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Judul artikel : Integrated DANP and binary goal programming model in generating joint-decision making for packaging postponement and supplier selection
Jurnal : Annals of Operation Research
Penulis : **Ivan Gunawan**, Dian Trihastuti, Ajay Kumar, Kim Hua Tan

1. 20 September 2022: Manuscript Submission to “Annals of Operation Research (ANOR)”
2. 8 May 2023: Decision on Manuscript - Need Revision
3. 17 May 2023: Submit Revision to ANOR
4. 5 July 2023: Paper Accepted
5. 14 July 2023: Author Query Request
6. 14 July 2023: Author Query Response
7. 15 July 2023: Request for Final Proof
8. 17 July 2025: Published Online

Correspondence Record

1. **20 September 2022: Manuscript Submission to “Annals of Operation Research (ANOR)”**

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Tue, Sep 20, 2022, 2:18 AM



to me ▾

Re: "Integrated DANP and Binary Goal Programming Model in Generating Joint-Decision Making for Packaging Postponement and Supplier Selection"

Full author list: Ivan Gunawan; Dian Trihastuti; Ajay Kumar; Kim Hua Tan

The submission id is: **ANOR**-D-22-01823

Dear Professor Gunawan,

We have received the submission entitled: "Integrated DANP and Binary Goal Programming Model in Generating Joint-Decision Making for Packaging Postponement and Supplier Selection" for possible publication in Annals of Operations Research, and you are listed as one of the co-authors.

The manuscript has been submitted to the journal by Professor Dr. Ajay Kumar who will be able to track the status of the paper through his/her login.

Please confirm your co-authorship by clicking on this link:

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Please note that all co-authors must confirm co-authorship or we will not be able to publish this paper if it is accepted.

Thank you very much.

With kind regards,
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2. 8 May 2023: First Decision on Manuscript - Revision

Decision on your manuscript #ANOR-D-22-01823 - [EMID:4724a20fa6b8358f] External Inbox x



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May 8, 2023, 8:55 PM ☆ ↶ ⋮

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Dear Dr. Kumar,

Please find below our referee comments on your manuscript, "Integrated DANP and Binary Goal Programming Model in Generating Joint-Decision Making for Packaging Postponement and Supplier Selection", which you submitted to Annals of Operations Research. As you will see, the publication of your manuscript in its present form will, unfortunately, not be possible. However, if you should decide to thoroughly revise the manuscript, following the suggestions of our referees, and send us the accordingly revised version, by 05 Jul 2023, we will be happy to send it for re-evaluation. Please include a list of responses to the comments. Your list of responses should be uploaded as a file in addition to your revised manuscript.

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Sincerely yours,
Davide La Torre (Lead Guest Editor)
Annals of Operations Research

COMMENTS FOR THE AUTHOR:

There is additional documentation related to this decision letter. To access the file(s), please click the link below. You may also login to the system and click the "View Attachments" link in the Action column.

Guest Editor: The paper has potential and the results are nontrivial. I invite the authors to address carefully the comments raised by the referee (s). In particular, attention should be paid to the model formulation that has some problems to be addressed. The authors should also stress on the originality of this approach with respect to others in the literature.

Reviewer #1: In this article, the authors are to establish the optimal joint decision-making process for packaging postponement and supplier selection with the ANP model integrated into the binary goal problem. The problem studied by the authors is interesting from a practical point of view and the paper is well-written and well-organized. The gap in the literature is well explained. Yes, there have been some studies about packing postponement and supplier selection but none of them minimizing the cost. However, please read the paper of NESTICO (Nesticò, Elia, and Naddeo 2020) First and important comment is PAGE number is missing!
I start with the abbreviation in abstract;
Decision-Making Trial Evaluation and Laboratory (DEMATEL) is a one method. And Analytic Network Process (ANP) is another method. DANP is the combination of DEMATEL-based Analytic Network Process. So in the study, DAMATEL is mentioned in the abstract part, but it is not used anywhere afterwards.
My difficulty with the paper is the modeling part;
There are a few problems with the model formulation on page 19 of the pdf we sent.
-Distribution centers are expressed under the index i, but when determining the parameter, Tk expresses the distribution center as k.
-The definition of Qjk does not match its content, given as i and j in the content
The authors mention that "The country has the highest logistics costs in Asia, so minimizing it will significantly impact the industry. Shoe companies can provide retail packaging (shoeboxes) at the factory or the distribution centre."
However, I can't see this distinction very well in the modeling part.

