



IVCEIS 2021

**PROCEEDING:
INTERNATIONAL VIRTUAL CONFERENCE
ON ENGINEERING, INNOVATION AND
SOCIAL SCIENCES 2021
(IVCEIS 2021)**

**Proceeding:
International Virtual Conference on
Engineering, Innovation and Social
Sciences 2021
(IVCEIS 2021)**

**Proceeding:
International Virtual Conference on Engineering,
Innovation and Social Sciences 2021
(IVCEIS 2021)**

Date: 27-28 November 2021

**Copyright 2021
Global Academic Excellence (M) Sdn Bhd**

All rights reserved. No part of this publication may be reproduced in any form or by any means, whether electronically and/or mechanically including photocopying, recording or any means of storage of information and retrieval system, without the written consent of Global Academic Excellence (M) Sdn Bhd / Author.

eISSN: 978- 967 - 2426 - 41 - 7

Published By:



**GLOBAL ACADEMIC EXCELLENCE
(M) SDN BHD -1257579-U**

**Lot 1156 Tingkat 2 Kompeni Niaga LUTH
Jalan Dato Pati, 15000 Kota Bharu ,
Kelantan, MALAYSIA
Website: www.egax.org
Email: publication@egax.org**



Contents

1. GENERALIZED COST OF FREIGHT MULTIMODAL SYSTEM IN JAVA	1
2. OPTIMIZATION OF THE GREEN INTERLOCKING EARTH BRICK MIX DESIGN USING RESPONSE SURFACE METHOD	12
3. FROM PADDY FIELDS TO TRADITIONAL FOOD: EVALUATING THE PROMOTION OF KEDAH AS A TOURIST DESTINATION.....	22

GENERALIZED COST OF FREIGHT MULTIMODAL SYSTEM IN JAVA

Larasari Tisno Suryawati¹
Nahry²
Fitri Indriastiw³
Sigit Pranowo Hadiwardoyo⁴

¹Faculty of Engineering, Universitas Indonesia (UI), Indonesia, (E-mail: laras.tisnosuryawati@gmail.com)

²Faculty of Engineering, Universitas Indonesia (UI), Indonesia, (E-mail: nahry@eng.ui.ac.id)

³Faculty of Engineering, Universitas Indonesia (UI), Indonesia, (E-mail: vindriastiw@gmail.com)

⁴Faculty of Engineering, Universitas Indonesia (UI), Indonesia, (E-mail: sigit.eng@ui.ac.id)

Abstract: *The multimodal system in Indonesia requires development in order to create a more efficient and reliable freight transport and diminish the domination of road transport, i.e. trucks. The utilization of more than one mode in a multimodal system, where there is a door-to-door element, requires a network development concept that refers to the use of generalized costs, instead of costs incurred to use the system (out of pocket). Generalized cost is the concept of monetization of time, distance and cost variables into a certain unit value (time or cost). The purpose of this paper is to analyze the generalized cost model of freight transport in Java based on truck, train and ship modes. In this paper, the generalized cost variable used is based on the viewpoint from freight forwarders and shippers obtained through primary surveys and the AHP method cost, reliability and lead time. Monetization of reliability and lead time variables on costs is based on a stated preference survey, the results of which show that the truck mode has a time VOR Rp 1,181,771 and VOT Rp 174,079 (per delivery per hour). These values are the largest compared to the other modes considering that congestion and the unavailability of adequate infrastructure are the factors that cause delays. The results of the generalized cost show that the ship mode, which has the largest generalized cost value, is 1.29 times more expensive than the truck mode considering that the journey is heavily influenced by weather and has a need for further modes to the destination as well as additional handling equipment which increases transportation costs. The results of this study are expected to be used by the government as a reference in determining multimodal transport development policies which will enable the system to compete in the logistics sector.*

Keywords: *Freight Transport, Multimodal, Stated Preference, AHP, Generalized Cost.*

Introduction

Freight transportation network in Indonesia, which is an archipelagic country with an area of 1,916,906.77 km² with 16,056 islands, is still not optimal (BPS 2019). This is due to several factors such as the complexity of licensing, unreliable lead time due to mode shifts which are still dominated by 75.3% road transport, resulting in high logistics costs (Gurning 2017; INDII 2014). Therefore, it is necessary to have an alternative freight transportation network, namely multimodal which in Indonesia has not been effective. Considering the concept of a freight multimodal transportation network, it has been stated in Indonesian Ministerial Regulation No. 8 of 2012. Multimodal is the use of two or more modes such as road, rail and sea modes (Steadieseifi et al., 2014).

A multimodal freight network needs to be developed to support regional economic growth, and be able to reduce negative impacts on the environment and energy consumption (Yamada et al. 2009). Observed from the consumer side, multimodal is also able to facilitate

the delivery of goods considering that the delivery is based on door-to-door. So, it is necessary to develop an efficient freight transportation network after an area already has a multimodal transportation network to become intermodal transportation (Lubis and Sjafruddin 2005).

Planning a multimodal freight transportation network needs to consider several variables. An important variable in effective and efficient multimodal system is the generalized cost variable. Generalized cost in transportation is a total cost concept which is a combination of three main components (time, distance and cost) to be converted into a certain value which can be a unit of cost or time (Anwar, Syapawi, and Ilham 2008).

The purpose of this paper is to analyze the generalized cost of multimodal freight transport using the main modes (land, sea and train modes) based on factors from the perspective of business actors (freight forwarders and shippers). This paper is arranged in the following order: Section 2 describes the methodology that covers the entire research process along with data sources, the factors used in the generalized cost and stated preference monetization factors to determine the cost value of the generalized cost factor. Section 3 presents the results of the survey and the generalized cost model. Section 4 contains conclusions and suggestions for further research.

Literature Review

Multimodal Freight Transport

Freight transport using at least two different modes of transportation based on one contract as a multimodal transport document from a place where goods are received by a multimodal transport business entity to a place specified for delivery of goods to recipients of multimodal transport goods (PP 2012). Multimodal is a condition where the mode of transportation provides a travel network from origin to destination (door-to-door) (Rodrigue, Comtois, and Slack 2016). The unit (size) of shipping goods can be in the form of containers, boxes, palletization or vehicles (Steadieseifi et al. 2014). There is some literature that discusses multimodal, especially in Indonesia by comparing multimodal policies in several countries such as Germany, Brazil and America in order to overcome obstacles for service providers and users so as to improve logistics performance (Budiswanto et al. 2018). Logistics costs can be reduced by a multimodal system that is able to deliver goods efficiently and quickly (Wibowo and Chairuddin 2017).

Factors Affecting Freight Transport

The factors that influence the choice of modes are important for planning a competitive transportation system (Flöden, Bärthel, and Sorkina 2010) and many studies have been conducted to determine the choice of multimodal transportation. The choice of mode is highly dependent on the commodity being sent, such as the speed factor (Punakivi and Hinkka 2006). The main influencing factors are costs, network characteristics, commodity characteristics, quality, externalities, risk of loss or damage to goods (Meixell and Norbis 2008). In 2003, the choice of mode in Belgium determined the factors that influence the choice of mode cost, flexibility, security and time are important variables (Vannieuwenhuyse, Gelders, and Pintelon 2003). This research is in line with research (Konstantinus and Zuidgeest 2019) which illustrates the importance of modal selection for multimodal for developing countries and regions.

Generalized Cost

Generalized cost modeling is used to minimize transportation costs. Generalized costs can be used in spatial modeling with variable approaches in the form of delivery size, speed, value density and economies of scale (Tavasszy, Davydenko, and Ruijgrok 2009). Other research

uses generalized cost in determining the minimum cost between multimodal and unimodal with factors that influence business actors to prefer multimodal (Sandberg et al. 2012). Research conducted in Aceh, Indonesia uses transportation costs that have been separated into vehicle operating costs, loading and unloading costs (Saleh and Sjafruddin 2010). Cost savings based on research conducted in Indonesia on the Sea-Toll provides a good picture by monetizing the actual shipping costs with the time value of the type of cargo (Triantoro 2020).

Methodology

Stated Preference (SP) is used to determine the monetization value of the variables used for generalized cost model analysis. The generalized cost model is obtained from the utility value of the analysis using the multinomial logit method. The data used in this study is based on the preferences of business actors (freight forwarders and shippers) in Java. The region was chosen considering that economic growth is still centered on the islands of Java based on the contribution to national GDP, namely 58.5% (BPS 2017).

Analytical Hierarchy Process

The first step is to conduct a survey to find out the main factors that influence the choice of modes for generalized cost of freight transport. This study chooses six factors that are often used in some research which are describes in table 1

Table 1: Definition of Variables Use in This Research

Variables	Definition
Transport Cost	Cost of Shipping Goods from the Point of Destination or Door-to-Door Including Loading and Unloading Costs
Reliability	Level of Timeliness of Delivery
Lead Time	Time Required to Move 1 TEU from the Point of Origin to the Point of Destination where the Goods are Unloaded until They are Delivered to the Recipient/Owner.
Frequency	Frequency of Certain Modes of Service (i.e. the Frequency of Truck Modes in a Day)
Flexibility	Unschedule Deliveries that can be Carried Out while Delay
Level of Damage/Loss of Goods	A Condition of Changes to Goods during the Delivery Process

At this stage, the Analytical Hierarchy Process (AHP) method is used to obtain a representation of a complex problem in a multilevel structure where there are objectives, factors, sub-criteria and alternatives (Saaty 1993).

The results obtained from the survey of mode selection factor analysis were analyzed using Expert Choice software. This analysis aims to obtain the results of the most influential factors from the largest AHP value obtained. These factors were selected based on factors that are often used in mode selection studies which are summarized in the table 2.

Table 2: Mode Choice Factors from References

Reference	Mode	Variables
Cullinane and Toy (2000)	-	Transport Cost, Reliability, Lead Time and Item Characteristics
Shinghal and Fowkeys (2002)	Road and Rail	Reliability and Flexibility
Norojono and Young (2003)	Road and Rail	Reliability, Flexibility and Security
Garcia – Menendez et al (2004)	Sea and Road	Transport Cost, Flexibility and Lead Time
Beuthe and Bouffioux (2008)	Road, Rail and Inland Waterways	Transport Cost, Reliability and Lead Time
Feo-Valero et al (2011)	Road and Rail	Transport Cost, Reliability, Flexibility, Lead Time, Frequency, Level of Damage/Loss of Items
Brooks et al (2012)	Road, Rail and Maritime	Transport Cost, Reliability and Lead Time
Ravibabu (2013)	-	Transport Cost and Lead Time
Reis (2014)	Road and Rail	Transport Cost, Reliability and Lead Time
Tri Nugroho (2016)	Road and Rail	Transport Cost, Reliability, Lead Time and Frequency

Source: (Beuthe and Bouffioux 2008; Brooks et al. 2012; Cullinane and Toy 2000; Feo-Valero, Garcia-Menendez, and Hidalgo 2011; Garcia-Menendez, Martinez-Zarzoso, and Miguel 2004; Manchala 2013; Norojono and Young 2003; Nugroho 2016; Reis 2014; Shinghal and Fowkes 2002)

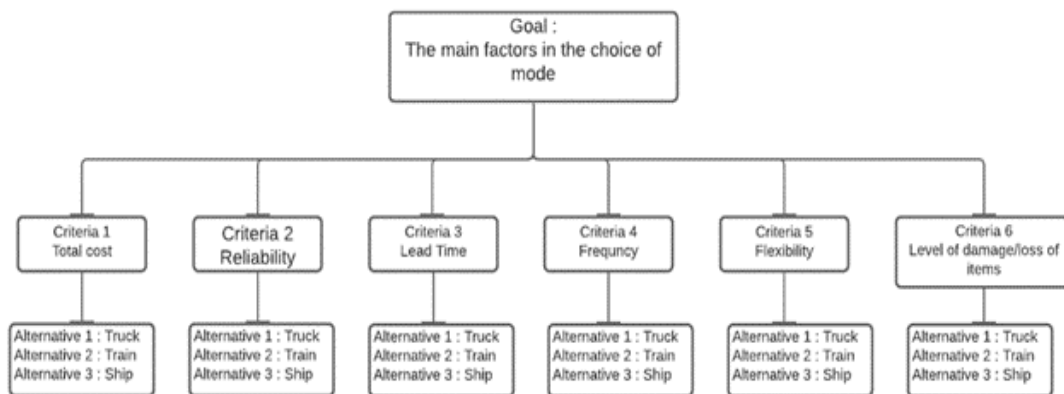


Figure 1: Hierarchy Structure of Mode Choice Analysis

Table 3: AHP Scale and Definition

Scale	Importance
1	Equal Importance
3	Slightly More Importance
5	Materially More Importance
7	Significantly More Importance
9	Absolutely More Importance
2,4,6,8	Compromise Value

Source: (Saaty 1993)

Stated Preference

The second stage is the making of a stated SP survey based on the most influential factors in the analysis from the first stage. This survey aims to determine the monetization value of the factors that are considered influential. The results of this survey were then analyzed using NLOGIT version 6 software using the multinomial logit method. The multinomial logit method generated from several specified modes truck, train and ship modes, produces a utility model. The utility model obtained is the model used for generalized cost.

