



# **E3S** **Web of Conferences**



## **PREFACE: the 1<sup>st</sup> ICoN-BEAT 2019**

On behalf of the organizing committee of the 1<sup>st</sup> International Conference on Bioenergy and Environmentally Sustainable Agriculture Technology (ICoN-BEAT 2019) and conjunction with the 2<sup>nd</sup> Congress Indonesian Agriculture Private University Association (APTSIPI - *Asosiasi Perguruan Tinggi Swasta Ilmu Pertanian Indonesia*). It is an honor and delight to welcome all participants to this conference which be held at the Campus III, University of Muhammadiyah Malang (UMM), Indonesia on November 7<sup>th</sup> to 8<sup>th</sup>, 2019. The conference theme is “Bioenergy and Environmentally Sustainable Agriculture Technologies: Toward Food, Energy and Water Sovereignty”.

This conference has been organized by Faculty of Agriculture and Animal Science, University of Muhammadiyah Malang. Two main topics have been discussed, i.e. bioenergy and other renewable energy, and environmentally sustainable agriculture. We are perceived confidently that this conference will provide positive influence and contribute to develop the academic field.

Supporting two main topics, the 1<sup>st</sup> ICoN - BEAT invited five experts in the fields of energy, environment and agriculture from Indonesia, Malaysia, and Thailand. The speakers are Mr. Arfie Thahar (Research and Development Division of the Indonesian Palm Oil Plantation Fund Management Agency, Jakarta), Assoc. Prof. Dr. Maizirwan Mel (Department of Biotechnology Engineering, International Islam University, Malaysia), Asst. Prof. Dr. Khwunta Khwamee (Department of Earth Science, Faculty of Natural Resources, Prince of Songkla University, Thailand), Mr. Paulus Tjakrawan (Executive Chairman of the Indonesian Biofuel Entrepreneurs Association, Jakarta), and Assoc. Prof. Dr. Tatang Hernas Soerawidjaja (Chairman of the Indonesian Bioenergy Association, Indonesian Research Council Commission, and Department of Chemical Engineering - Bandung Institute of Technology).

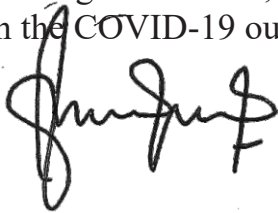
A pride because the number of participants who already send the paper about 116 presenters. After a rigorous selection process, the Scientific & Editorial Board of the 1<sup>st</sup> ICoN - BEAT 2019 decided to publish 51 papers in E3S Web of Conferences, an open-access proceedings in environment, energy and earth sciences, managed by EDP Sciences, Paris, France and indexed on Scopus, Scimago, Conference Proceedings Citation Index-Science (CPCI-S) of Clarivate Analytics's Web of Science, and DOAJ (Directory of Open Access Journals).

The Proceeding of the 1<sup>st</sup> ICoN - BEAT 2019, consists of 51 selected papers, amount 38 papers were the results of joint research by Indonesian and overseas scholars. In the collaboration research, 71 institutions were involved 20 of which were from abroad Indonesia. The overseas institutions are from: Australia, Austria, Czech, Estonia, Eswani, Georgia, Germany, India, Japan, Latvia, Lithuania, Madagascar, Malaysia, the Netherlands, P.R. China, Sweden, Taiwan - ROC, Thailand, the United Kingdom, and Uzbekistan. Each of the papers submitted in E3S Web of Conferences was reviewed by at least two experts using the double-blind system. The published papers have passed all necessary improvement requirements in accordance to the Web of Conferences standard, reviewer's comments, SI (*Système International d'Unités*), similarity tests by Turnitin program (with the highest threshold of 20 %), 90 % of references must be at least dated from 15 years, and reflected on Google, as well as editing procedure by professional editors from four countries (Estonia, Indonesia, Lithuania, and Malaysia).

Last but not least, I personally would like to thank you the official committees, organizing partners, and scientific & editorial board. Special thanks as well to our co-host partners: i) APTSIPI, ii) ILUNET (*Ikatan Alumni Energi Terbarukan*) University of Darma Persada, Jakarta, iii) Konsorsium Bioteknologi Indonesia, iv) Merdeka University of Madiun, v) University of Veteran Bangun Nusantara, Sukoharjo, vi) C- BIORE (Center of Biomass and Renewable Energy), vii) ITENAS (*Institut Teknologi Nasional*), viii) ILCAN (Indonesian Life Cycle Assessment Network), ix) *Rumah Paper Kita* as editing and proofreading services for supporting the 1<sup>st</sup> ICoN - BEAT 2019.

Finally, I would like to express my gratitude feeling for your participations, and please prepare yourself to gain the treasure of knowledge from the passionate experts. Then share the valuable enlightenment for a better future. It is my pleasure to see many of you in the 1<sup>st</sup> ICoN - BEAT 2019, and see you again in the 2<sup>nd</sup> ICoN - BEAT 2021. Stay safe and stay healthy in COVID-19 pandemic.