- While setting up the model, only the without packing part was considered, so why a new variable was created, if the other way would not be investigated at all, or, the reason should be written more clearly.
- Is there any postponement when the packaging is done at the factory?

Typo Error:
Page 21, line 35 (see Table 1) , Is it really Table 1, because table 1 is review of related past studies.
Page 23 line 14 "In Table 4", Shouldn't it be "Table 7"?

Also

3. 17 May 2023: Submit Revision to ANOR

Response to Reviewer

We have revised our paper accommodating comments/suggestions from the reviewers. The extensively modified parts are written with **blue color**



No.	Reviewer's comments	Author's responses
1	The problem studied by the authors is interesting from a practical point of view and the paper is well-written and well-organized.	Thank you so much for your kind words
2	The gap in the literature is well explained.	Thank you so much for your kind words
3	Yes, there have been some studies about packing postponement and supplier selection but none of them minimizing the cost. However, please read the paper of NESTICO (Nesticò, Elia, and Naddeo 2020)	Thank you for suggesting a very good article. We cited Nesticò (2020) in section 6 of our paper, as a future direction of research that considers triple bottom-line aspects of sustainability.
4	First and important comment is PAGE number is missing!	Page number added.
5	I start with the abbreviation in abstract; Decision-Making Trial Evaluation and Laboratory (DEMATEL) is a one method. And Analytic Network Process (ANP) is another method. DANP is the combination of DEMATEL-based Analytic Network Process. So in the study, DAMATEL is mentioned in the abstract part, but it is not used anywhere afterwards.	The description about the role of DEMATEL in DANP is added in sub-section 3.1
7	My difficulty with the paper is the modeling part; There are a few problems with the model formulation on page 19 of the pdf we sent. - Distribution centers are expressed under the index i, but when determining the parameter, T_k expresses the distribution center as k. - The definition of Q_{jk} does not match its content, given as i and j in the content	Thank you for a detailed review. We have revised the index as mentioned.
8	The authors mention that "The country has the highest logistics costs in Asia, so minimizing it will significantly impact the industry. Shoe companies can provide retail packaging (shoeboxes) at the factory or the distribution centre." However, I can't see this distinction very well in the modeling part.	The logistic cost in the model only considers the transportation cost. We also add a statement in the introduction to make it clear.
9	While setting up the model, only the without packing part was considered, so why a new variable was created, if the other way would not be investigated at all, or, the reason should be written more clearly.	Thank you for the review. We have revised the model based on this specific review. The reason has been explained on page 19, <u>paragraph one</u> .
10	Is there any postponement when the packaging is done at the factory?	In the literature, there are several opposite terms for postponement, such as speculation and preponement. In this paper, when the packaging is done at the factory, we call it the existing state according to Tiedemann and Wikner (2019). Based on its definition, the term preponement or speculation is not appropriate when used in this article. We define the existing state in sub-section 4.4
11	Typo Error: - Page 21, line 35 (see Table 1), Is it really Table 1, because table 1 is review of related past studies. - Page 23 line 14 "In Table 4", Shouldn't it be "Table 7"?	Thank you for the review. We have revised the typo error mentioned.



criteria was determined using a pairwise comparison questionnaire adopted from the DEMATEL approach. The questionnaire uses a Likert scale of 0 to 4, with the number 0 indicating no relationship and the number 4 indicating a very strong relationship. This step aims to build a network model in ANP. [Therefore, it can be called DEMATEL-based ANP or DANP.](#)

The ANP questionnaire was prepared based on predetermined sub-criteria. Therefore, this paired comparison questionnaire is different from the previous questionnaire. The ANP questionnaire uses a Likert scale with a range of 1 to 9, with a scale of 1 indicating that both elements have significant influence and a scale of 9 indicating one element is more important than the others. The two questionnaires were distributed to respondents categorized as experts in the industry.