SP used is a choice modeling category in the form of a discrete choice model. The model is able to facilitate calculations in monetizing the analyzed factors in the form of costs (money). Based on the preliminary survey, it was found that the Jakarta - Surabaya route has 3 modes of transporting goods (trucks, trains and ships) so it is used as a hypothetical condition shows in Table 4

Table 4: Hypothetical Conditions of Each Modes

	Transport Cost	Lead Time	Reliability
Truck	Rp 13,000,000	24 Hours	80% On Time
Train	Rp 10,000,000	16 Hours	90% On Time
Ship	Rp 5,750,000	120 Hours	70% On Time

The attributes and levels used in this study for each mode are listed in the Table 5

Table 5: Attributes Level of Each Variables Modes

Attributes	Truck		Train			Ship			
	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Transport Cost	-2	Existing	+2	-2	Existing	+2	-1	Existing	+1
Lead Time	+5	Existing	-5	+3	Existing	-3	+24	Existing	-24
Reliability	%20 On Time	40% On Time	80% On Time	20% On Time	40% On Time	80% On Time	20% On Time	40% On Time	80% On Time

Based on the original orthogonal design, the combination was 3^3 where there were 3 factors that resulted in 27 combinations. To reduce respondents' confusion and fatigue, the alternatives were simplified to 9 combinations. This simplification uses a full factorial design with each level in which in this study there are 3 levels for each attribute (variable) of transport cost, lead time and reliability combined for each other level for each other attribute. It can summarize all the main conditions and interactions between variables in the dataset.

Comparative Analysis

The third stage presents a comparative analysis between generalized cost models from several modes and then provides conclusions regarding the generalized cost model for truck, rail and ship modes. The analysis is used to see the current condition of Indonesia's multimodal and determine which modes should be further developed.

Model Development

Based on a survey conducted on 36 business actors with the location of destination and origin of goods in Java. The choice of SP survey data is then converted into binary data using the Multinomial Logit model. The model will provide input in the form of a utility model where

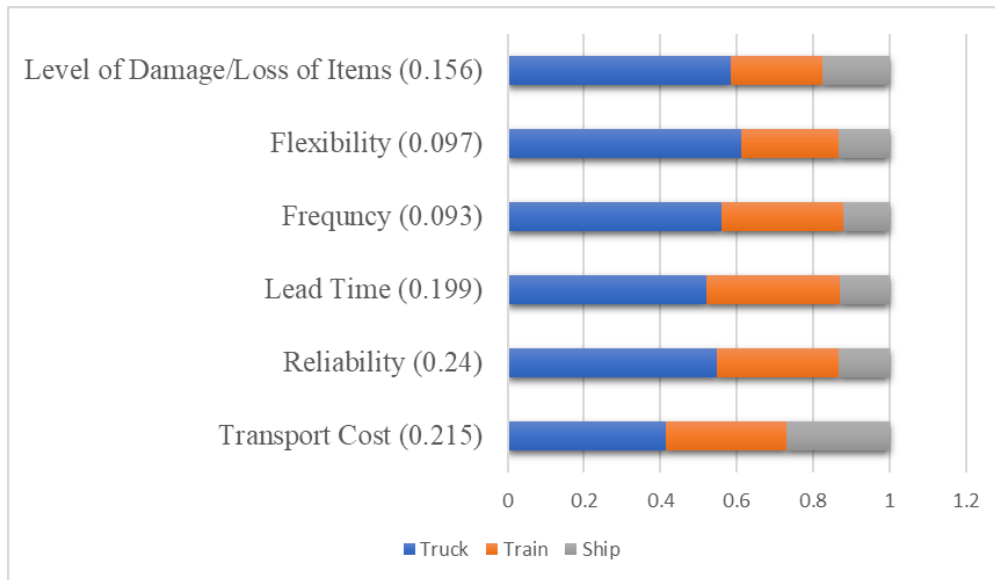


Figure 2: AHP Analysis Result

Based on figure 2, it can be seen that the largest proportion is in the criteria of reliability (0.240), transport cost (0.215) and lead time (0.199). These results are in line with the reasons of the respondents who are people directly related to the process of selecting modes in logistics activities. Where the reliability factor (timeliness) is crucial considering that delays in delivery of goods can increase lead time which adds to shipping costs which are part of the transport cost. Different commodities do not have a significant influence on the choice of mode selection factors based on the results of interviews with several business actors.

The alternatives obtained from the survey results are still dominated by the modes of trucks (0.583), trains (0.240) and ships (0.176). This is in accordance with the current condition of selecting the mode of transportation of goods in Indonesia, which is still dominated by the truck mode, which has high transportation and infrastructure costs, and frequent accidents and congestions. In Indonesia, the average proportion of travel by road mode dominates 75.3%, train 1.1% and ship mode 24.2% (INDII 2014). Therefore, it is necessary to optimize the use of multimodal in Indonesia considering the condition of the mode used is still focused on road modes to maximize the potential of national logistics of an archipelago country.

In Table 7 it can be seen that the estimates of the variables are in accordance with what is expected in actual conditions. Test the whole model by looking at the comparison of the chi-square count that is greater than the chi-square table. Test the influence factor with a z value to determine the order of the most influential factors based on a significance value of 5%. The coefficient in the negative value model indicates that an increase in each variable will decrease utility or decrease a person's willingness to choose an alternative.

Table 7: Parameter Result of Multinomial Logit Model

Attributes	Coefficient			Prob $z > Z^*$		
	Truck	Train	Ship	Truck	Train	Ship
Travel Cost	-0.25092	-0.37835	-0.09539	0.0002	0.0006	0.5787
Lead Time	-0.04368	-0.06212	-0.00843	0.1038	0.3428	0.3181
Reliability	-0.29653	-0.37831	-0.03487	0.0003	0.0032	0.0001
Log – L0	Truck		-128.109			
	Train		-62.383			
	Ship		-73.9499			
Log - L	Truck		-117.6522			
	Train		-53.132			
	Ship		-62.00561			
Chi-Squared	Truck		20.91369			
	Train		18.50194			
	Ship		23.88863			
Chi-Squared Table	Truck		7.8147			
	Train		7.8147			
	Ship		7.8147			

Table 8: VOT and VOR Result

	a	b	g	Lead Time (VOT)		Reliability (VOR)	
				Rupiah (Juta)/ Hour	USD/Hour	Rupiah (Juta)/ Hour	USD/Hour
Truck	-0.25092	-0.04368	-0.29653	174,079	12	1,181,771	82
Train	-0.37835	-0.06212	-0.37831	164,187	11	999,894	69
Ship	-0.09539	-0.00843	-0.03487	88,374	6	365,552	25

Table 9: Generalized Cost for Each Modes

	Transport Cost	Lead Time (VOT)	Reliability (VOR)	Generalized Cost (GC)
Truck	13,000,000	174,079	1,181,771	22,850,407
Train	10,000,000	164,187	999,894	14,226,816
Ship	5,750,000	88,374	365,552	29,514,755

Case Study

In this calculation, transportation costs, lead time and reliability are used by calculating the hours of delay based on the percentage of on-time shipments from Jakarta - Surabaya. The value of the lead time (VOT) parameter in the vehicle to the cost per hourly delivery is Rp. 174,079 for truck mode, Rp. 164,187 for train mode and Rp. 88,374 for ship mode. The value of reliability (VOR) on the cost per delivery per hour is IDR 1,181,771 for truck mode, IDR 999,894 for train mode and IDR 365,552 for ship mode. These results indicate that business actors in the truck mode are willing to pay Rp. 174,079 per delivery to be able to save time for one hour while they are willing to pay Rp. 1,181,771 per delivery to reduce the variance of lead time in the form of a delay of one hour.

There are differences in the preference for reducing the time variance from one mode to another. The truck mode according to its characteristics has a high level of delay due to congestion or other obstacles such as the absence of adequate infrastructure. This is different from other modes such as trains where there are still few available rails in certain areas and sea modes which take a long time due to depending on unpredictable weather conditions.

Basically there are many factors that affect lead time (Kumar, Basu, and Maitra 2004). Where in freight transport, the lead time is influenced by the cost of the trip, the commodity sent and the route taken.

Conclusion

In optimizing the multimodal freight transport in Indonesia, it is important to know the factors that influence business actors in choosing modes. Based on the choice of business actors, it was found that the influencing factors were transport cost, lead time and reliability with alternative modes of trucks, trains and ships. This study further used these factors to develop a utility model of the modes of trucks, trains and ships. The VOT and VOR values of trucks are still the highest compared to other modes of Rp. 174,079 per delivery per hour and Rp. 1,181,771 per delivery per hour respectively. But considering the long lead time and the low level of reliability of ships, the value of the largest Generalized cost is in the ship mode, which is Rp. 29,514,755.

Limitations in this study can be developed for further research. The expansion of the wider scope will provide a more valid picture of the logistics conditions in Indonesia. The use of other monetization factors such as frequency, flexibility and the level of damage or loss of goods is certainly able to provide a better picture of the Generalized Cost, especially for different commodities. So that it can be used as a reference in determining future transportation policies made by the government. Policies that are right on target are expected to increase competitiveness in the logistics sector.

References

- Anwar, Ahmad Syapawi, and Chairul Insani Ilham. 2008. "STUDI PERBANDINGAN OF GENERALIZE COST VESSEL MODA KAPAL KETINTING DENGAN MODA ANGKUTAN KOTA TRAYEK MAHAKAM HILIR-SAMARIDA SEBERANG Anwar Ahmad Syapawi * Chairul Insani Ilham."
- Beuthe, Michel, and Ch Bouffioux. 2008. "Analysing Qualitative Attributes of Freight Transport from Stated Orders of Preference Experiment." *Transport Economics and Policy* 42(1).
- BPS. 2017. "Pendapatan Nasional Indonesia."
- BPS. 2019. "Luas Daerah Dan Jumlah Pulau Menurut Provinsi, 2019." Retrieved (https://www.bps.go.id/indikator/indikator/view_data_pub/0000/api_pub/UFpWMMJZO VZIZTJnc1pXaHhDV1hPQT09/da_01/1).
- Brooks, Mary R., Sean M. Puckett, David A. Hensher, and Adrian Sammons. 2012. "Understanding Mode Choice Decisions: A Study of Australian Freight Shippers." *International Journal of Maritime Economics* 14(3):274–99.
- Budiswanto, N., M. Miharja, B. Kombaitan, and P. Pradono. 2018. "Multimodal Freight Transport Regulations in Indonesia and Its Implementation (A Case Study of Tanjung Priok Port)." *IOP Conference Series: Earth and Environmental Science* 158(1). doi: 10.1088/1755-1315/158/1/012021.
- Cullinane, Kevin, and Neal Toy. 2000. "Identifying Influential Attributes in Freight Route/Mode Choice Decisions: A Content Analysis." *Transportation Research Part E Logistics and Transportation*.
- Feo-Valero, M., L. Garcia-Menendez, and R. Garrido Hidalgo. 2011. "Valuing Freight Transport Time Using Transport Demand Modelling." *Transport Reviews* 31(5).
- Flöden, J., F. Bärthel, and E. Sorkina. 2010. "Factors Influencing Transport Buyer's Choice of Transport Service - A European Literature Review." *Paper Presented at the 12th World Conference on Transport Research Society, Lisbon, Portugal*.

