanical harvester from outside people who own mechanical harvesters. However, the outside people are not under contract to the mill, which usually leads to paying unfair hiring costs, in cash, for harvesting, loading and transporting by the small growers, resulting in high debts for the small-scale growers.

These special problems prevailing in this industry relate to its having limited resources and intense competition. As a result of resource constraints, the operating costs have increased greatly, especially for the inbound logistics process that involves planting, harvesting, and transportation, all of which need cost reduction. In practice, the small-scale growers are not able to manage all procedures effectively, because of their lack of bargaining power and inadequate resources, which may eventually force them to give up growing sugarcane or to shift to other economic crops. The Office of Agricultural

Thus, this research considers the allocation and routing of the available mechanical harvesters to service the needs of small-scale growers. In the mechanical harvester allocation problem (HAP), it is decided when and where each mechanical harvester should be assigned to which sugarcane fields, while in the mechanical harvester routing problem (HRP), the route of each mechanical harvester is decided. A key input to the HAP is the total time available for each mechanical harvester, and also the total number of mechanical harvesters available in each time period. These inputs depend on the harvest schedule assigned to sugarcane fields for the previous periods, a decision that belongs to the HRP. Thus, the two problems are closely connected, and it is therefore likely that higher quality solutions can be obtained by solving a model integrating the two problems. Since each sugarcane field should be harvested differently at each time period, due to its commercial cane sugar (CCS) value, a harvesting scheduling at a proper time is required to increase CCS yields. In this paper, we consider the mechanical harvester assignment and routing problem with time windows (HARPTW) to maximize the total areas serviced by the mechanical harvesters under a resource sharing system.

contribution

However, there are no publications on the HARPTW, and there is to date no research that has applied Adaptive Large Neighborhood Search algorithms (ALNS) to solve the HARPTW. The ALNS was proposed by Ropke and Pisinger (2006). It extends the LNS by allowing repair operators and multiple destroy to be used within the same search. A destroy operator is chosen at each iteration, on the basis of choosing probabilities which are adjusted dynamically during the search process, according to the performance obtained by the operators in the previous iterations (Mancini, 2016). Recently, the ALNS has been applied in

quality. In our research, the destroy method has been made iteratively in the incomplete solution, such as destroy the list of customers in the VRP problem that has not yet been routed, then the repair method has been applied. For the repair method, a good constructive algorithm is hidden inside it to get a good solution. The final solution will be more flexible, since the destroy and repair methods have been executed only in the complete solution.

The remainder of this paper is organized as follows. In Section 2, a brief literature review of the HARPTW problem and its variants is presented. In Section 3, the mathematical model is developed. In Section 4, the ALNS for the HARPTW problem is presented. Computational results are discussed in Section 5. Finally, the conclusion and the future research direction are presented in the last section.

2. Literature review

Recently, the feedstock supply to sugar mills has received significant attention in the academic literature. Most work on the sugarcane industry has been divided into value chain optimization, harvest scheduling and transportation (Lamsal, 2014; Sethanan and Neungmatcha, 2016). However, most work on the sugarcane industry relating to sugarcane mechanical harvesters has been done in the last 10 years on mechanical harvester scheduling. The route planning of a sugarcane mechanical harvester in the sugarcane supply system has been studied to manage the supply system for the mill to ensure continuous feed and low operational costs, such as in the research study of Jiao et al. (2005), Higgins (2006), Díaz and Pérez (2002), Le Gal et al. (2009) and Sethanan and Neungmatcha (2016). Yet, to the best of our knowledge,

GOOD REVIEW

- เริ่มต้นจาก Most related article แล้ว discuss ในประเด็นต่างๆ ให้น่าสนใจ
- แล้วค่อย ๆ เพิ่ม other related articles >>> end up with contribution ที่บทความนี้มีมากกว่า หรือเพิ่มเติมจากการ review
- Most related articles, relate article, other important article >>>> contribution

2. Literature review

Most related articles

Recently, the feedstock supply to sugar mills has received significant attention in the academic literature. Most work on the sugarcane industry has been divided into value chain optimization, harvest scheduling and transportation (Lamsal, 2014; Sethanan and Neungmatcha, 2016). However, most work on the sugarcane industry relating to sugarcane mechanical harvesters has been done in the last 10 years on mechanical harvester scheduling. The route planning of a sugarcane mechanical harvester in the sugarcane supply system has been studied to manage the supply system for the mill to ensure continuous feed and low operational costs, such as in the research study of Jiao et al. (2005), Higgins (2006), [illegible] and Pérez (2012), Le Gal et al. (2009) and Sethanan and Neungmatcha (2016). Yet, to the best of our knowledge, none of the literature addresses the integration of assignment and scheduling of sugarcane mechanical harvesters to the sugarcane fields, under the limitations of the mechanical harvester availability and the CCS value of sugarcane fields.