[The DEMATEL procedure begins by processing the questionnaire results on the relationship between the sub-criteria to compile a relationship matrix \(Matrix A\).](#) If the number of experts is more than one, the matrix will be filled with the average value of all experts' assessments. Each expert (k) will produce non-negative matrices $X^k = [x_{ij}^k]_{n \times n}$, with $1 \leq k \leq H$. Then, the mean is calculated to accommodate all experts' opinions using Equation (5).

$$A = [a_{ij}]_{n \times n} = \frac{1}{H} \sum_{k=1}^H [x_{ij}^k]_{n \times n} \quad (5)$$

After the relationship matrix between sub-criteria is formed, then the matrix is normalised using Equation (6). Finally, the normalized matrix (Matrix G) is processed into a total relationship matrix (matrix T) using Equation (7), where I is the identity matrix.

$$G = \frac{1}{\sum_{j=1}^n a_{ij}} A, i, j = 1, \dots, n \quad (6)$$

$$\sum_{j \in [0,1]} \sum_{k \in R} x_{ijk} = 1, \forall i \in N \quad (15)$$

$$x_{ijk} \in \{1.0\} \quad (16)$$

$$d_1^+, d_1^-, d_2^+, d_2^- \geq 0 \quad (17)$$

The difference between mathematical formulas in the BLP and BGP models lies in the objective function. The BGP model always minimises the deviational variables. The objective function in LP model creates a goal constraint for the BGP model with the addition of two non-negative deviation variables: d_i^+ and d_i^- in Equations 13 and 14. In Equation 13, variables d_1^+ demonstrate the advantages, whereas d_1^- shows shortcomings from the target cost of 0. [Supplier selection for each distribution centre is carried out only under conditions of packaging postponement \(shipping products without packaging\), in which \$j = 0\$.](#) In Equation 14, the variable d_2^+ shows the advantages and d_2^- shows the shortcomings of the target score N (the number of distribution centres) multiplied by 5 (highest score). Furthermore, Equations 15 and 16 have the same function as Equations 10 and 11. Finally, Equation 17 guarantees that the deviational variables are positive.

In this study, the programming was pre-emptive or solving stratified problems starting from the top-priority goals. After the top priority is resolved, the next priority is determined without changing the optimal solution from the previous priority solution. Therefore, the solution of the top priority goal becomes a constraint for the next priority's problem solution. In this case, minimising logistics costs has a higher priority than supplier selection. Thus, the first solution sought is minimising logistics costs.

Discount on Packaging Prices from Factory Suppliers	Number of DCs Implements Packaging Postponement	DC					
		1	2	3	4	5	6
90%	0						
80%	0						
70%	2			✓	✓		
60%	3			✓	✓	✓	
50%	5	✓	✓	✓	✓	✓	
40%	6	✓	✓	✓	✓	✓	✓
30%	6	✓	✓	✓	✓	✓	✓
20%	6	✓	✓	✓	✓	✓	✓
10%	6	✓	✓	✓	✓	✓	✓
0%	6	✓	✓	✓	✓	✓	✓

Another sensitivity analysis was performed by considering the price changes from potential suppliers for each distribution centre when prices from the main supplier are fixed (see Table 9). It was found that when the price from the potential new suppliers increases by 40%, the packaging postponement decision does not change. The change occurs when the potential supplier raises the price up to 50%. At this point, the packaging postponement decision applies to distribution centres 1, 3, 4, and 5. Meanwhile, a 60% price increase suggests packaging postponement decision in distribution centres 4 and 5; and a price increase of 70% suggests postponement being applied at the distribution centre 5. **Finally, packaging done in the factory (the existing state) becomes feasible if the packaging price reaches more than 70%.**

selection criteria. Future research can examine model development involving transportation mode selection and order allocation quantity. This model can also be developed by releasing the assumptions used in this study. **Model objectives that involve economic, social, and environmental aspects related to sustainability can be a further direction for developing an integrated model of packaging postponement and supplier selection (Nesticò, et al., 2020).** Besides, the long solving time in large and complex real cases requires further research to develop heuristic or metaheuristic approaches to overcome them.