- Garcia-Menendez, Leandro, Inmaculada Martinez-Zarzoso, and Delia Pinero De Miguel. 2004. "Determinants of Mode Choice between Road and Shipping for Freight Transport: Evidence for Four Spanish Exporting Sectors." *Transport Economics and Policy* 38(3).
- Gurning, Saut. 2017. "Penilaian Model Logistik Untuk Aplikasi Angkutan Multimoda : Studi Kasus Angkutan Xair Petrokimia Dari Tuban Ke Wilayah Jawa Dan Sumatera." (April 2017):1–17.
- INDII. 2014. "No Title."
- Konstantinus, A., and M. Zuidgeest. 2019. "An Investigation into the Factors Influencing Inter-Urban Freight Mode Choice Decisions in the Southern African Development Community Region." *Transport and Supply Chain Management*, 13(0):a463.
- Kumar, C. V., Debasis Basu, and Bhargab Maitra. 2004. "Modeling Generalized Cost of Travel for Rural Bus Users: A Case Study." *Journal of Public Transportation* 7(2):59–72. doi: 10.5038/2375-0901.7.2.4.
- Lubis, Harun Al-rasyid S., and Ade Sjafruddin. 2005. "Multimodal Transport in Indonesia: Recent Profile and Strategy Development." *Journal of the Eastern Asia Society for Transportation Studies* 5(July 2015):46–64.
- Manchala, Ravibabu. 2013. "A Nested Logit Model of Mode Choice for Inland Movement of Export Shipment: A Case Study of Containerised Export Cargo from India." *Research in Transport Economics* 38(1):91–100.
- McFadden, Daniel. 1974. "Conditional Logit Analysis of Qualitative Choice Behavior." *Drying Technology* 33(8):907–14.
- Meixell, Mary J., and Mario Norbis. 2008. "A Review of the Transportation Mode Choice and Carrier Selection Literature." *The International Journal of Logistics Management* 19(2):183–211. doi: 10.1108/09574090810895951.
- Norojono, O., and W. Young. 2003. "A Stated Preference Freight Mode Choice Model." *International Maritime Safety, Environmental Affairs and Shipping* 26(2).
- Nugroho, Munajat Tri. 2016. "Port and Inland Mode Choice from The Exporters and Forwarders Perspective : Case Study - Java, Indonesia."
- PP. 2012. *Peraturan Pemerintah Republik Indonesia No 8 Tahun 2011*. Vol. 64.
- Punakivi, Mikko, and Ville Hinkka. 2006. "Selection Criteria of Transportation Mode: A Case Study of Four Finnish Industry Sectors." *Transport Reviews* 26(2):207–19.
- Reis, Vasco. 2014. "Analysis of Mode Choice Variables in Short - Distance Intermodal Freight Transport Using an Agent - Based Model."
- Rodrigue, Jean Paul, Claude Comtois, and Brian Slack. 2016. *The Geography of Transport Systems*.
- Saaty, Thomas. 1993. *The Analytical Hierarchy Process: Planning, Priority, Setting, Resource Allocation*.
- Saleh, Sofyan M., and Ade Sjafruddin. 2010. "DI PROVINSI NANGGROE ACEH DARUSSALAM." 10(1):65–76.
- Sandberg, Thor-Erik, Hanssen, Terje A. Mathisen, and Finn Jorgensen. 2012. "Generalized Transport Cost in Intermodal Freight Transport."
- Shinghal, Nalin, and Tony Fowkes. 2002. "Freight Mode Choice and Adaptive Stated Preference." *Transportation Research Part E: Logistics and Transportation Review* 38(5):367–78.
- Stedjeseifi, M., N. P. Dellaert, W. Nuijten, T. Van Woensel, and R. Raoufi. 2014. "Multimodal Freight Transportation Planning: A Literature Review." *European Journal of Operational Research* 233(1):1–15. doi: 10.1016/j.ejor.2013.06.055.

- Suryadi, Kadarsah, Muhammad Ali Ramdhani, and Wuly Anisah. 2000. *Sistem Pendukung Keputusan: Suatu Wacana Struktural Idealisasi Dan Implementasi Konsep Pengembangan Keputusan*. Bandung: Remaja Rosdakarya.
- Tavasszy, Lori, Igor Davydenko, and Kees Ruijgrok. 2009. "The Extended Generalized Cost Concept and Its Application in Freight Transport and General Equilibrium Modeling." *Integration of Spatial Computable General Equilibrium and Transport Modelling* (May 2017):1–20.
- Thurstone, L. L. 1927. "A Law of Comparative Judgment." *Psychological Review* 34(4):273–86.
- Triantoro, Wegit. 2020. "Comparative Cost Analysis of Domestic Container Shipping Network: A Case Study of Indonesian Sea-Toll Concept." *Jurnal Penelitian Transportasi Laut* 22(1):33–46. doi: 10.25104/transla.v22i1.1535.
- Vannieuwenhuysse, B., L. Gelders, and L. Pintelon. 2003. "An Online Decision Support System for Transportation Mode Choice." *Logistics Information Management*, 16(2):125–33.
- Wibowo, Wahyu, and Irwan Chairuddin. 2017. "Sistem Angkutan Multimoda Dalam Mendukung Efisiensi Biaya Logistik Di Indonesia." *Jurnal Manajemen Transportasi Dan Logistik* 4(1):25. doi: 10.25292/j.mtl.v4i1.48.
- Yamada, Tadashi, Bona Frazila Russ, Jun Castro, and Eiichi Taniguchi. 2009. "Designing Multimodal Freight Transport Networks: A Heuristic Approach and Applications." *Transportation Science* 43(2):129–43. doi: 10.1287/trsc.1080.0250.

OPTIMIZATION OF THE GREEN INTERLOCKING EARTH BRICK MIX DESIGN USING RESPONSE SURFACE METHOD

Hidayati Asrah^{1,2}
Mohd Daniel Naufal Jackson Boyd¹
Sheikh Mohd Iqbal S Zainal Abidin^{1,2}
Abdul Karim Mirasa^{1,2}
Lim Chung Han^{1,2}

¹Faculty of Engineering, Universiti Malaysia Sabah (UMS), Malaysia, (E-mail: hidayati@ums.edu.my)

²Green Materials and Advanced Construction Technology (GMACT) Research Unit, Universiti Malaysia Sabah, Malaysia.

Abstract: *The utilization of Response Surface Method (RSM) in investigating the engineering properties of green Interlocking Compressed Earth Brick (ICEB) is a promising method compared to the conventional methods because it reduces the time taken and cost to be implemented. RSM is a tool used to develop models based on the input of independent and response variables, to which it predicts the output of the response with high accuracy. Therefore, the objectives of this research are to optimize the mix designs of green ICEB by using RSM and to study the engineering properties of green ICEB. The softwares used in this research are Design Expert Version 11, and Minitab 19 which is used for validation. The independent variables are cement and Spent Bleaching Earth Ash (SBEA), while the compressive strength and water absorption are the response variables. Based on the results, Design Expert Version 11 has the capability of developing a significance mathematical model equation to predict the response variables. The 2-D contour plots and 3-D plots are able to present the engineering properties realistically based on the actual experimental data. According to the RSM, the best mix for green ICEB with SBEA to provide the highest compressive strength is 94.6% cement and 5.4% SBEA, while the lowest water absorption is 90% cement and 10% SBEA.*

Keywords: *Response Surface Method, Interlocking Compressed Earth Brick, Spent Bleaching Earth Ash, Compressive Strength, Water Absorption*

Introduction

Many environmental issues such as pollution, deterioration of environment and exhaustion of resources have arisen caused by waste materials produced from manufacturing industries and human way of life all around the globe. The waste materials produced can be in various of types but for Malaysia, the common type of waste materials produced are such as plastics and industry wastes like Spent Bleaching Earth Ash (SBEA), palm oil fuel ash (POFA), spent bleaching earth (SBE) and fly ash. Jereme et al. (2015) found that Malaysia produces a considerable amount of waste due to the growth of population and the booming economy industry, in which only 25% of the waste materials are sent to sanitary landfills. Abdullah and Sulaiman (2013) stated that Malaysia is one of the main exporters of palm oil, producing tonnes to be exported to other Asian countries and Europe. As a result of this circumstance, millions of tonnes of solid and liquid palm oil waste have been created, with the majority of the wastes, such as fibres and shells, being disposed of in landfills. Song and Zhang (2018) also suggested that sustainable materials used as replacement must have lower maintenance, energy

consumption and cost, beneficial to environmental, and acquired from renewable energy sources. This is supported by Barbuta et al. (2015) whereby worldwide communities' awareness towards sustainability of environment have increased with regards to natural resources, raw materials, and its wastes. The largest waste production is from the construction industry, where there is a need for green materials to reduce environmental pollutions. This can help to reduce risk of complications from unhandled and overflowing of waste materials as well as reducing natural resources or other raw materials consuming.

One of the ways to use these waste materials effectively is by incorporating them into the construction sector, especially into building components such as interlocking bricks. Apart from using waste materials as its constituents, interlocking bricks also provide lower cost of production and faster installation (Asman et al., 2018). Currently there is a limited study on optimizing the mix design of green Interlocking Compressed Earth Brick (ICEB) using the SBEA. In Malaysia, the SBEA is conventionally dumped in the landfill where it may give rise to certain issues such as pollution due to the excess oil deterioration in the SBE. Other common ways to dispose of SBE include using them as animal feed or burning them (Loh et al., 2013). Therefore, due to overflowing SBEA in palm oil industry and it was difficult to manage properly, previous researchers suggest the wastes are used as the main raw material in building components (Wangrakdiskul et al., 2015).

Therefore, research on introducing SBEA into ICEB need to be done together with its effect on engineering properties of the bricks. The ICEB are generally manufactured with machinery and ready-made moulds at factories on a large scale. However, finalizing the optimum green ICEB mix proportion is a time-consuming process since it takes time to discover the best mix design based on lab testing. The behaviour of green ICEB in terms of compressive strength and water absorption is difficult to visualise using observation and analysis on paper. Only a few researchers had previously used RSM to optimise interlocking brick mix design utilising scrap rubber (Mohammed et al., 2018) and PET (Alaloul et al., 2020). Therefore, this research focuses on optimizing mix design of green ICEB containing SBEA using Response Surface Method (RSM). In this study, the Response Surface Method (RSM) was used to create a prediction model and visualise a three-dimensional plot for the response behaviour of compressive strength and water absorption against the % of SBEA replacement of the green ICEB. The RSM can provide optimal condition for input-controlled variables, in which the software will come up with a maximum or minimum response for certain field of concerns (Morshedi & Akbarian, 2014). Optimization of the mix design will contribute to manufacturing of higher-quality green ICEB containing SBEA. The established formula will guide the producers to produce ICEB which meet the required strength and water absorption requirements. This can be useful in terms of time saving and faster work in determining the best green ICEB mix design.

Methodology

The approach for achieving the research objectives is divided into two (2) phases. Phase 1 involves computer modelling utilising the response surface approach, whereas Phase 2 investigates the relationship between engineering parameters and properties of green ICEB. Design Expert (version 11) from Stat-Ease, Inc. was used to develop the RSM models and the results were validated using the Minitab 19. The data used to develop the RSM models was obtained from past laboratory works results (Haril, 2020) done at the Universiti Malaysia Sabah's Interlocking Compressed Earth Brick (ICEB) Factory. The laboratory results consist of nine (9) data for independent variables such as cement and SBEA, as well as responses such as compressive strength and water absorption. The set of data is shown in Table 1.