Other related articles

Harvesting scheduling is an interesting topic in the optimization batching problem. The ALNS/TS shows significant advantages on the larger instances of the existing benchmark sets, and can solve the newly generated large-scale instances. Qu and Bard (2012) developed a greedy randomized adaptive search procedure (GRASP) for pickup and delivery problems with transshipment. In this paper, adaptation of various insertion and removal algorithms was specialized to accommodate transshipments.

Contribution

Review of past research shows that despite the importance of the integration of assignment and scheduling of mechanical sugarcane harvesters to the sugarcane fields under the limitations of the mechanical harvester availability and the CCS value of sugarcane fields, this aspect of the problem has remained neglected. Therefore, this paper contributes to the literature by developing the mathematical model for the HARPTW for small scale problems. Considering the NP-Hardness of the problem, an effective ALNS that employs the idea of Differential Evolution (DE) is designed to solve large-scale problems. Over the last decade, DE, first introduced by Storn and Price (1997), has been one of the best evolutionary algorithms, and is used extensively in various fields, since its features make it very attractive for numerical optimization (Dechampai et al., 2017).

HINT

- ต้องอ้างถึงบทความสำคัญ ๆ ที่เกี่ยวข้องกับงานเรา เรียงตามลำดับมากที่สุดไปน้อยที่สุด การเขียนต้องอ้างถึงให้มากที่สุด บทความที่ดี ควรอ่านหรือมี reference ถึง paper อื่น ๆ ไม่ต่ำกว่า 20-30 บทความ
- การเขียน review เป็นโอกาสที่ดีที่เราจะได้อ้างถึงบทความที่อยู่ใน journal ที่เราจะส่ง (เพิ่ม impact factor ให้ journal ซึ่ง editor ชอบ)
- Paper ที่อ้างอิงไม่ครบ สุดท้ายก็ต้องทำอยู่ดี
- บางครั้ง intro กับ review รวมกัน หากแยกกัน review บางตัวอาจไปอยู่ใน intro ได้ครับ

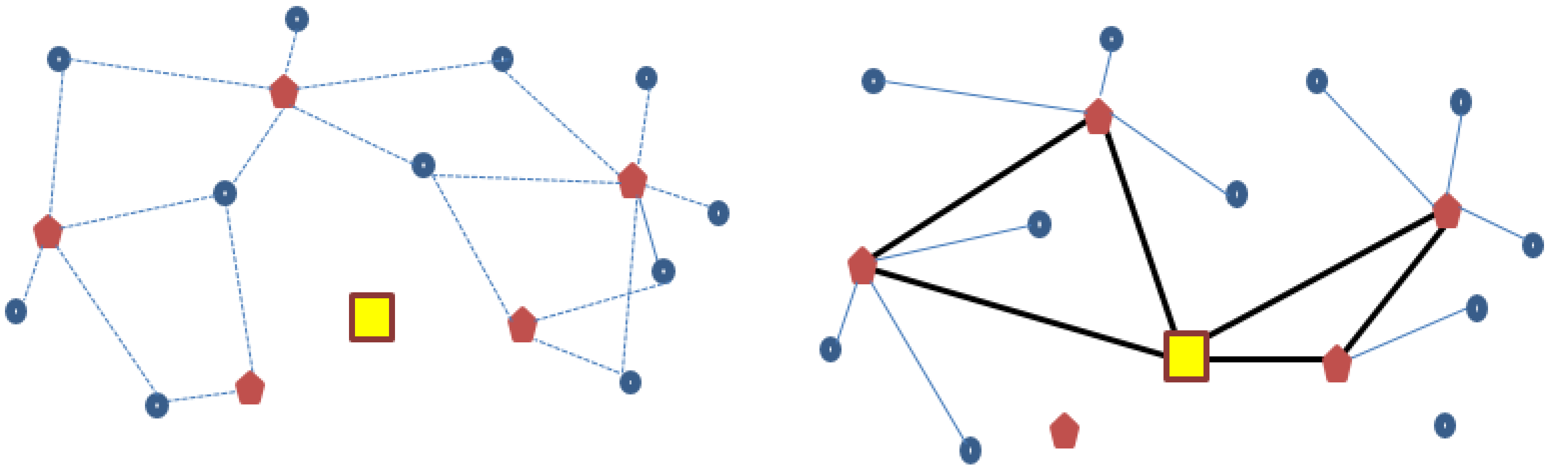
METHODOLOGY :