REFERENCES

- Aktan, H. E., & Akyuz, G. (2017). Positioning the decoupling point along a supply chain: A case study. *International Journal of Productivity and Quality Management*, 22(3), 309. <https://doi.org/10.1504/IJPQM.2017.087302>
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4. 5 July 2023: Paper Accepted

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Dear Dr. Kumar,

I am pleased to inform you that your manuscript, "Integrated DNP and Binary Goal Programming Model in Generating Joint-Decision Making for Packaging Postponement and Supplier Selection," has been accepted for publication in Annals of Operations Research.

When proofs are ready, you will be notified by the Production Department and you will be able to find information regarding your accepted paper at the following link:

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Thank you for your contribution to our journal.

Best regards,

Endre Boros
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Annals of Operations Research

COMMENTS FOR THE AUTHOR:

Reviewer #1: They have made required chnaging. Thank you.
Reviewer #2: The paper can be accepted in the current form.

5. 14 July 2023: Author Query Request

Journal: 10479
Article: 5513

Author Query Form

Please ensure you fill out your response to the queries raised below
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Dear Author

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5.	Please check the layout of Tables 4 and 7 and correct if necessary.	

6.	Kindly check and confirm inserted Journal title for references Alimohammadiou and Bonyani (2021), Chiu et al. (2019) are correctly identified	
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Integrated DANP and binary goal programming model in generating joint-decision making for packaging postponement and supplier selection

Ivan Gunawan¹ · Dian Trihastuti¹ · Ajay Kumar² · Kim Hua Tan³

Received: 19 September 2022 / Accepted: 5 July 2023
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Abstract

This article explores the application of goal programming (GP) for improving tactical decision-making in supply chains. GP demonstrates flexibility to be integrated with other Multi-Criteria Decision Making (MCDM) methods such as Decision-Making Trial Evaluation and Laboratory (DEMATEL)-based Analytic Network Process (ANP) (DANP) to support better business decisions. Joint-decision making of packaging postponement and supplier selection involving two business functions: logistics and purchasing, effectively reduce the supply chain cost. This research proposes integrating the DANP and binary goal programming (BGP) model to generate optimal joint decision-making of packaging postponement and supplier selection. Based on a case of a shoe company in Indonesia, this research identifies the optimal trade-off between packaging and transportation costs. The findings show that the company needs to apply the packaging postponement to all distribution centres to minimize total cost. The sensitivity analysis illustrates that the decision remains until the packaging cost at the main factory is reduced by 50% or the packaging cost at the distribution centre (DC) is increased by 50%. The optimal solution shows the reduction of average logistics cost by 12.64%. This article provides a practical approach for managers to negotiate packaging prices with suppliers by considering transportation costs.

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6. 14 July 2023: Author Query Response

Author Correction

10479_2023_5513_Author

NO	LnNo	EqNo	TblNo	FigNo	InCorTxt	CorTxt	Remarks
Added: 7/14/2023 7:57:17 PM							
Author Query Response: Dear Editor, Please find the author query response in the file uploaded and make necessary changes. At the end of the response we also provide two revisions of some typos (error) found in the typeset. Thank you and best regard.							
Corrected By: Ajay Kumar							

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Query	Details Required	Author's Respond
1.	Kindly check and confirm inserted city and country name for affiliations 2 and 3 are correctly identified	Yes, we confirm that the inserted city and country names for affiliations 2 and 3 are correct.
2.	Please confirm if the author names are presented accurately and in the correct sequence (given name, middle name/initial, family name). Author 4 Given name:[Kim Hua] Last name [Tan]. Also, kindly confirm the details in the metadata are correct.	We confirm that all the author names are presented accurately and in the correct sequence. Also, we confirm that the details in the metadata are correct.
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5.	Please check the layout of Tables 4 and 7 and correct if necessary.	Please refer to the additional attachment below.
6.	Kindly check and confirm inserted Journal title for references Alimohammadiou and Bonyani (2021), Chiu et al. (2019) are correctly identified.	The reference information inserted in the typeset is incorrect. Please replace it with the reference below in the reference list. Alimohammadiou, M., & Bonyani, A. (2021). A decision framework for supplier selection under a fuzzy environment. Modern Researches in Decision Making, 5(4), 119-143. Chiu, S. W., Kuo, J.-S., Chiu, Y.-S.P., & Chang, H.-H. (2019). Production and