Table 1: Set of Data Used in RSM Modelling

Input		Output	
Cement (kg)	SBEA (kg)	Compressive Strength (MPa)	Water Absorption (%)
18.50	0	9.09	13.91
16.65	1.85	7.17	15.00
14.80	3.70	6.95	16.13
13.88	4.63	6.10	16.58
12.95	5.55	7.24	17.44
12.03	6.48	4.64	17.28
11.10	7.40	3.45	18.18
10.18	8.33	4.22	17.43
9.25	9.25	1.88	21.00

RSM Models Development

The data were inserted into Design-Expert (version 11) in which the technique of Face Centred Central Design (FCCCD) was used to obtain the RSM model. The factors and coded factor level used are shown in Table 2. The coded factor level was used to aid the interpretation of the coefficients fit to any experimental model in which the high value becomes +1 meanwhile the low value becomes -1.

Table 2: Coded Factor Level for Independent Variables

Independent Variable	Coded Factor Level		
	Min	Center	Max
	-1	0	1
Cement	9.25	12.95	18.50
SBEA	0	5.55	9.25

Optimization of ICEB Mix Design

Numerical optimization was used for this research, where the independent variables are the cement and SBEA, and response variable are the compressive strength and water absorption. The cement was adjusted to be in range from 0 to 18.5, meanwhile the SBEA was from 1 to 18.5. In the meantime, the response variables which are compressive strength and water absorption were adjusted to maximum. Next, the weight of each variable was set to 1 and the importance of each variable also can be adjusted according to the significance of it. The effects of SBEA as cement replacement in green ICEB were then studied using the 2D contour plot and 3D plot which was obtained after the analysis of data have been completed.

Results and Discussion

RSM Models for Compressive Strength

The RSM models were generated in the form of mathematical equation where they were used to predict the response which is based on the interaction between independent variables. The disparities between the predicted and actual response are represented as residuals, in which the actual response is subtracted from the predicted response. The closer the residual value is to zero (0), the more accurate the predicted response is. The mathematical equation shown in Equation 1 is used in this modelling to determine the projected compressive strength. This is based on the independent variables of cement (ranging from 9.25 kg to 18.5 kg) and SBEA (ranging from 0 kg to 9.25 kg). Table 3 shows the predicted response produced from the mathematical equation, as well as the residuals in which the overall RSM modelling is acceptable. The highest residual value is the fifth pair of data between cement and SBEA which

is 1.93, while the closest residual value to zero (0) is the first pair of data between cement and SBEA which is -0.1221.

$$\text{Compressive strength} = -594.50333 + 32.63326A + 31.93084B \quad (1)$$

where, A = Cement; and B = SBEA

Table 3: Actual and Predicted for Compressive Strength

Cement (kg)	SBEA (kg)	Actual (MPa)	Predicted (kg)	Residual
18.50	0	9.09	9.21	-0.1221
16.65	1.85	7.17	7.91	-0.7426
14.80	3.70	6.95	6.61	0.3369
13.88	4.63	6.10	6.29	-0.1862
12.95	5.55	7.24	5.31	1.9300
12.03	6.48	4.64	4.99	-0.3467
11.10	7.40	3.45	4.01	-0.5641
10.18	8.33	4.22	3.69	0.5328
9.25	9.25	1.88	2.71	-0.8346

Figure 1 presents the normal plot of the residuals for the compressive strength as the response which is attained from the RSM modelling. All of the residual's data approximately fall on the straight line. Figure 2 shows the predicted response against the actual response graph for the modelling where the compressive strength act as a response. It can be seen that most of the predicted response are placed along the straight line of actual response. Figure 3 exhibits the relationship between residuals and predicted response where the compressive strength acts as response. All the data fall between the limits, which are 4.6553 and -4.6553; and also closer to the zero (0) line. From the figure, it can be deduced that the modelling is acceptable due to high accuracy of data obtained.

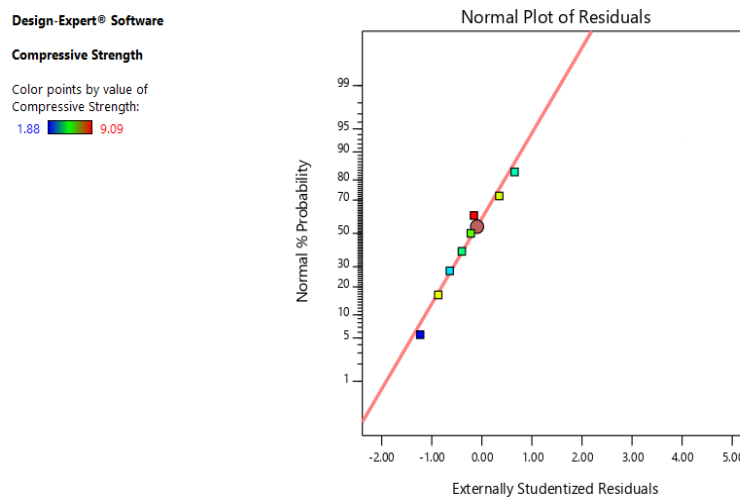


Figure 1: Normal Plot for Compressive Strength Residuals

Design-Expert® Software
Compressive Strength
Color points by value of
Compressive Strength:
1.88 9.09

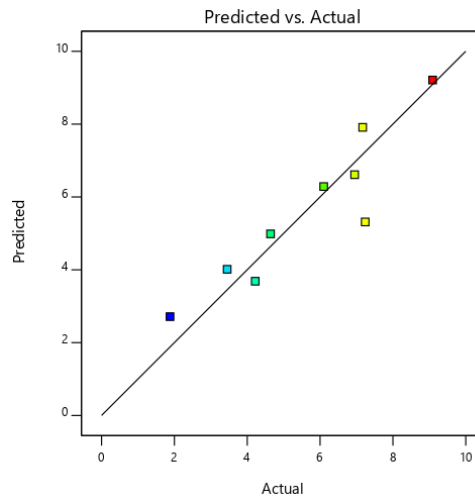


Figure 2: Predicted vs. Actual for Compressive Strength

Design-Expert® Software
Compressive Strength
Color points by value of
Compressive Strength:
1.88 9.09

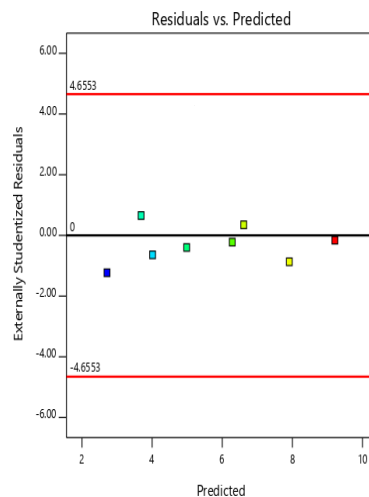


Figure 3: Residuals vs. Predicted for Compressive Strength

RSM Models for Water Absorption

Equation 2 shows the mathematical equation used in this modelling to obtain the predicted water absorption. The predicted response obtained from the mathematical equation can be observed in Table 4 together with the residuals. The overall RSM modelling is acceptable because the highest residual value is in the ninth pair of data between cement and SBEA which is 0.9797, while the closest residual value to zero (0) is in the first pair of data between cement and SBEA which is 0.0436.

$$\text{Water absorption} = 2013.27667 + (-108.07623A) + (-107.41095B) \quad (2)$$

where, A = Cement; and B = SBEA

Figure 4 shows a normal plot of the residuals for water absorption as a response obtained from RSM modelling, with the majority of the residual data falling on a straight line and just one residual data being abnormally placed. Figure 5 shows the predicted response against the actual response graph for the modelling where the water absorption acts as response. Most of the predicted responses are aligned with the actual response's straight line. The relationship between residuals and predicted response is seen in Figure 6, where water

absorption also functions as a response. All the data fall between the limits of 4.6553 and -4.6553; and also closer to the zero (0) line. Figure 4, 5 and 6 prove the modelling is acceptable due to high accuracy of data obtained.

Table 4: Actual and Predicted for Water Absorption

Cement (kg)	SBEA (kg)	Actual (%)	Predicted (%)	Residual
18.50	0	13.91	13.87	0.0436
16.65	1.85	15.00	15.10	-0.0972
14.80	3.70	16.13	16.33	-0.1979
13.88	4.63	16.58	15.87	0.7141
12.95	5.55	17.44	17.56	-0.1187
12.03	6.48	17.28	17.10	0.1833
11.10	7.40	18.18	18.79	-0.6095
10.18	8.33	17.43	18.33	-0.8974
9.25	9.25	21.00	20.02	0.9797

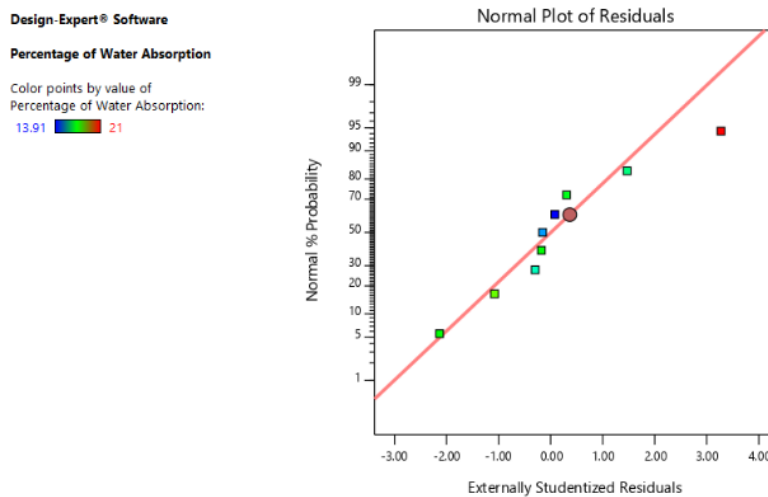


Figure 4: Normal Plot for Water Absorption Residuals

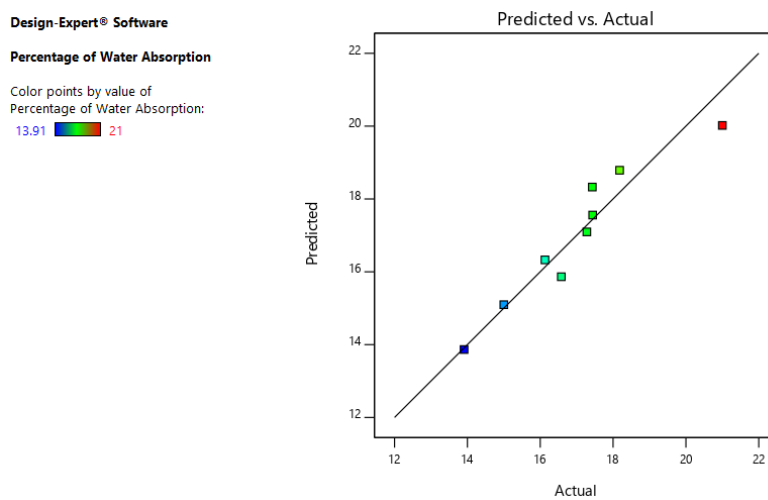


Figure 5: Predicted vs. Actual for Water Absorption

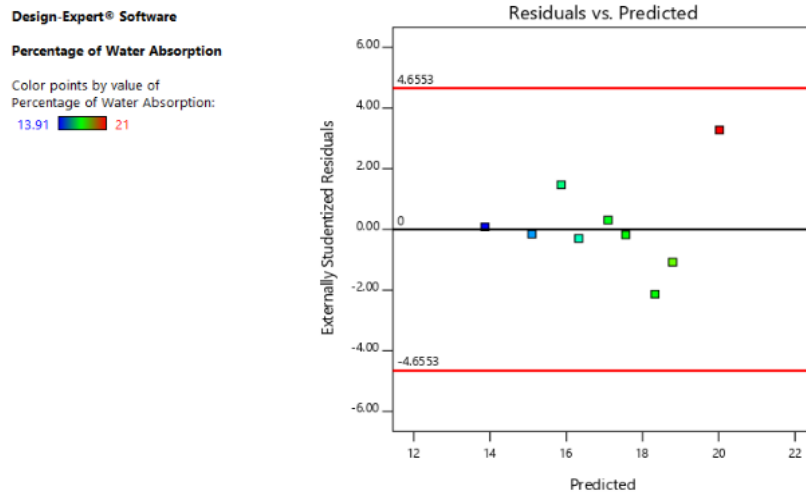


Figure 6: Residuals vs. Predicted for Water Absorption

Validation of Compressive Strength RSM Model

Table 5 compares Design Expert (Version 11) and Minitab 19 software results for compressive strength. As shown in Table 5, both software created a significant model with a P-value less than 0.05 ($P < 0.05$), which is 0.0030. The F-value (17.88) obtained from both software also indicated that the model is significant and the projected R-squared also revealed that the models created by both software are in fair agreement (0.7251). Overall, RSM model for compressive strength developed by Design Expert (Version 11) is comparable to Minitab's RSM model for compressive strength.