- Has to be brand new method??
- Modified ….
- Improved ….
- ได้หมด

HOW TO WRITE METHOD

- อธิบายเป็นขั้นตอน
- มีรูปประกอบ หรือตัวอย่างประกอบตามสำควร
- จัดเรียงความคิดให้นึกถึงใจคนอ่านว่าเขียนอย่างไรให้เข้าใจง่าย
- ส่วนประกอบของ method
- (1) ขั้นตอนการดำเนินการทุกขั้นตอน (2)ตัวอย่างประกอบ (เฉพาะวิธีการที่เราคิดขึ้นมาเอง)

PROBLEM DEFINITION



(a) Unsolved problem

(b) A possible solution of the problem

Pseudo code

Pseudocode for maximization of the harvest area under a sharing mechanical harvester system

Input : V_t

For t=1 : T

Randomly generate an initial solution V_t update $V_t^* = V_t$ and $f(V_t^*) = f(V_t)$

If number of iterations/solution quality less than predefined number

then do

Generate candidate solution V_t' by

Randomly select the destroy method

- Select Destroy Method (select the destroy method using probability)
- Perform the selected destroy method.

Randomly select the repair method

- Select Repair Method
- Perform the selected repair method.

Update V_t by

$$V_t = \begin{cases} V_t' & if\ f(V_t') \geq f(V_t) \\ V_t'\ or\ V_t\ with\ prob\ 1-5\ if\ f(V_t') \leq f(V_t) \end{cases}$$

Update $f(V_t^*)\ if\ f(V_t') \geq f(V_t)$

Else end the algorithm

Output : V_t

Fig. 2. General Procedure of ALNS.

Framework

Solution 1			Solution 2			Solution 3		
Harvester 1	Harvester 2	Harvester 3	Harvester 1	Harvester 2	Harvester 3	Harvester 1	Harvester 2	Harvester 3
F1	F2	F8	F3	F4	F1	F8	F4	F5
F6	F5	F9	F2	F6	F9	F9	F1	F7
		F10	F10				F3	
760 rai			939 rai			849 rai		

V=V2

Solution		
Harvester 1	Harvester 2	Harvester 3
F3	F4	F1
F2	F6	F9
F10		
939 rai		

Note: $F_1, F_2, \ldots, F_9$ = Sugarcane Fields, $\mathbf{1\ rai = 0.16\ Hectare}$, V = Solution

Fig. 3. Examples of 3 randomly constructed solutions (V1, V2, and V3).

Example

The selected Destroy and Repair methods in a particular iteration are allowed to add a new score into their current scores. The new score is assigned using the following rules.

(1) Add 10 scores when the new best solution is found in that iteration.
(2) Add 8 scores when the solution found in that iteration is better than the accepted solution in the previous iteration.
(3) Add 6 scores when the solution found in that iteration is worse than that of the accepted solution in the previous iteration, but it is accepted as the next current solution using Formulas 1–5.
(4) Add 4 scores when the solution found is not accepted by Formulas 1–5.

Then the current score is updated and Roulette wheel selection is used to pick one of the Destroy and Repair methods. For example, if the current score of the Destroy methods 1–8 is 221, 432, 123, 451, 324, 225, 254 and 310, the total score for all methods is 2140. We use the total score to find the probability of selecting each Destroy method by use (score of each Destroy method)/(total score) and the result is 0.09, 0.18, 0.05, 0.19, 0.14, 0.10, 0.11 and 0.13. Then find the cumulative probabilities of all methods which are 0.09, 0.28, 0.33, 0.52, 0.66, 0.76, 0.87 and 1.00. Finally, a random number is generated. For example, if the random number is 0.56, then Destroy method 5 will be selected. This procedure can be applied to the Repair method as well.

