



# International Conference on Operations Research

# 3<sup>th</sup>

# I C O R



## OPTIMAL DECISIONS FOR MARINE TOURISM



## The 3<sup>rd</sup> ICOR 2018

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Operations Research (OR) had become powerful decision making tools worldwide. In its use, Management Science (MS) is used as another term for OR. Concept of OR is borderless as it can be derived from various discipline such as Mathematics, Statistics, Economics, Engineering, Marine Science, Social, etc. to make a new set of knowledge for decision making. Today, OR has become a professional discipline which deals with the application of scientific methods in decision making theory.

The scope of OR can be used to find best solution for both simple and complex problem. It is beneficial in every aspect of human life regarding resources optimization. OR is widely used in important and main fields such as national planning and budgeting, transportation, education, agriculture, and marine management. Therefore, research and study involving OR are inevitable.

Number of research and study about OR or using OR as tools is high these years. This is accommodated by Indonesian Operations Research Association (IORA) IORA as one of OR organisations in an annual international conference entitled International Conference on Operations Research (ICOR). ICOR 2018 is the third conference. This initiates to bring together OR/MS researchers, academicians and practitioners, whose collective work has sustained continuing OR/MS contribution to decision-making in many fields of application. It can be considered as good platforms for the OR/MS community, particularly in Indonesia, to meet each other and to exchange ideas.

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## **WELCOMING SPEECH**

### **The 3<sup>rd</sup> International Conference on Operations Research 2018**

Minister of Marine Affairs and Fisheries of Indonesia Susi Pudjiastuti or Representative.  
Governor of North Sulawesi, Indonesia Olly Dondokambey, S.E.  
Rector of Sam Ratulangi University Prof. Dr. Ir. Ellen Joan Kumaat, MSc, DEA.  
IORA President and Dean of FMIPA University of Padjadjaran Prof. Dr. H. Sudradjat Supian, MSc.

Distinguished Guests, Ladies and Gentlemen.

On behalf of ICOR 2018 Organizing Committee, I would like to Welcome you all and thank you for being here. Especially to Rector of Universitas Sam Ratulangi for fulfilling our invitation and to give opening speech for this conference. Special thanks also for Keynote Speakers, Plenary Speakers, Contributed Speakers and All Participants of this conference.

This conference can be held in collaboration of Indonesian Operations Research Association (IORA) and Faculty of Science Universitas Sam Ratulangi.

The point of this conference is to provide a perfect event for researchers, academics, and practitioners of Operations Research, to share experience, build communication and network with experts from all over the world. Furthermore, this conference is aimed at promotion and spread of scientific operations research field in Indonesia through Indonesian Operations Research Association (IORA).

The same conference had previously been held twice, initially hosted by Universitas Pakuan Bogor, and followed by Universitas Terbuka Tangerang as second host. This conference is now held at Universitas Sam Ratulangi Manado for the third time, that is why it is known as the 3<sup>rd</sup> International Conference on Operations Research (ICOR) under a main theme entitled Optimal Decisions for Marine Tourism.

Number of participants of this conference are more than 200, from 9 countries.  
Selected Papers will be published on scopus indexed IOP Publications.

Lastly, we want to gratefully thank again rector for her help and support, all keynote speakers, plenary speakers, contributed speakers, all participants, and all organizing committee who have given contribution to make this conference happen.

Dr. Nelson Nainggolan, MSi  
Conference Chair

## FOREWORD

Welcome to Universitas Sam Ratulangi, welcome to The 3<sup>rd</sup> International Conference on Operations Research (ICOR) organized by the Indonesian Operations Research Association (IORA) and the Faculty of Mathematics and Natural Sciences, Universitas Sam Ratulangi.

The theme this year is *Optimal Decisions for Marine Tourism*. This theme is based on the fact that Indonesia is a maritime country as well as tourism is targeted to be the prime mover of the country development and that Operations Research is relevant and essential knowledge to apply to these areas.

We have more than 200 participants registered, which shows a wide range of interests on this topic. Hopefully all papers can be published in the IOP Proceeding indexed in Scopus.

It is a great honor for us to organized this event. We thank

IORA for appointed us and for the collaboration which I believe will be a door that open to more collaborations with more partners in the future. We get full support from and therefore we thank the Rector of Universitas Sam Ratulangi and the Governor of North Sulawesi Province.

Finally, we welcome you to Manado, for many of the participants maybe still long destination, but we hope that during your stay you will enjoy and take advantage of the many sights to see in the city and also experience wonderful moments in and on Bunaken Island as well as the many natural wonders in the surrounding areas.

*Pakatuan wo Pakalawiden. God bless you.*

Faculty of Mathematics and Natural Sciences, Universitas Sam Ratulangi.  
Dean

Prof. Dr. Benny Pinontoan, M. Sc.