Table 5: Comparison of Software Outputs for Compressive Strength

	Design Expert (Version 11)	Minitab 19	% of Difference
F-Value	17.88	17.88	0
P-Value	0.00030	0.00030	0
Predicted R ²	0.7251	0.7251	0

Validation of Water Absorption RSM Model

Table 6 shows the comparison of software outputs for water absorption between Design Expert (Version 11) and Minitab 19. From Table 6, both software created a significant model with a P-value of less than 0.05 ($P < 0.05$), which equals 0.0006. The F-value obtained from both software suggested that the model is significant (32.33), and the projected R-squared also indicated that the models created by both software are in fair agreement (0.7518). Thus, the RSM model for water absorption generated by Design Expert (Version 11) is equally competent as Minitab's RSM model for compressive strength.

Table 6: Comparison of Software Outputs for Water Absorption

	Design Expert (Version 11)	Minitab 19	% of Difference
F-Value	32.33	32.33	0
P-Value	0.00060	0.00060	0
Predicted R ²	0.7518	0.7518	0

Optimization of ICEB Proportions

The result of compressive strength optimization can be observed in Table 7. The software indicated that green ICEB has maximum compressive strength of 7.562 MPa at 17.471 kg

cement (94.6%) and 1.000 kg SBEA (5.4%). This is greater than the compressive strength of ICEB with 10% SBEA as cement substitute, which is 7.17 MPa.

Table 7: Optimized Mix Proportions for Compressive Strength

Number	Cement (kg)	SBEA (kg)	Compressive Strength (MPa)
1	17.471	1.000	7.562

The result of water absorption optimization can be observed in Table 8 where the software suggested cement content of 16.608 kg (90%) and SBEA 1.962 kg (10%). These suggestions result in output water absorption of 7.603% which is lower than ICEB with 50% of SBEA as cement replacement by 21%.

Table 8: Optimized Mix Proportions for Water Absorption

Number	Cement (kg)	SBEA (kg)	Water Absorption (%)
1	16.608	1.962	7.603

Relationship of SBEA as Cement Replacement Towards Compressive Strength of ICEB

Figure 7(a) –(b) display the 2-D and 3-D contour plot of the relationship between independent variables cement and SBEA, with the response variable compressive strength, respectively. From Figure 7(a), the change in colour from blue to red shows the increase in compressive strength value. Therefore, it can be deduced that high proportions of SBEA and low proportions of cement result in low ICEB compressive strength values. Meanwhile, in Figure 7(b) it can be inferred that the proportions of cement are the slightly more dominant factor in affecting compressive strength of ICEB compared to the proportions of SBEA.

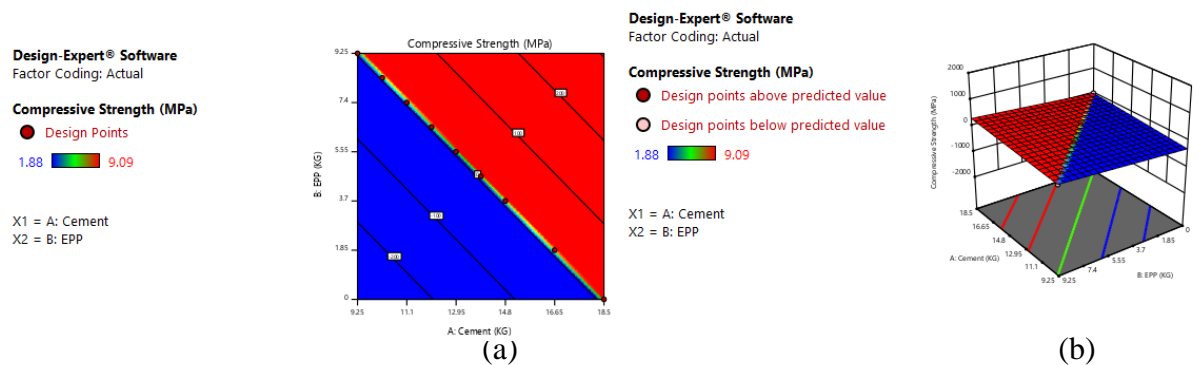


Figure 7: Contour Plot for Compressive Strength (a) 2-D; (b) 3-D

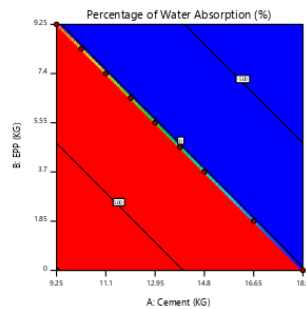
Relationship of SBEA as Cement Replacement Towards Water Absorption of ICEB

Figure 8(a)-(b) display the 2-D and 3-D contour plot for the relationship between independent variables cement and SBEA with the response variable water absorption. From the figures, it can be seen that high SBEA and low cement proportions resulted in high ICEB water absorption values. The 3D depiction of the association between the independent variable cement and SBEA shows that, as compared to cement proportions, SBEA proportions are a more important component in influencing ICEB water absorption.

Design-Expert® Software
Factor Coding: Actual

Percentage of Water Absorption (%)
● Design Points
13.91

X1 = A: Cement
X2 = B: EPP

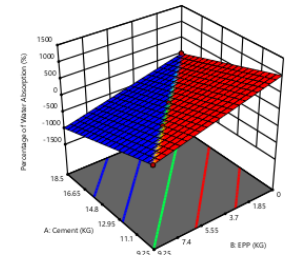


(a)

Design-Expert® Software
Factor Coding: Actual

Percentage of Water Absorption (%)
● Design points above predicted value
○ Design points below predicted value
13.91

X1 = A: Cement
X2 = B: EPP



(b)

Figure 8: Contour Plot for Compressive Strength (a) 2-D; (b) 3-D

Conclusion

Based on the results obtained from this research, the following conclusions have been made:

1. By using the RSM through Design Expert (Version 11), the optimized green ICEB mix to obtain the highest compressive strength is by using 94.6% of cement and 5.4% of SBEA, which results in a compressive strength of 7.562 MPa.
2. The optimized mix of green ICEB based on water absorption is by using 90% cement and 10% SBEA. The mix produced the lowest water absorption of 7.603%.
3. The RSM models developed by Design Expert (Version 11) demonstrated positive results where the predicted R-squared values, F-values, and P-values indicated accurate models for both compressive strength and water absorption as a response. It proved that the software is able to develop a model with small percentage of error between the actual and predicted data.
4. The higher the SBEA proportions and the lower the cement proportions in green ICEB, the lower the brick's compressive strength. The cement proportions had a significantly greater influence on compressive strength than SBEA proportions.
5. The greater the amount of SBEA used to substitute cement in green ICEB, the higher the percentage of water absorption for the brick. The SBEA proportions are more dominant compared to cement proportions in affecting the percentage of water absorption.

References

- Abdullah, N., & Sulaiman, F. (2013). The Oil Palm Wastes in Malaysia. Biomass Now - Sustainable Growth And Use. doi: 10.5772/55302
- Alaloul, W., John, V., & Musarat, M. (2020). Mechanical and Thermal Properties of Interlocking Bricks Utilizing Wasted Polyethylene Terephthalate. International Journal Of Concrete Structures And Materials, 14(1). <https://doi.org/10.1186/s40069-020-00399-9>
- Asman, N., Bolong, N., Mirasa, A.K., Saad, I., Asrah, H., & Lim, C. (2018). Life Cycle Assessment of Interlocking Bricks System Construction-A Review. In: Joint Seminar on Science, Engineering and Technology, South Korea.
- Barbuta, M., Bucur, R., Cimpeanu, S., Paraschiv, G., & Bucur, D. (2015). Wastes in Building Materials Industry. Agroecology. <https://doi.org/10.5772/59933>
- Haril, H.S. (2020). The Properties of Interlocking Eco-Processed Pozzolan Brick. B. Eng. Thesis, Sabah: Universiti Malaysia Sabah.
- Jereme, I.A., Alam, M.M. and Siwar, C. (2015). Waste Recycling in Malaysia: Transition from Developing to Developed Country. Indian Journal of Education and Information Management. Vol.4(1),1-14. <http://ijeim.informaticspublishing.com/index.php/ijeim/article/viewFile/80238/62033>

- Loh, S., James, S., Ngatiman, M., Cheong, K., Choo, Y., & Lim, W. (2013). Enhancement of palm oil refinery waste – Spent bleaching earth (SBE) into bio 54 organic fertilizer and their effects on crop biomass growth. *Industrial Crops And Products*, 49, 775-781. <https://doi.org/10.1016/j.indcrop.2013.06.016>
- Morshedi, A., & Akbarian, M. (2015). Application of Response Surface Methodology: Design of Experiments and Optimization: A Mini Review. *Indian Journal of Fundamental and Applied Life Sciences*, 4 (4), 2434-2439.
- S Mohammed, B., Liew, M., S Alaloul, W., Al-Fakih, A., Ibrahim, W., & Adamu, M. (2018). Development of rubberized geopolymer interlocking bricks. *Case Studies In Construction Materials*, 8, 401-408. <https://doi.org/10.1016/j.cscm.2018.03.007>
- Song, Y., & Zhang, H. (2018). Research on sustainability of building materials. *IOP Conference Series: Materials Science And Engineering*, 452, 022169. <https://doi.org/10.1088/1757-899x/452/2/022169>
- Wanrakdiskul, U., Khonkaew, P., & Wongchareonsin, T. (2015). Use of the Spent Bleaching Earth from Palm Oil Industry in Non Fired Wall Tiles. *The International Journal Of Advanced Culture Technology*, 3(2), 15-24. <https://doi.org/10.17703/ijact.2015.3.2.15>

FROM PADDY FIELDS TO TRADITIONAL FOOD: EVALUATING THE PROMOTION OF KEDAH AS A TOURIST DESTINATION

Norhanim Abdul Razak¹

¹School of Tourism, Hospitality & Event Management, COLGIS, Universiti Utara Malaysia, (E-mail: norhanim@uum.edu.my)

Abstract: *It is claimed that the state tourism officials continuously promote places of interest and attractions within Kedah even during the enforcement of MCO in Malaysia. The ongoing marketing effort is worthwhile as potential tourists can plan and choose the places they would like to visit after the lockdown has been lifted. Hence, it is vital to evaluate the current promotion of Kedah as a tourist destination as marketing can play a crucial role in enhancing the appeal of a particular site and attracting tourists. Firstly, this paper investigates how the state of Kedah has been marketed by the national and state tourism promotional bodies. Additionally, the portrayals of Kedah by international travel organizations were also examined. The semiotic analysis method was employed in the assessment, where it focuses on how Kedah has been presented on the websites of these organizations. In general, the findings of this paper uncovered several prominent visual and textual signifiers showing and describing field fields on the websites of both national and state promotional organizations. The attraction points such as Paddy Museum, Zahir Mosque, Balai Nobat, Mahathir's Birth Place and Pekan Rabu have been featured strongly in portraying the capital city, Alor Setar. The signified meanings of the uniqueness and exoticism of local cuisines are reflected through visual and textual signifiers, including laksa (a dish comprising rice noodles and fish gravy), pekasam (fermented fish) and traditional snacks. As Kedah is popularly known as the 'Rice Bowl of Malaysia', it is reasonable that visual and textual signifiers of paddy fields and attractions associated with paddy have been presented widely on the websites. Overall, it is reflected that the key theme in marketing Kedah as a tourist destination via the travel promotional websites is the projection of rural-cultural tourism.*

Keywords: *Kedah, tourism promotion, semiotic analysis, local cuisines*

Introduction

Kedah is well-known as the 'Ricebowl of Malaysia'. As one of the states in Malaysia, Kedah is renowned for the cultivation of paddy and producing rice for the country (MADA, 2020). According to Mohamad and Jamil (2012) Kedah supplies one-third of rice production in Malaysia. It is said that the flat terrain in Kedah and the ability to retain water makes it suitable for paddy plantation. In tracing the history of paddy plantations in this state, Ibrahim (1991) mentioned that this grain has been planted near Sungai Muda and Merbok since a long time ago. Since then, it has spread widely to many areas of Kedah until this state has been popularly labelled as the "Ricebowl of Malaysia". Although some paddy field areas had to be sacrificed for developmental projects, the former Menteri Besar (MB) of Kedah, Datuk Seri Ahmad Bashah Md Hanipah, argues that Kedah will continue to be the Ricebowl of Malaysia. This argument is because rice field areas that had been used for development projects will be replaced for paddy plantations elsewhere in the state (Halid, 2016). Similarly, the current MB also highlighted the dilemma facing Kedah. Specifically, the state has to retain some areas of

paddy field and forest reserve rather than develop these sites that can give a better return to the state economically (Zulkifli, 2021).