flow

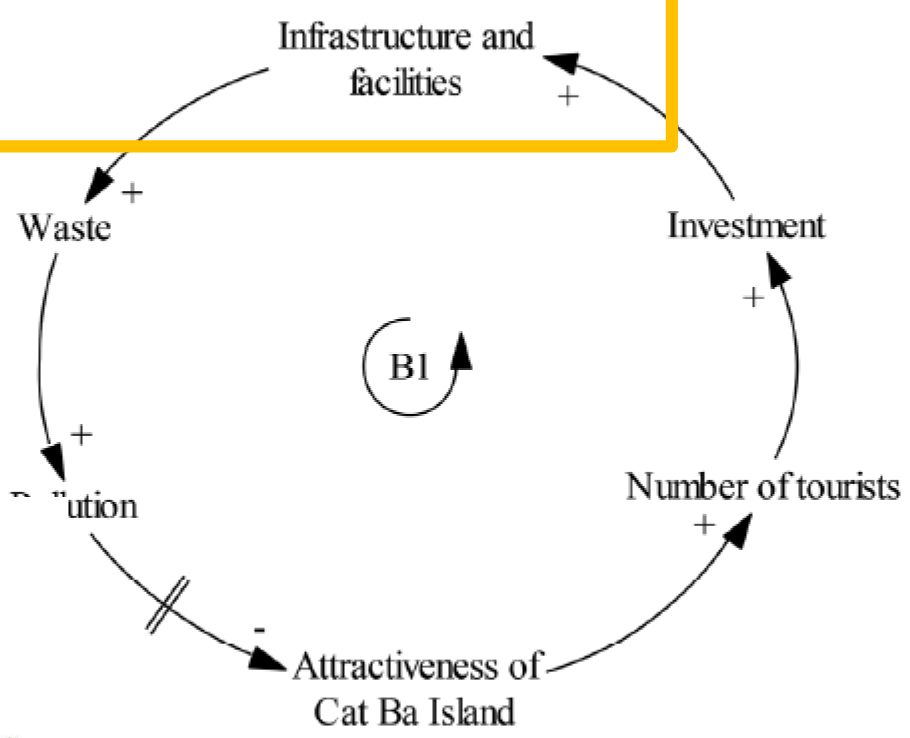
2. Research methods

There are five main steps in the system dynamic modelling process. These are problem articulation, formulating a dynamic hypothesis, formulating a simulation model, testing the model, and policy design and evaluation (Sterman, 2000). For this study, the methods used to complete the first two steps are explained in Mai and Smith (2015). Here we explain how we implemented the last three steps to develop, test and use a dynamic model of the tourism system on Cat Ba Island.

2.1. Formulating a simulation model

In Mai and Smith (2015), a causal loop diagram (CLD) was used to describe feedback loops influencing tourism system dynamics on Cat Ba Island. The limitation of CLDs is that they cannot be used to simulate

Tourism Management 68 (2018) 336–354



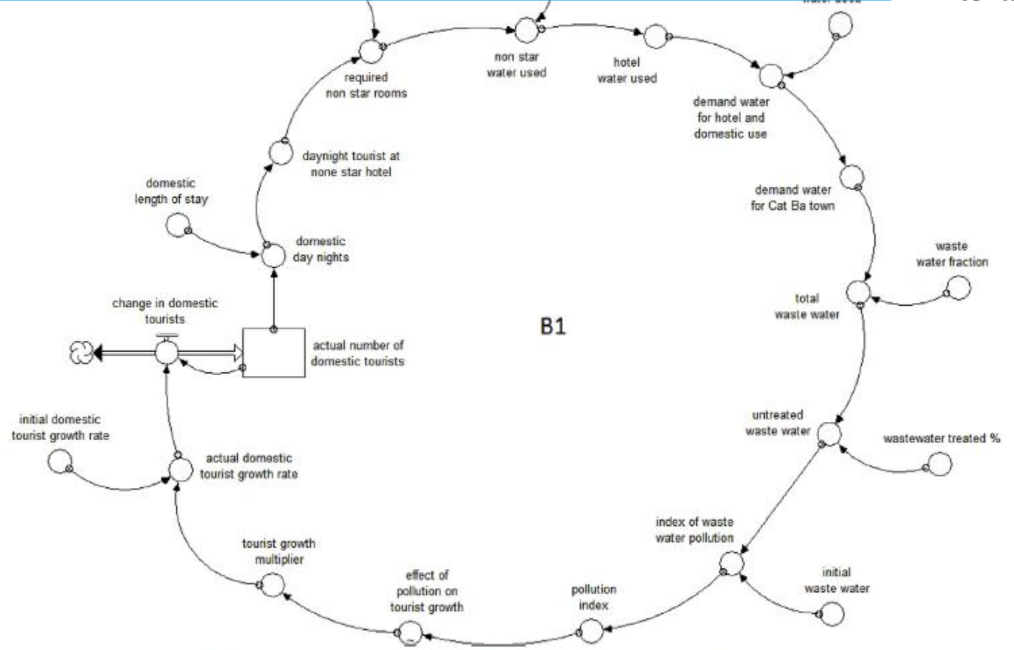


Fig. 2. The balancing loop in Fig. 1 replicated as a stock and flow model.

administrative sciences

MDPI

procedure

Article

Marketplace Location Decision Making and Tourism Route Planning

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check for updates

4. Adaptive Large Neighborhood Search Algorithm

The Adaptive Large Neighborhood Search heuristic algorithm has been used for solving s problems and for finding the optimal solution, such as the Vehicle Routing Problem and the Lo Routing Problem. In this study, the ALNS heuristic algorithm was used to solve the tourism planning problem for vehicle routing.