## CONGRATULATORY SPEECH BY THE PRESIDENT OF THE INDONESIAN OPERATIONS RESEARCH ASSOCIATION (IORA)

Distinguished Guest, All invited Speakers, Participant, Ladies and Gentlemen,

It is great pleasure for me On behalf of the Association of the Indonesian Operations Research Association, I would like to welcome you all at this special event International Conference On Operations Research at the Universitas Sam Ratulangi. This event is the third event for IORA-ICOR and congratulations to the Universitas Sam Ratulangi be able to host and also thanks to the minister of maritime affairs and fisheries and Manado Provincial Governor.



The theme of the conference, Competing in the era of analytics, reflects our belief that many future challenges in our life need involvement of operations research and typical analytic operations research. Our future and our capacity to reach sustainable development goal such as ensure availability and sustainable management of water and sanitation for all; ensure access to affordable, reliable, sustainable and modern energy for all; take urgent action to combat climate change and its impacts; end poverty in all its forms everywhere; conserve and sustainably use the oceans, seas and marine resources for sustainable development; end hunger, achieve food security and improved nutrition and promote sustainable agriculture, ensure healthy lives and promote well-being for all at all ages, and other challenges require the advances the roles of operations research in collaboration with other disciplines. Operations Research is the application of scientific & mathematical methods to the study & analysis of problems involving complex systems. Analytics is defined as the scientific process of transforming data into insights for making better decisions.

Operations research is multi discipline therefore Interaction with other fields of science is indispensable and proven to have given rise to new areas that improve the ability in decision making and techniques used are modeling.

Typically, applications of Operations Research in these and other areas deal with decisions involved in planning the efficient allocation of scarce resources - such as material, skilled workers, machines, money and time - to achieve stated goals and objectives under conditions of uncertainty and over a span of time. Efficient allocation of resources may entail establishing policies, designing processes, or relocating assets. OR analysts solve such management decision problems with an array of mathematical methodologies.

Completely of the operations research field can be seen in AMS 2000 or MCS 2010.

And now, I need to clarify that IORA is new association in Indonesia he is beginning piloted in workshops in Operations Research and Optimization modelling on June 4, 2011 in the Department of Mathematics Faculty of Mathematics and Natural Science, Universitas Padjadjaran, then be disseminated to several universities, government and industry.

IORA is a container that provides a forum for scientists Operational Research and to expand our horizons through the exchange of knowledge and application technology, IORA established on August 25, 2014 by deed of Notary Number 42 and the Minister of Justice and Human Rights Number. AHU-00439.60.10.2014.

IORA members came from a variety of fields, education, Research, government, industry, practitioners etc, in 2017 members numbered 130 members and until now IORA members numbered 240 members, and we wait for those who have become members through [www.iora.or.id](http://www.iora.or.id).

Ladies and gentlemen,

We need to inform that at the current conference will also be held meeting IORA board. Finally, Have a nice International Conference on Operations Research. I hope there are plenty of benefits we can share and empower through this and hopefully your participations and contributions will make this conference a productive and successful one.

President, The Indonesia Operations research Association

Prof. H. Sudradjat SUPIAN, M.Sc., PhD



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## Structural determination with isolation of antioxidant component algae *Eucheuma spinosum* collected from Nain Island, North Sulawesi – Indonesia

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### Introduction

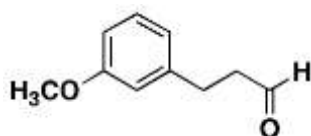
Algae are known as a very slow damaged marine organism since their cells possess antioxidative mechanisms and antioxidant components. Marine algae known as fisheries product has long been utilized as foodstuffs in some Asian countries especially China, Korea, and Japan [1].

Marine algae are considered as a source of bioactive compounds as they are able to produce a great variety of secondary metabolite characterized by a broad spectrum of biological activities [2]. Algae are known as a very slow damaged marine organism since their cells possess antioxidative mechanisms and antioxidant components [3]. They are rich in soluble dietary fibers, proteins, minerals, vitamins, antioxidants, phytochemicals, and polyunsaturated fatty acids, with low caloric value. However, like most flora their nutrient contents are affected by external factors such as the geographic location, environmental, season, sampling conditions. Usually they are only used as gelling agent and stabilizers in the food and pharmaceutical industries, but current research has revealed their potential medicinal uses against cancer, allergy, diabetes, oxidative stress, inflammation, thrombosis, obesity, lipidemia, hypertensive and other degenerative ailments. Although the majority of researches were on mammals, the trials on humans and epidemiological studies supported these findings [4]. In recent years, the continuous discovery of natural products with antioxidant activity from marine alga has attracted considerable attention.

In the course on the bioactive components from marine algae, we found that the MeOH extract of Indonesian red algae *Eucheuma spinosum* exhibit the antioxidant activity. Chemical study on the MeOH extract led to the isolation of 3-(3-methoxyphenyl)propanal (**1**, Figure 1).