Even though Kedah has been known as an agricultural state, it is vital to develop other sectors for its economic benefits and sustainability (Halid, 2016). This attempt is evident as the state has been investing in the growth of the tourism industry. Over time, numerous resources found in the state have been developed for tourism purposes. It is mentioned by Mohamad and Jamil (2012) that Kedah has several interesting historical, adventure, religious, natural and recreation sites for touristic reasons. The value of the tourism industry was also reflected through the recent statement made by the current Menteri Besar (MB) of Kedah, who had acknowledged that the budget allocated by the federal government to expand the research for Sungai Batu Archaeological site and to fund the erosion mitigation project in Pantai Merdeka (Zulkifli, 2021). The allocation of funds for these two projects will contribute significantly towards the development of tourism in Kedah, particularly in the contexts of heritage, beach and community-based tourism.

Tourism organizations responsible for tourism development and marketing of Kedah had organized and initiated several programmes to boost the tourism industry in the state (“Kedah sasar perkenal 50 pakej pelancongan baharu”, 2016). A new tagline titled ‘Kedah, Malaysia: Where It All Began’ has been introduced as part of the launched of ‘Discover Kedah’ campaign (“Discover Kedah 2016”, 2015). This promotional campaign highlights the archaeological sites and historical attractions located in Kedah. Two main archaeological sites in Kedah are Bujang Valley and Sungai Batu Complex. According to researchers from USM, the civilisation at Sungai Batu had been identified to be in existence since 535 BC (Seng, 2017). This discovery places Sungai Batu as the oldest civilisation in the Southeast Asia region. Hence, the launched of the new tagline which emphasizes on ancient history seems appropriate for this state. Moreover, one of the efforts undertaken was the organization of a workshop to improve tourism products, mainly on the mainland of Kedah. It was identified that the mainland of Kedah has several spectacular assets such as natural heritage and royal heritage attractions. The natural heritage resources such as Gunung Jerai and Tasik Pedu have been recognized among key attributes, while Balai Besar and Zahir Mosque have been acknowledged as key heritage attractions for the state (“Kedah sasar perkenal 50 pakej pelancongan baharu”, 2016).

At the same time, several niche markets which can be marketed have been identified. These include backpackers, family travellers, recreational travellers and honeymooner travellers. Furthermore, it is recommended for Kedah to focus on fishing and angling markets as these activities can provide additional income for local fishermen (Ismail, 2021). As Kedah recently entered Phase 4 of Pelan Pemulihan Negara, tourism authorities have activated a few tourism activities (Ismail, 2021). One program organized is ‘Jom Ride Ke Kedah’, which targets high power bikers.

Problem Statement

As mentioned above, various efforts have been carried out to develop Kedah as one of the premier tourist destinations in Malaysia. Yet, one of the issues identified in positioning Kedah as a primary tourist destination is connected to the promotion of this state. From a tourism perspective, Kedah possesses several outstanding destinations and attractions. However, the promotion of these sites are lacking and need to be strengthened even further. Furthermore, the outbreak of the COVID-19 health pandemic has tremendously impacted the tourism industry in this state. Due to that, many tourism operators and businesses, either on Langkawi Island or on the mainland of Kedah, are required to stop their operations since March 2020. Owing to the importance of this industry, the state tourism officials continue to aggressively promote

places of interest and attractions within Kedah even during the enforcement of MCO in Malaysia. These promotional efforts are apparent from the observation of the mass media. It is believed that the ongoing marketing effort is valuable as potential tourists can plan and choose the places they would like to visit after the lockdown has been lifted. Hence, it is vital to evaluate the current promotion of Kedah as a tourist destination as marketing can play a crucial role in enhancing the appeal of a particular site and drawing tourist visitations. This paper investigates how the state of Kedah has been marketed by the national and state tourism promotional bodies. Additionally, the portrayals of Kedah by international travel organizations, Tripadvisor and Lonely Planet were examined as well. The analysis carried out in this paper focuses on the destinations and attractions on the mainland of Kedah that have been promoted rather than on Langkawi Island. This study concentrates on the mainland of Kedah as Langkawi Island is already one of the top tourist destinations in Malaysia, and this island has been previously examined extensively. In contrast, more research needs to be done in the context of the mainland of Kedah to boost its future tourism potentials.

Literature Review

The review of the literature of previous studies which have investigated Kedah as a tourist destination uncovered that past scholars have delved into several research areas. A study by Mohamad and Jamil (2012) had investigated the motivational factors to visit Kedah among tourists. The findings of this study revealed that rest and relaxation are the primary factors that motivate tourists to visit Langkawi Island. Besides, tourists found the island of legend the best place to escape, experience night entertainment, socialize, and explore the culture. After Langkawi, the city of Alor Setar is rated by tourists as the second-best destination to visit, particularly for visiting friends and relatives. For adventure and fitness reasons, tourists have selected Sedim River as the suitable site for these activities (Mohamad & Jamil, 2012).

Food is one of the main attributes which can attract tourists to visit a particular destination or site and have been incorporated into tourism promotional materials. There are two studies that have explored foods found in the state of Kedah. For example, Ishak, Ismail, Saad and Md Ramli (2021) examined the Malay heritage foods in Kedah. The findings of this research identified some of the unique dishes eaten by locals. As the state of Kedah is well-known with rice, sticky rice with mango, durian, and salted fish are among food traditional food available in the state. Some of these dishes had a Thai influence as the location of Kedah is bordered by Thailand. Among the favourite breakfast found in Kedah is sticky rice mango, or called *pulut manga*. This food has Thai influence as the state of Kedah is located close to Thailand. Other dishes such as Malay mixed herb rice or known locally as *nasi ulam*, which is often eaten with boiled yam stems in the sour sauce, are famous among older generations. Two other specialities commonly associated with traditional Kedahans are beef curry cooked with banana stem and grilled snakehead fish. Findings of a study by Ishak et al. (2021) demonstrated that some traditional cuisines are rice-based dishes. This preference or food culture is reasonable as the state is the primary rice producer in the country. Some of the traditional and popular heritage cuisines in this state are made from local herbs and natural ingredients available in the surrounding. As some of the heritage food of Kedah appeared fairly distinctive and exotic, it can further strengthen the identity of Kedah as a tourist destination. Wahid (2015) explores the potential of the traditional snack known as 'bahulu' as a tourism product. The findings of this research confirmed that tourists considered 'bahulu' could be a tourism product. However, its quality and packaging need to be improved to present 'bahulu' as a tourism product representing the state of Kedah.

Yusof and Ismail (2016) reviewed the brand identity of Langkawi Island as a tourist destination. It is uncovered in this research that DMO plays a significant role in creating and

highlighting the destination brands of this island to tourists. For over 35 years, the tourism authorities of Langkawi Island had chosen and projected several themes and taglines to promote this island and attract different market segments to visit. However, Yusof and Ismail allege that there was a lack of consultation with the stakeholders in selecting and promoting images or slogans of Langkawi Island over the years. Therefore, these authors suggested that DMOs have to consult various stakeholders before choosing the best destination images and taglines to represent a particular destination or place.

Method

In evaluating the portrayal of Kedah as a tourist destination, semiotic analysis was employed in this paper. In general, semiotic analysis, also known as semiotics, can be referred to as a study of signs and symbols. Semiotics, according to Ramachandran (2005:70), “is a tool in addressing sign systems systematically”. Tsotra, Janson & Cecez-Kecmanovic (2004) state that semiotics as a linguistic assessment in the field of human sciences is a useful method in revealing meanings in various contexts, including online marketing. Historically, the term semiotics originated from the word ‘semeion’, which denotes ‘sign’ in the Greek language (Noth, 1990). This term has been employed as a communication or representation tool since a long time ago.

Two scholars who pioneered the study of semiotics are a Swiss linguist named Ferdinand de Saussure (1857-1913) and an American philosopher Charles Sanders Peirce (1839-1914) (Ramachandran, 2005). These two individuals have been regarded as the founders of semiotic study. The model of the semiotics conceptualized by Saussure proposed ways to analyse signs in the context of society. He proposed there are three aspects to using semiotic as an assessment tool. These components are i) sign, ii) a signifier, and iii) the signified (Ramachandran, 2005). Saussure (1965) describes the signifier as the actual objects while the signified is the concept in the individual’s mind or a mental mind.

It is, therefore, appropriate to select semiotic analysis in the assessment carried out in this paper as destination marketers commonly use semiotic touristic language comprising of signs and images to present and project tourist destinations to potential visitors (Naghizadeh, 2021). Additionally, Bonarou (2021) argues that visual images or signifiers are particularly crucial in the projections of realities of tourism discourses by tourist destinations. In this paper, semiotic analysis was applied to assess the portrayal of Kedah as a tourist destination in contemporary tourism websites developed by public and private marketing organizations. For public organizations, the recent websites of Tourism Malaysia and the state tourism body, as well as the private travel agencies such as Lonely Planet and Trip Advisor, were assessed in this paper. For this study, the visual images and textual descriptions featured on the websites are considered signs. Then, the main signifiers in the projection of Kedah were identified, and the signified meanings were reviewed in this paper. Finally, the overall representation of Kedah as a tourist destination based on the signifiers and signified meanings was also discussed.

Findings

National and State Promotional Websites

In the tourism promotional websites, visual signs are the main highlights in presenting the destinations and sites to enhance the appeal of these places to potential visitors. As a famous phrase claimed that a picture is worth a thousand words, the visual signs have immersed value in the context of tourism promotional websites. In fact, tourism promotional websites are filled with many graphical images. The first website examined in this paper is the promotional website of Tourism Malaysia, as it is the official tourism organization responsible for marketing the country. In promoting Kedah as a tourist destination, the promotional video

which is incorporated into the interactive brochure titled Malaysia Travel Guide starts with an image of a paddy field. In actual fact, paddy fields are shown more than once in the promotional video. A caption ‘Ancient Ruins, Beach Holidays and Pastoral Charms’ has been featured as part of this pictorial image. This caption acts as a signifier to accentuate the association of this state with archaeological sites, beach tourism and rural and agricultural lifestyles. Attractions associated with these themes are projected prominently in the promotional video and online brochures created by Tourism Malaysia. Owing to the important of paddy to Kedah, visual signifiers of paddy fields have been presented on the front cover of two brochures promoting the districts of Kubang Pasu and Pendang by the state government of Kedah. The relatively large images of paddy fields are the main highlight of these two districts promoted to visitors. Images of paddy fields project Kedah as a rural heritage destination.