4.1. ALNS Algorithm

The heuristic of the ALNS algorithm comprises a destroying and a repairing method, u random weight that controls an applied method during the search process and the weight adju during the implementation of the algorithm. The probability of a certain heuristic applyin situation depends on its performance in the past. The algorithm contains six destroying metho five repairing methods. The six destroying methods and the five repairing methods are explai Sections 4.2 and 4.3, respectively. The destroying and repairing methods have weights that chara

Algorithm 1: Adaptive Large Neighborhood Search (ALNS) algorithm of tourism route planning.

1. Construct a feasible solution s;
2. s*←s;
3. Initialize weights;
4. If the stopping criterion is not met, then
   - 4.1 Select q, r ∈ R, d ∈ D according to probabilities p
   - 4.2 s′ = r(d(s))
   - 4.3 If the acceptance criterion is satisfied, then s←s′;
     If s is better than s*, then s*←s′;
   - 4.4 Adjust weights;
5. Return s*.

The ALNS algorithm for the tourism route planning problem has 5 steps as follows:

COMPUTATIONAL FRAMEWORK AND RESULT

- บอกวิธี ขอบเขตการทดลอง เพื่อหาคำตอบตามปัญหาที่เขียนไหว้ใน intro
- ผลการทดลองควรแสดงให้เห็น contribution ทุกอย่างที่เราได้
- ตอบคำถามจากผลการทดลองได้ด้วยว่า why และ how ผลการทดลองถึงดีหรือไม่ดี
- ถ้ามีการทดลองควรมี 3-5 ตารางเพื่อให้แลดูเหมือนมีงานเยอะ
- ควรเลือกจะใช้ ตาราง กราฟ อย่างใดอย่างหนึ่ง

Framework

5. Computational framework and results

5.1. Computational framework

The case study mill uses approximately 15,000 tons of sugarcane per day, with 3000 contract growers that are separated into 10 sub-regions. Currently, the sugar mill owns 80 mechanical harvesters in total. Each machine can harvest 15–25 tons per day depending on its performance, size, and capacity.

In order to test the model, the Adaptive Large Neighborhood Search (ALNS) employed the idea of DE in the mechanical harvester assignment and routing problem with time windows (HARPTW) to maximize the total area serviced by the harvesting-sharing system. It was also validated by comparing the solutions with the optimal solution obtained by Lingo v.11 for Windows software and the proposed algorithms. The performance of the proposed methods was tested using 3 groups of problem instances and one real case study. Details of generated data are shown in Table 4.

Table 4 shows that 21 problem instances were used to test the algorithm in total, which includes the real case study. The research presents 4 new acceptance of worse solution criteria and 1 popular formula, thus 5 sub-algorithms are presented as ALNS-1 (original), ALNS-

Details of test instances

Table 4

Details of data generated for every group of problem instances.

Group of data	Data name	No. of fields	Size of fields (rai)	No. of Harvesters	Total area (rai)
Small	S-1	8	5–100	3	150–600
	S-2	10		4	
	S-3	10		4	
	S-4	12		3	
	S-5	10		4	
Medium	M-1	15	10–150	7	150–600
	M-2	15		8	
	M-3	20		8	
	M-4	20		7	
	M-5	25		9	
	M-6	25		10	
	M-7	25		10	
	M-8	30		12	
Large	L-1	50	10–150	20	400–1500
	L-2	55		20	
	L-3	60		22	
	L-4	60		23	
	L-5	65		25	
	L-6	65		25	
	L-7	70		25	
Case study	C-1	321	5–200	80	120,000

Remark: 1 rai = 0.16 Ha.

Tools used

2, ALNS-3, ALNS-4, and ALNS-5 which use Formulas 1, 2, 3, 4 and 5 respectively. The algorithms have been coded in C++ and run on a computer notebook with Intel® CoreTM i5-2410 M 2.3 GHz and 4 GB memory. The stopping criteria have been set according to the problem size. For small instances, the time after which the optimal solution was found is presented, while in the medium, large and case study problems, computational time was used, which was set to be 10, 20, and 60 min respectively. The experiment has been executed 5 times and the best solution is recorded. Due to the optimal solution not being found within the acceptable computational time for the medium and large (including the case study) sized problems, the time limit of the run time in Lingo v.11 for Windows was set to be 240 h for the medium sized instances and 480 h for the large-sized instances (including the case study). The best and bound of the solutions generated are reported and compared with those that are generated by the proposed heuristics.