		distribution decisions for a multi-product system with component commonality, postponement strategy and quality assurance using a two-machine scheme. Jordan Journal of Mechanical & Industrial Engineering, 13(2), 105-115.
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Attachment of Query [5]

Please note the location of Ti(IDR/trip) is in the table's second column and third row. The correct layout for Table 4 is as follows:

		Distribution Centre (i)					
		1	2	3	4	5	6
Ti(IDR/trip)		9,800,000	6,300,000	10,200,000	8,900,000	14,500,000	8,250,000
Capacity (pairs)	Without						
	postponement	2,000	1,280	1,600	1,280	2,000	1,600
	Postponement	2,500	1,600	2,000	1,600	2,500	2,000

As for the clarity of readers, we suggest the revision for Table 7 as follows:

DC (i)		Results					
DC 1	Supplier (k)	0	1	2	3	4	5
	Solution	-	-	√	-	-	-
DC 2	Supplier (k)	0	1	2	3	4	5
	Solution	-	-	√	-	-	-
DC 3	Supplier (k)	0	1	2	3	4	5
	Solution	-	-	-	-	√	-
DC 4	Supplier (k)	0	1	2	3	4	5
	Solution	-	-	-	-	√	-
DC 5	Supplier (k)	0	1	2	3	4	5
	Solution	-	-	-	-	√	-
DC 6	Supplier (k)	0	1	2	3		
	Solution	-	√	-	-		

In addition, we found some typos in the manuscript typeset. It was our mistake in the first manuscript. We apologize for the inconvenience. Please make the necessary changes to the Query below:

Query	Location and Detailed	Author's Respond
7.	Equation 6 (line 271) Instead of an A, it should be $\forall$.	The correct equation is: $G = \frac{1}{\sum_{j=1}^n a_{ij}} \quad \forall i, j = 1, \dots, n$
8.	Equation 7 (line 272) Instead of (IG), it should be (I - G)	The correct equation is: $T = G(I - G)^{-1}$

Best Regards,

Authors

7. 15 July 2023: Request for Final Proof

From: P Ashok Kumar <ashok.kumarp@springernature.com>
Sent: Saturday, July 15, 2023 4:03 PM
To: KUMAR Ajay <akumar@sem-hyon.com>
Cc: Amit Dixit <amit.dixit@springer.com>
Subject: Query regarding correction for Journal 10479/ANOR - Article 5513

Dear Dr. Ajay Kumar,

Journal 10479/ANOR - Article 5513
Title: Integrated DANP and binary goal programming model in generating joint-decision making for packaging postponement and supplier selection

We thank you for returning the corrections for the above-mentioned article. While incorporating the corrections, we found that "equation 6, 7" is changed as "equation 7, 8" (page number 15), but if we do so there will be no equation 6 in proof. Kindly check and provide/clarify correction in an e-mail.

With Regards,
Ashok Kumar Pitthal
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8. 17 July 2025: Published Online

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Integrated DANP and binary goal programming model in generating joint-decision making for packaging postponement and supplier selection

Original Research | Published: 17 July 2023
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Abstract

This article explores the application of goal programming (GP) for improving tactical decision-making in supply chains. GP demonstrates flexibility to be integrated with other Multi-Criteria Decision Making (MCDM) methods such as Decision-Making Trial Evaluation and Laboratory (DEMATEL)-based Analytic Network Process (ANP) (DANP) to support better business decisions. Joint-decision making of packaging postponement and supplier selection involving two business functions: logistics and purchasing, effectively reduce the supply chain cost. This research proposes integrating the DANP and binary goal programming (BGP) model to generate optimal joint decision-making of packaging

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