In addition to paddy fields, there are several other main signifiers which are represented on the tourism websites. For example, the online brochure incorporated into the website of Tourism Malaysia titled Kedah Map and Guide (2015) presented Zahir Mosque on the front cover of its online brochure. The fairly large size of the mosque, which appeared on the cover, showcases the uniqueness of the architecture of this historical mosque. The signified meaning of the visual signifier of a mosque demonstrates the importance of Islam to the state and Kedahans. Another relatively new mosque that is presented as a place of interest is the Al-Bukhary Mosque. Both of these mosques are located in the capital city, Alor Setar. Overall, there are several top visual signifiers incorporated as main places of interest in the state of Kedah. These visual signifiers denote the portrayal of heritage attractions, particularly the built heritage associated with religious sites such as the mosque and Wat Nikrodharam, a Buddhist temple. In addition, these visuals portrayed to readers that Kedah is a multi-ethnic destination supporting the national tagline of Malaysia as a “Truly Asia”.

There are several spectacular visual signifiers depicting the royal heritage of Kedah, which are manifested on the national and state online brochures. These include Balai Nobat, Balai Besar and Royal Museum. Other fascinating visuals include Paddy Museum, Big Clock Building, Pekan Rabu, Terusan Wan Muhamad Saman and Tun Mahathir’s Birth Place project Kedah as a cultural heritage site. Signifiers to denote archaeological themes and natural attractions in rural settings are evident via images of Gunung Jerai, Gunung Keriang, Bujang Valley Archaeological Site, Ulu Muda Eco Park, Sungai Sedim Whitewater Rafting and Ulu Legong Hot Spring. Based on the assessment of the visual signifiers, it is apparent that this state is projecting several niche markets for tourists, from a few sub-categories of heritage tourism to natural and rural tourism. Additionally, several traditional cuisines and snacks known to be consumed by the local population in Kedah, such as laksa, has been presented on the website of Tourism Malaysia. Several visuals of traditional cuisines and snacks associated with Kedahans such laksa Kedah, gulai daging batang pisang, kuih dangai, kuih bunga pundak, kuih pek nga and kuih karas are depicted on the website of the state government. The portrayal of these rare local cuisines and snacks projects Kedah as an exotic destination to potential visitors. However, one familiar cuisine which is beef noodle soup is also added in the promotional material.

The textual signifiers are essential in providing detailed descriptions to support the visuals included on the website. In introducing the state, it is claimed that

Kedah beckons visitors with picturesque views and rustic charm. The state is known as the Ricebowl of Malaysia for its vast expanses of rice fields. Kedah is also touted as the most ancient state in Malaysia. It lays claim to some of the most outstanding historical attractions in the region Bujang Valley, which was the cradle of a thriving ancient civilisation. The state capital of Kedah is Alor Setar, a bustling town with impressive landmarks and historic buildings.”

(Brochure Kedah Map and Guide, 2015).

Firstly, this quote acts as a textual signifier to project the rural lifestyle of Kedah and the agricultural landscape. The inclusion of this quote supports visual images represented on the websites particularly in relation to paddy fields. Furthermore, the focus on archaeology is evident in the quote. This finding is parallel with the tagline ‘Where It All Began’ employed by both national and state promotional bodies since 2016. As apparent in the quote, a combination of rural and modern elements have been presented on the website. It is essential to add some elements of modernity rather than just focusing on rurality and traditional attributes. More than one category of tourism attraction is presented to tourists on the websites of national and state organizations, particularly emphasizing its rural, historical and modernity.

There are several textual signifiers describing local cuisines that have been presented on the websites of national and state promotional organizations. For example, it is stated that

Kedah is the place to savour an assortment of Northern favourites. Among the specialities in Kedah is Laksa Kuala Kedah, a dish comprising rice noodles and aromatic fish gravy garnished with cucumber, onion and herbs. Other delicacies include Pekasam or a preserved salted fish, and Nasi Ulam, which is a combination of rice, fresh herbs and spices. Other unique dishes include Gulai Rebung, or stir-fried bamboo shoots.

(Kedah Map and Guide, 2015)

As reflected in the quote above, one of the famous dishes in this state is Laksa Kedah. The uniqueness of laksa has been incorporated into the state brochures as well. For example, under a section labelled as ‘Kedah Cuisine and a Cuppa’, it is mentioned that “there are recipes so original to the state until it bears its name. Laksa Kedah is one such must-try, a fish-based soupy rice noodle dish. For a local cuppa, try our local coffees such as ‘kopi Kedah’ and ‘kopi Cap Gantang’ and you won’t go wrong”. As presented on the websites, Kedah is a special place to enjoy the signature laksa and other unique and exotic cuisines. The state promotional materials also acknowledged local coffees and presented them to visitors. Overall, visual images and textual descriptions of traditional cuisines, snacks and local beverages are among main components included in the promotional websites developed by national and state organizations.

Lonely Planet and Tripadvisor

The websites of Lonely Planet and Tripadvisor were also analysed in this paper. The assessment of both public and private organizations are important to obtain a comprehensive understanding of how the state of Kedah has been marketed currently. Moreover, potential visitors will look into various websites, either public or private. Both Tripadvisor and Lonely Planet websites have incorporated numerous visual and verbal signifiers in promoting Kedah. A number of signifiers that appeared in the portrayal of the capital city Alor Setar are Aman Central, Zahir Mosque, Paddy Museum, Pekan Rabu Complex, Alor Setar Tower, Tun Mahathir Birth Place, Kedah Royal Museum, Al-Bukhary Mosque and Wat Nikrodharam. The archaeological site, Bujang Valley, is highlighted as one of the main tourist attractions that should be visited by tourists. Nature-based sites are also marketed by these websites. For example, Tripadvisor has included Sungai Sedim Recreational Forest and Pantai Merdeka, among core tourist attractions in the state of Kedah. In addition to visual images, verbal signifiers provide basic information and the best part of the attractions, and places are mentioned. These two websites mainly highlight the top tourist attractions in different regions of Kedah that should be visited by tourists. Comments and remarks made by the previous

tourist who have visited these sites and attractions are also available on these websites. For example, there are some positive feedbacks from past tourists who visited Paddy Museum describing its uniqueness. Lastly, both local and modern food outlets have been incorporated into the promotion of Kedah by Tripadvisor and Lonely Planet. This is done to inform foreign tourists of the availability of both traditional and modern cuisines in this state.

Discussion

Based on the analysis of the visual and verbal signs on these websites, it is apparent that the promotion of the state of Kedah as a tourist destination has been consistently presented by these tourism organizations. In particular, these four websites featured almost similar visual images or signifiers to promote Kedah to potential visitors. However, a more detailed explanation in the form of verbal signifiers is available on the state tourism website. Similarly, Tourism Malaysia, as the official body selected to market destinations in Malaysia, including Kedah incorporated fairly extensive information on Kedah. As mentioned in the literature section Kedah is widely known as the 'Ricebowl of Malaysia', it is not surprising that visual signifiers of paddy fields landscape and paddy museum have been integrated into the websites of these four promotional organizations. One of the iconic visual signifiers in the promotion of Kedah is the pictorial image of paddy field area surrounded Gunung Keriang which is located not far from the capital city of Alor Setar. In terms of destinations, sites and attractions located surrounding the capital city, Alor Setar have been listed as places of interest in these four websites. Sites such as Zahir Mosque, Balai Nobat, Balai Besar, Paddy Museum and Pekan Rabu are among the main features to mark the identity of the city. This observation is consistent with findings reported by Mohamad and Jamil (2012), which stated that the capital city Alor Setar is considered by tourists as the second best site to be visited in Kedah after Langkawi. Hence, this finding found that tourism promotional organizations, either public or private, incorporated many sites and attractions within Alor Setar to lure tourists.

Besides, in the literature review section, Ishak et al. (2021) claimed that local foods play a significant role in tourism. The findings of this paper support this claim by demonstrating visual and verbal signifiers associated with food and beverages, including local cuisines, have been incorporated into tourism promotional websites. In addition, some of the unique traditional dishes and local snacks, including those made from rice or glutinous rice, are showcased on tourism websites. In fact, several exotic dishes commonly consumed by locals can accentuate the identity of Kedah as a unique tourist destination in Malaysia.

On the whole, the findings of this paper demonstrate that both public and private destination marketers play significant roles in creating and projecting a particular image of a destination through the selection of signifiers to represent the destinations. In the context of Kedah, the original image of this state as the 'Ricebowl of Malaysia' has been accentuated by these four websites. As mentioned in the introduction section, programmes and workshops to discuss the growth of tourism in Kedah had been carried out with several of the stakeholders. The findings of this paper are different from the observation made by Yusof and Ismail (2016), which mentioned that the branding and taglines of Langkawi had been modified over the years without consultation with stakeholders.

Conclusion

In conclusion, this paper evaluated the portrayal of Kedah as a tourist destination using semiotic analysis. Based on the assessment, it was identified that the websites of Tourism Malaysia, state government, Lonely Planet and Tripadvisor had incorporated many similar signifiers in highlighting the core tourism destinations and attractions with the mainland of Kedah. The assessment also pointed that several visual and verbal signifiers, particularly paddy fields,

paddy museums, local cuisines made from rice and exotic local dishes, have been represented to attract potential tourists. Several categories of tourism attractions have been highlighted on these websites, where heritage tourism such as royal heritage, built heritage, *archaeological heritage*, religious heritage and cultural heritage have been portrayed. Natural heritage attractions in the context of the rural landscape are also available. However, some modern attractions such as shopping malls, a tower and western food outlets have been included in the description of the capital city. Alor Setar. These attractions are integrated into promotional material in order to balance the portrayal of Kedah as a rural and exotic destination to reflect its branding and identity as the 'Ricebowl of Malaysia'.

References

- Bonarou, C. (2021). The poetics of travel through unravelling visual representations on postcards: A critical semiotics analysis. *Journal of Tourism, Heritage & Services Marketing*, 7(1), 44-53. <http://dx.doi.org/10.5281/zenodo.4519317>
- Halid, S. (2016, October 28). Kedah negeri jelapang padi. *BH Online*. <https://www.bharian.com.my/taxonomy/term/2643/2016/10/206953/kedah-kekak-negeri-jelapang-padi>
- Ibrahim, A. L. B. (1991). Tanaman padi di negeri Kedah dan hubungannya dengan sumber air: Satu tinjauan daripada perspektif sejarah. *Kajian Malaysia*, IX (2), Nota Penyelidikan. <http://eprints.utm.my/id/eprint/5022/1/TanamanPadi.pdf>
- Ishak, N., Ismail, A., Saad, M., & Md Ramli, A. (2021). *Researching Kedah's Malay heritage food tradition and eating culture. International Journal of Academic Research in Business and Social Sciences*, 11 (16). pp. 140-154.
- Ismail, S. (2021, November 17). Kedah usaha aktifkan semula industri pelancongan. *Harakah Daily*. <https://harakahdaily.net/index.php/2021/11/17/kedah-usaha-aktifkan-semula-industri-pelancongan/>
- Kedah sasar perkenal 50 pakej pelancongan baharu (2015, November 20). *BH Online*. <https://www.bharian.com.my/berita/nasional/2015/11/98564/kedah-sasar-perkenal-50-pakej-pelancongan-baharu>
- Kerajaan Negeri Kedah (2021). Pelancongan. <https://www.kedah.gov.my/pelancongan/>
- Lonely Planet (2021). Kedah. <https://www.lonelyplanet.com/malaysia/kedah>.
- Mohamad, D. & Jamil, R. M. (2012). A preference analysis model for selecting tourist destinations based on motivational factors: A case study in Kedah, Malaysia. *Procedia Social and Behavioural Sciences*, 65, 20-25.
- Muda Agricultural Development Authority [MADA] (2020, December 1). Paddy industry development program. https://www.mada.gov.my/?page_id=13761&lang=en
- Naghizadeh, R. (2021). Semiotic analysis in tourism. *Journal of Tourism & Sports Management (JTSM)*, 4(2), 415-422.
- Noth, W. (1990). *The Handbook of semiotics*. Bloomington, USA: Indiana University Press.
- Tripadvisor (2021). Explore Kedah. <https://www.tripadvisor.com.my/Tourism-g298281-Kedah-Vacations.html>
- Tourism Malaysia (2021). Interactive digital brochures. <https://ebrochures.malaysia.travel/>
- Tourism Malaysia (2015). Kedah Map and Guide. https://cdn.litnya.com/tourism-malaysia/Map_Guide_KEDAH/Map_Guide_KEDAH_English.pdf
- Tsotra, D., Janson, M. & Cecez-Kecmanovic, D. (2004). Marketing on the internet: A semiotic analysis. *AMCIS 2004 Proceedings*. 526. <https://aisel.aisnet.org/amcis2004/526>
- Ramachandran, S. (2005). Analysing visual and textual content of tourism brochures: A case of Malaysian destination image, *TEAM Journal of Hospitality & Tourism*, 2(1), 69-80.