Result

Table 2. The result comparison of Lingo program and the ALNS algorithm.

Problem Size	No.	Parameter		Lingo Program Result			ALNS Result		Difference			
		i, j	f	Status	Total Distance (km)	Processing Time (h)	Total Distance (km)	Processing Time (h)	Total Distance (km)	Processing Time (h)	Gap in Distance Traveled (%)	Processing Time Gap (%)
Small	S-1	10	5	Global Opt	109.90	00:00:01	109.90	00:00:01	0	0	0.0	0.0
	S-2	10	5	Global Opt	164.40	00:00:01	164.40	00:00:01	0	0	0.0	0.0
	S-3	10	5	Global Opt	302.60	00:00:33	302.60	00:00:33	0	0	0.0	0.0
	S-4	10	5	Global Opt	308.73	00:00:58	308.73	00:00:58	0	0	0.0	0.0
	S-5	10	5	Global Opt	286.60	00:00:37	286.60	00:00:37	0	0	0.0	0.0
		Average			**234.45**	**00:00:24**	**234.45**	**00:00:24**	**234.45**	**0**	**0.0**	**0.0**
Medium	M-1	40	15	Feasible	898.65	40:59:27	901.50	00:05:05	−2.85	40:54:22	−0.32	99.88
	M-2	40	15	Feasible	1157.84	60:17:21	1161.01	00:05:05	−3.17	60:12:16	−0.27	99.92
	M-3	40	15	Feasible	997.78	41:49:13	1002.37	00:05:55	−4.59	41:43:46	−0.46	99.88
	M-4	40	15	Feasible	1131.47	55:56:29	1153.50	00:05:25	−22.03	55:51:02	−1.95	99.91
	M-5	40	15	Feasible	992.78	50:49:25	1018.52	00:05:45	−25.74	50:44:20	−2.59	99.90
		Average			**1035.70**	**49:45:24**	**1047.38**	**00:05:25**	**−11.68**	**49:40:28**	**−1.12**	**99.90**
Large	L-1	80	25	Lower bound	2058.56	>120	2077.58	00:14:48	−19.02	119:51:52	−0.92	99.88
	L-2	80	25	Lower bound	1938.81	>120	1987.10	00:13:46	−48.29	119:50:54	−2.49	99.89
	L-3	80	25	Lower bound	2076.52	>120	2099.13	00:15:54	−22.61	119:51:46	−1.09	99.87
	L-4	80	25	Lower bound	1965.64	>120	1973.07	00:14:51	−7.43	119:50:49	−0.38	99.88
	L-5	80	25	Lower bound	2087.31	>120	2092.70	00:15:43	−5.39	119:50:57	−0.26	99.87
		Average			**2025.37**	**120**	**2045.92**	**00:14:54**	**−20.55**	**119:50:48**	**−1.03**	**99.88**

Note: i, j are tourism attractions at position i, j and f is farm number.