We report herein the isolation and structure of 3-(3-methoxyphenyl)propanal (**1**), which had exhibit the antioxidant activity.

**Figure 1.** Structure of compound (**1**) isolated from *E. spinosum*.



3-(3-methoxyphenyl)propanal (**1**)

### Result and Discussions

The MeOH extract of Indonesian seaweed *E. spinosum* showed antioxidant activity and separated into twenty-five fractions (Fr.1–Fr. 25) by octadecylsilyl (ODS) column chromatography. 3-(3-methoxyphenyl)propanal (**1**) was isolated from the combination of fraction 6 and 7. The antioxidant activity was detected in fraction 6 and 7, and TLC separation of fraction 6 and 7 gave an antioxidant compound of **1**.

The <sup>13</sup>C NMR spectrum showed 10 resolved signals, which were classified into one oxygenated

methyl, two methylene, four sp<sup>2</sup> methine, one oxygenated sp<sup>2</sup> quaternary, one sp<sup>2</sup> quaternary, and one carbonyl carbon by the analysis of 1D and 2D NMR spectra (Table 1). The <sup>1</sup>H NMR spectrum displayed 12 proton signals, and one signal at δ 3.90 was assigned as methoxy protons (3'-OMe). The connectivity of carbons and protons was established by HMQC correlations.

**Table 1.** <sup>13</sup>C (125 MHz) and <sup>1</sup>H (500 MHz) NMR data for 3-(3-methoxyphenyl)propanal (**1**)

No	δ <sub>c</sub>	δ <sub>H</sub> (J = Hz)	HMBC
1	192.8	9.75 (1H;s)	5'
2	46.3	2.74 (2H; t; 3.25; 1.3)	3
3	30.1	2.10 (2H; s)	2, 6'
1'	133.2	-	-
2'	117.1	6.90 (1H; d; 9.1)	-
3'	156.7	-	6'
4'	116.2	6.68 (1H; d; 8.45)	-
5'	133.5	7.76 (1H; d; 8.4)	4', 2
6'	130.3	7.00 (1H; d; 8.4)	2', 1, 2
3'-OCH <sub>3</sub>	56.4	3.90 (2H; s)	-

The presence of aromatic ring was assigned by the <sup>1</sup>H-<sup>1</sup>H HMQC and HMBC correlations of the <sup>1</sup>H NMR signals.

Antioxidant assay showed different DPPH content in all samples condition (p < 0.05) in the three MeOH concentrations. The fresh *E. spinosum* has the highest DPPH content and the highest was recorded in 60 % methanol, 75.27 ± 0.29 (Table 2).

**Table 2.** DPPH content in different forms of *E. spinosum*

MeOH (%)	DPPH (%)	
	<i>E. spinosum</i> (fresh)	<i>E. spinosum</i> (dry)
60	75.27 ± 0.29 (b)	64.27 ± 1.44 (b)
70	65.19 ± 1.09 (a)	59.32 ± 1.20 (a)
80	66.77 ± 1.08 (a)	58.53 ± 0.61 (a)

A 1,1-diphenyl-2-picrylhydrazil (DPPH) compound is stable and actified radical by delocating the free electron on a molecule containing free radicals, so that the molecule becomes unreactive. The free radicals are highly reactive and unstable molecules since these have one or more unpaired electrons. Capture mechanism of DPPH radicals by the antioxidant occurs through proton donation to the radical. Therefore, the compound that enables to donate its proton contains strong radical capturing activity [5, 6]. The compounds belong to phenolic, flavonoid, tanin, and alkaloid groups, and the compounds with many sulfide groups. Proton donation causes the violet colored-DPPH radical to turn to colorless non-radical compounds. Thus, the radical capture activity could be counted from DPPH radical scavenging. The remaining DPPH radical content was spectrophotometrically measured at λ 517 nm [5, 7]. The inhibitory ability against the free radicals is affected by the extent of extract concentration. The DPPH activity generally rises with extract increment up to certain concentration. Then it will decrease with more concentration addition. The DPPH test was extensively used in natural product studies for antioxidant isolation and extract and pure compound ability to absorb the radicals [8].

The active fraction was purified with reverse phase TLC with 90% MeOH to give compound **1**.

3-(3-methoxyphenyl)propanal (**1**): <sup>1</sup>H NMR (CDCl<sub>3</sub>): δ 9.75 (1H, s), δ 2.74 (2H, t, J = 3.25, 1.3 Hz), δ 2.10 (2H, s), δ 6.90 (1H, d, J = 9.1 Hz), δ 6.68 (1H, d, J = 8.45 Hz), δ 7.76 (1H, d, J = 8.4 Hz), δ 7.00 (1H, d, J = 8.4), δ 3.90 (2H, s). <sup>13</sup>C NMR : δ 30.1, 46.3, 56.4, 116.2, 117.1, 130.3, 133.2,

133.5, 156.7, 192.8.

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