- Seng, A. T. L. (2017, November, 11). Old-new history of ancient Kedah. *New Straits Times*.
<https://www.nst.com.my/lifestyle/pulse/2017/11/301995/old-new-history-ancient-kedah>
- Wahid, N. A. (2015). Bahulu attraction – What is expected of bahulu as a tourism product.
Journal of Agribusiness Marketing, 7, 33- 48.
- Yusof, M. F. M. & Ismail, H. N. (2016). The evolvement of brand identity of Langkawi Island,
Malaysia. *Planning Malaysia: Journal of the Malaysian Institute of Planners*, Special
Issue, 329-342.
- Zulkifli, A. (2021, October 29). Kedah lauds 2022 Budget, appreciates tourism sector
allocation. *New Straits Times*.
<https://www.nst.com.my/news/nation/2021/10/741083/kedah-lauds-2022-budget-appreciates-tourism-sector-allocation>

International Virtual Conference on Engineering, Innovation and Social Sciences 2021 (IVCEIS 2021)

ORGANIZING COMMITTEE

Chairman:

Dr Ahmad Shahrizal Muhamad

Treasurer:

Zafira Zainudin

(Global Academic Excellence (M) Sdn Bhd, Malaysia)

Technical Committee:

Norhaslinda Mohd Kamil

(Global Academic Excellence (M) Sdn Bhd, Malaysia)

Technical Reviewer:

Dr. Umi Kartini Rashid

(Universiti Tun Hussein Onn Malaysia)

Dr. Ahmad Zamani Ab Halim

(Universiti Malaysia Pahang, Malaysia)

Dr. Nurazwa Ahmad

(Universiti Tun Hussein Onn Malaysia)

Dr. Nasuha Lee Abdullah

(Universiti Sains Malaysia)

Dr. Elena Gregoria Chai Chin Fern

(Universiti Malaysia Sarawak, Malaysia)

Dr. Ku Hasnita Ku Samsu

(Universiti Putra Malaysia)

Dr. Mohd Norfian Alifiah

(Universiti Teknologi Malaysia)

IVCEIS 2021

Liaison Officer:
Nuratikah Amid Dudin
(Global Academic Excellence (M) Sdn Bhd, Malaysia)



IVCEIS 2021



IVCEIS 2021

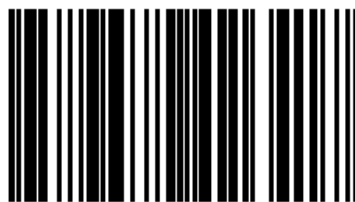
Published by:

Global Academic Excellence (M) Sdn. Bhd.

(1257579-U)

KELANTAN, MALAYSIA

e ISBN 978-967-2426-41-7



9 7 8 9 6 7 2 4 2 6 4 1 7

GAE'S CONFERENCES 2021



2nd Penang International Multidisciplinary Conference 2021 (2nd PIMC 2021)

Date: 23-24 January 2021

Venue: Penang, Malaysia

Website: <https://submit.confbay.com/conf/pimc2> @ <http://2pimc2021.egax.org/>

Email: pimcconferences@gmail.com; conference2@egax.org



4th International Conference on Global Business and Social Science 2021 (4th ICBSS 2021)

Date: 20-21 February 2021

Venue: Kuala Lumpur, Malaysia

Website: <https://submit.confbay.com/conf/4icgbss2021> @ <http://icgbss2021.egax.org/>

Email: icgbssofficial@gmail.com; conference2@egax.org



3rd Langkawi International Multidisciplinary Conference 2021 (3rd LIMC 2021)

Date: 13-14 March 2021

Venue: Langkawi, Malaysia

Website: <https://submit.confbay.com/conf/limc3> @ <http://3limc2021.egax.org/>

Email: limcconf2019@gmail.com; conference2@egax.org



6th International Conference on Education, Business, Islamic and Technology 2021 (6th ICEBIT 2021)

Date: 3-4 April 2021

Venue: Ipoh, Perak, Malaysia

Website: <https://submit.confbay.com/conf/icebit6> @ <http://icebit2021.egax.org/>

Email: icebitofficial@gmail.com; conference2@egax.org



5th International Conference Business, Tourism and Technology 2021 (5th ICBTT 2021)

Date: 24-25 April 2021

Venue: Online

Website: <https://submit.confbay.com/conf/icbtt5> / <http://icbtt2021.egax.org/>

Email: icbttofficial@gmail.com; conference2@egax.org



5th ICGBSS 2021

**5th International Conference on Global Business and Social Science 2021
(5th ICGBSS 2021)**

Date: 27-28 May 2021

Venue: Kuala Lumpur, Malaysia

Website: <https://submit.confbay.com/conf/icgbss5> @ <http://5icgbss2021.egax.org/>

Email: icgbssofficial@gmail.com; conference2@egax.org



3rd IRCMST 2021

**3rd International Research Conference on Multidisciplinary in Social Sciences and
Technology 2021 (3rd IRCMST 2021)**

Date: 26-27 June 2021

Venue: Cameron Highland, Malaysia

Website: <https://submit.confbay.com/conf/ircmst3> @ <http://ircmst2021.egax.org/>

Email: ircmstofficial@gmail.com; conference2@egax.org



2nd IRCASE 2021

**2nd International Research Conference on Applied Sciences and Engineering 2021
(2nd IRCASE 2021)**

Date: 26-27 June 2021

Venue: Cameron Highland, Malaysia

Website: <https://submit.confbay.com/conf/ircase2> @ <http://2ircase2021.egax.org/>

Email: ircaseofficial@gmail.com; conference2@egax.org



ICAT 2021

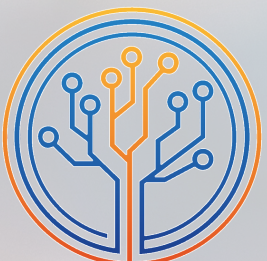
**International Conference on Applied Thermofluids & Computational Fluids Mechanics
(ICAT 2021)**

Date: 26-27 June 2021

Venue: Cameron Highland, Malaysia

Website: <https://submit.confbay.com/conf/icat1> @ <http://icat2021.egax.org/>

Email: icatofficial1@gmail.com; conference2@egax.org



2nd ICMASIT 2021

**2nd international Conference on Multidisciplinary Approaches in Social Sciences, Islamic
and Technology (2nd ICMASIT 2021)**

Date: 3-4 July 2021

Venue: Langkawi, Malaysia

Website: <https://submit.confbay.com/conf/icmasit2> @ <http://icmasit2021.egax.org/>

Email: icmasitofficial@gmail.com; conference2@egax.org



**4th International Conference on Tourism, Technology and Business Management 2021
(4th ICTTBM 2021)**

Date: 1-2 August 2021

Venue: Kota Bharu, Kelantan, Malaysia

Website: <https://submit.confbay.com/conf/icttbm4> @ <http://icttbm2021.egax.org/>

Email: icttbmofficial@gmail.com; conference2@egax.org



**4th International Research Conference on Humanities, Social Sciences and Technology 2021
(4th IRCHST 2021)**

Date: 21-22 August 2021

Venue: Kuala Lumpur, Malaysia

Website: <https://submit.confbay.com/conf/irchst4> @ <http://irchst2021.egax.org/>

Email: irchstofficial@gmail.com; conference2@egax.org



2nd International Conference on Innovation Approaches in Business, Education and Technology (2nd ICIABET 2021)

Date: 18-19 September 2021

Venue: Cameron Highland, Malaysia

Website: <https://submit.confbay.com/conf/iciabet2> @ <http://iciabet2021.egax.org/>

Email: iciabetofficial@gmail.com; conference2@egax.org



3rd Penang International Multidisciplinary Conference 2021 (3rd PIMC 2021)

Date: 25-26 September 2021

Venue: Penang, Malaysia

Website: <https://submit.confbay.com/conf/pimc3> @ <http://3pimc2021.egax.org/>

Email: pimcconferences@gmail.com; conference2@egax.org



**6th International Conference on Social Sciences, Humanities and Technology 2021
(6th ICSHT 2021)**

Date: 23-24 October 2021

Venue: Sabah, Malaysia

Website: <https://submit.confbay.com/conf/icsht6> @ <http://icsht2021.egax.org/>

Email: icshtofficial@gmail.com; conference2@egax.org



4th Langkawi International Multidisciplinary Conference 2021 (4th LIMC 2021)

Date: 20-21 November 2021

Venue: Langkawi, Malaysia

Website: <https://submit.confbay.com/conf/limc4> @ <http://4limc2021.egax.org/>

Email: limcconf2019@gmail.com; conference2@egax.org



4th IRCMST 2021

4th International Research Conference on Multidisciplinary in Social Sciences and Technology (4th IRCMST 2021)

Date: 27-28 November 2021

Venue: Kuala Lumpur, Malaysia

Website: <https://submit.confbay.com/conf/ircmst4> @ <http://4ircmst2021.egax.org/>

Email: ircmstofficial@gmail.com; conference2@egax.org



5th IRCHST 2021

5th International Research Conference On Humanities, Social Sciences and Technology (5th IRCHST 2021)

Date: 11-12 December 2021

Venue: Kota Bharu, Kelantan, Malaysia

Website: <https://submit.confbay.com/conf/irchst5> @ <http://5irchst2021.egax.org/>

Email: irchstofficial@gmail.com; conference2@egax.org



3rd IRCASE 2021

3rd International Research Conference on Applied Sciences and Engineering 2021 (3rd IRCASE 2021)

Date: 11-12 December 2021

Venue: Kota Bharu, Kelantan, Malaysia

Website: <https://submit.confbay.com/conf/ircase3> @ <http://3ircase2021.egax.org/>

Email: ircaseofficial@gmail.com; conference2@egax.org



5th ICIEL 2021

5th International Conference on Islamic, Education and Law 2021 (5th ICIEL 2021)

Date: 18-19 December 2021

Venue: Ipoh, Perak, Malaysia

Website: <https://submit.confbay.com/conf/iciel5> @ <http://iciel2021.egax.org/>

Email: icielofficial@gmail.com; conference2@egax.org



**International Virtual Conference on Social Sciences, Engineering and Technology 2021
(IVCoSET 2021)**

Date: 8 September 2021

Venue: Online

Website: <https://submit.confbay.com/conf/ivcoset2021> @ <http://ivcoset2021.egax.org/>

Email: ivcosetofficial@gmail.com; conference2@egax.org



**International Virtual Conference on Engineering, Innovation and Social Sciences 2021
(IVCEIS 2021)**

Date: 2 December 2021

Venue: Online

Website: <https://submit.confbay.com/conf/ivceis2021> @ <http://ivceis2021.egax.org/>

Email: ivceisofficial@gmail.com; conference2@egax.org



**International Virtual Conference on Social Sciences, Education and Innovation 2021
(IVCoSEI 2021)**

Date: 14 June 2021

Venue: Online

Website: <https://submit.confbay.com/conf/ivcosei2021> @ <http://ivcosei2021.egax.org/>

Email: ivcoseiofficial@gmail.com; conference2@egax.org

GAE

GLOBAL ACADEMIC EXCELLENCE

"KNOWLEDGE FOR FUTURE"



admin@egax.org



www.egax.org



+6097406346
+60108428094



@GAExcellence



_GAExcellence



Global Academic
Excellence GAE



@gaesbofficial