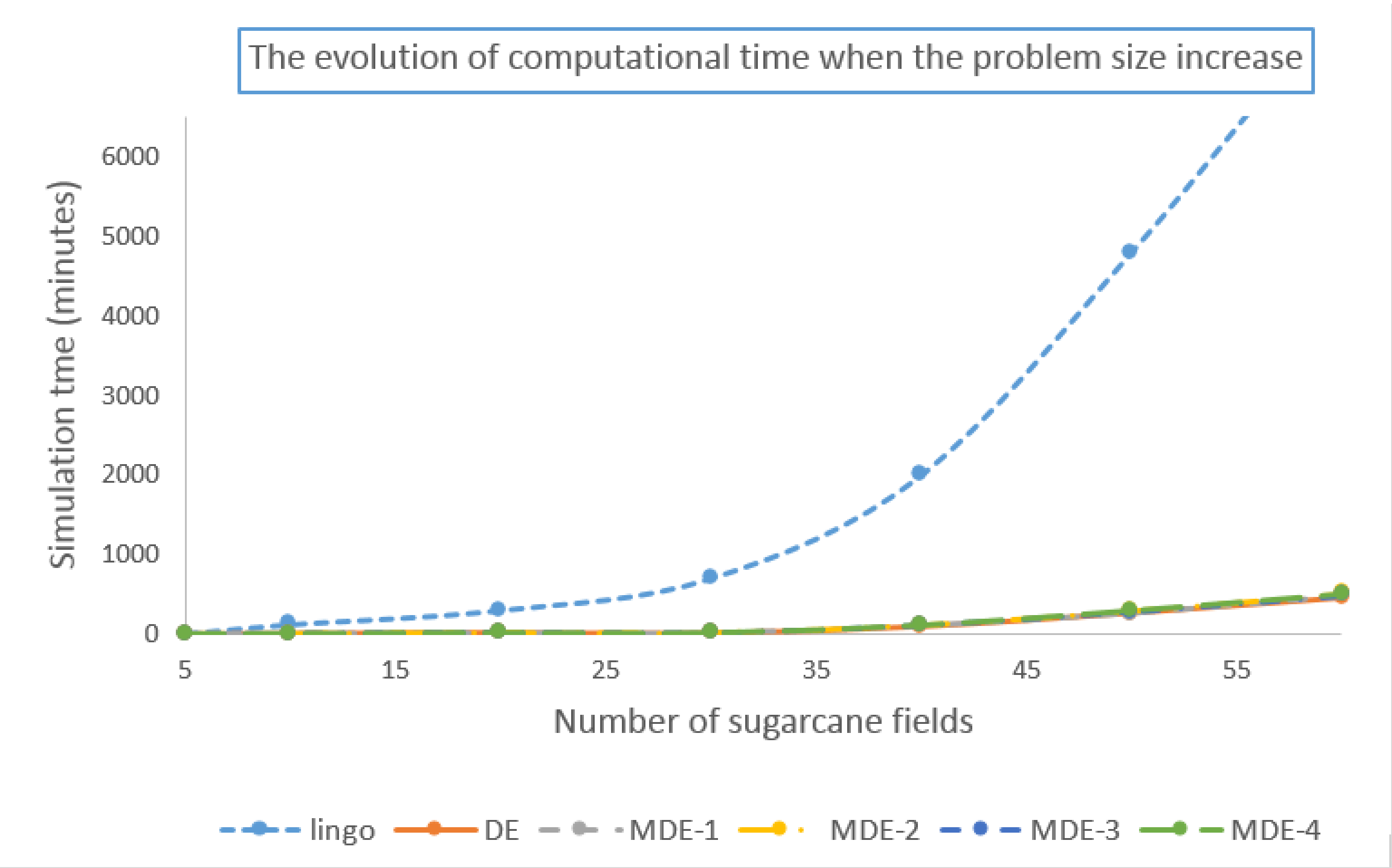

Figure 5. Evolution of computational time.

graph

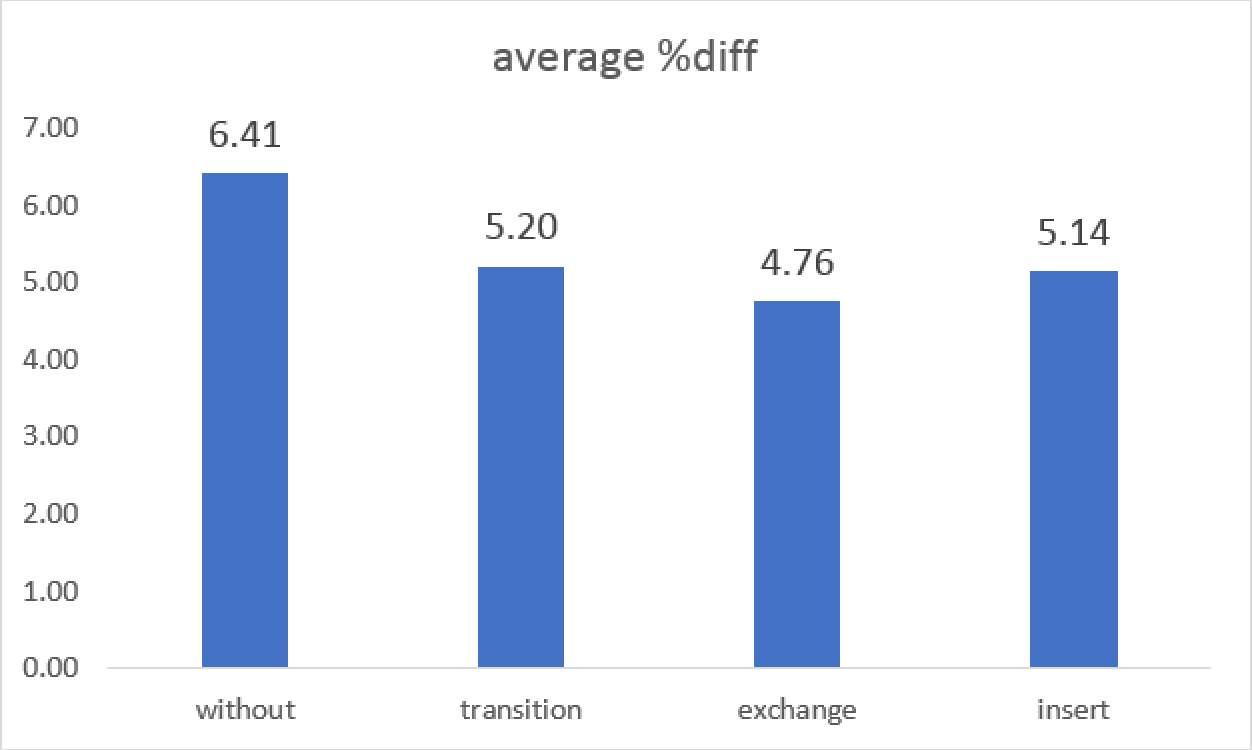

Figure 8 Average percent different of DE using different process to generate 2nd order of trial vector.

graph

CONCLUSION

- สรุปบทความ ทั้งหมด **มิใช่** สรุปผลการทดลอง
- ส่วนประกอบของ conclusion
- 1. บทความนี้ทำอะไร ทำอย่างไร (Research questions and method)
- 2.สรุปผลของการดำเนินการวิจัย (สรุปให้ครบทุก contribution ตามที่เขียนไว้ใน introduction)
- 3.discussion
- 4.future research

6. Conclusions

Research questions

In this study, we examined a tourism route design problem and attempted to determine the appropriate location for tourism facilities in Thailand. The ALNS algorithm method was used to solve the vehicle routing problem to help design an appropriate travel route and to choose the best location for tourism facilities. The traveling distance results produced by the ALNS algorithm were similar to those produced by the Lingo program for all problem sizes. However, for high numbers of tourism attractions and farms (complex problem), the ALNS algorithm required significantly less processing time than the Lingo program, effectively reducing the computation time by 99.8% for the medium problem and 99.7% for the large problem. For all problems, the total traveling distance results produced by the two methods were not significantly different. Therefore, ALNS is a suitable method for designing tourism routes, rapidly providing highly effective solutions for complex problems with a large number of attractions.

Method

Result

Case Study

A tourism route was designed using the ALNS method for a case study. To create a large and complex problem, 115 tourism attractions and 25 farms were used in this case study, as shown in Tables A1 and A2. The result of the case study is provided in Table 4.

6. Conclusions and future developments

Research questions

This research focuses on the mechanical harvester assignment and routing problem with time windows (HARPTW) to maximize the total areas serviced by a mechanical harvester under a sharing infield resources system. A mixed-integer programming model that can handle small-size problems was proposed. For large-scale problems, an effective ALNS that employs the idea of Differential Evolution (DE) is firstly designed to solve the problems integral to the mechanical harvester assignment problem (HAP) and mechanical harvester routing problem (HRP).

Method

In our research, to develop the ALNS employing the idea of DE, the destroy method has been made iterative in the incomplete solution, such as destroying the list of sugarcane fields that have not yet been scheduled, then the repair method has been applied, in which a good constructive algorithm is hidden to get a good solution. The final solution will be more flexible than if the destroy and repair methods have been executed only in the complete solution. Our algorithm has two phases, which are constructing the sequences of the sugarcane fields and the mechanical harvesters. Then the construction of the complete algorithm will be performed. Additionally, four new formulas were developed to calculate the probability of accepting a worse solution using a linear and parabola function, instead of the exponential func-

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OTHER TOPICS RELATED TO THE SUBMISSION

- Cover page : letter to editor which used to explain research problem, method contribution that the author is used to convince the editor that their article to be accept to publish.

Cover page

Dear Editor

We have improved our article regards to the comment of the reviewers. The overall changed ca be addressed as following :

(1) Number of words is increased from 8200-9500 words
(2) 8 references has been added.
(3) The literature review , methodology , conclusion section is reformulated and add more explanation to be easier to understand for the reader.
(4) The English has been carefully checked by the native speaker.

We also attached the reviewer's answer to the editor in the end of this letter.

Best regards

Author's team

Cover Letter

Dear Editor

We have corrected/answer all comments of the reviewers, the change has been made through the article as I attached the reviewer answer. This generate the references article increase from 25 to 38 references , number of words increase from 8200 to 9574 words. Hopefully, it will be successful in this round of correction. The acknowledgement , email address and original pics in the main text as you suggest in email already.

Best regards
Rapeepan Pitakaso