With warmest regards  
Malang - Indonesia, Dec 12, 2020  
in the COVID-19 outbreak



**Dr. Ir. Listiari Hendraningsih, M.P.**  
**Conference Chair**

**Principal Editor:** Roy Hendroko Setyobudi (Malang, IDN)

**Board of Editor:** Aris Winaya (Malang, IDN), Juris Burlakovs (Tartu, EST), Maizirwan Mel (Kualalumpur, MYS), and Olga Anne (Klaipėda, LTU).



## SCIENTIFIC & EDITORIAL BOARD

- Abubakar Yaro, Strathclyde Institute of Pharmacy & Biomedical Sciences, University of Strathclyde, Scotland (GBR)
- Andoniana Rakoto Malala, *Centre de Formation et d'Application du Machinisme Agricole* - CFAMA (MDG)
- Aris Winaya, Department of Animal Science – University of Muhammadiyah Malang (IDN)
- Bayu Prabowo, Renewable Energy Development Research, Research and Technology Center – PT Pertamina, Jakarta (IDN)
- Budi Siswanto, Merdeka University of Madiun and *Rumah Paper Kita* (Our House of Papers) RP Editing & Proofreading Services (IDN)
- David Hermawan, Department of Fisheries – University of Muhammadiyah Malang (IDN)
- Erkata Yandri, Graduate School of Renewable Energy - Darma Persada University, Jakarta (IDN)
- Haryo Wibowo, Institute for Thermal Power Engineering (ITPE) – Zhejiang University of China (CHN)
- Henik Sukorini, Department of Agrotechnology – University of Muhammadiyah Malang (IDN)
- Jumpen Onthong, Department of Earth Science – Prince of Songkla University, Songkhla (THA)
- Juris Burlakovs Department of Water Management, Estonian University of Life Sciences, Tartu (EST)
- Ima Yudha Perwira, Department of Aquatic Resources Management– University of Udayana, Bali (IDN)
- Lili Zalizar, Department of Animal Science – University of Muhammadiyah Malang (IDN)
- Listiari Hendraningsih, Department of Animal Science – University of Muhammadiyah Malang (IDN)
- Maizirwan Mel, Dept. of Biotechnology Engineering – International Islamic University Malaysia, (MYS)
- Marlina Achmad, Department of Fisheries – University of Hasanuddin, Makassar (IDN)
- Muhammad Danang Birowosuto, CNRS International NTU Thales Research Alliance – Nanyang Technological University (SGP)
- Mohammad Syaifudin Zuhri, Merdeka University of Madiun and RP Editing & Proofreading Services (IDN)
- Mulyoto Pangestu, Department Obstetrics and Gynaecology - Monash University (AUS)
- Nugroho Triwaskito, Department of Forestry - University of Muhammadiyah Malang (IDN)
- Olga Anne, Department of the Natural Sciences of Maritime Engineering, Klaipeda University (LTU)
- Peeyush Soni, Dept. of Agriculture and Food Engineering, Indian Institute of Technology Kharagpur (IND)
- Praptiningsih Gamawati Adinurani, Department of Agrotechnology – Merdeka University of Madiun and RP Editing & Proofreading Services (IDN)
- Rangga Kala Mahaswa, Universitas Gadjah Mada and RP Editing & Proofreading Services (IDN)
- Roy Hendroko Setyobudi, Department of Agriculture Science, Postgraduate Program, University of Muhammadiyah Malang and RP Editing & Proofreading Services (IDN)
- Tsitsino Turkadze, Dept. of Chemical and Environmental Technologies, Akaki Tsereteli State University (GEO)
- Warkoyo, Department of Food Science & Technology - University of Muhammadiyah Malang (IDN)
- Yahya Jani, Department of Built Environment and Energy Technology, Linnaeus University (SWE)
- Zane Vincevica-Gaile, Department of Environmental Science, University of Latvia (LVA)

**E3S Web of Conferences**

**Volume 226 (2021)**

**The 1<sup>st</sup> International Conference on Bioenergy and Environmentally Sustainable Agriculture  
Technology (ICoN BEAT 2019)**

**Malang, East Java, Indonesia, November 7-8, 2019**

R. Hendroko Setyobudi, A. Winaya, J. Burlakovs, M. Mel and O. Anne (Eds.)

## Table of Contents

### **Analysis of Methods for Determining the Characteristics of a Single Spatial Electromagnetic Field**

Abdulahak Khalikov

E3S Web Conf., 226 (2021) 00001

### **The Study of the Electrical Conductivity of Apples and Grapes as an Object of Electrical Processing**

Abdurahman Radjabov, Matkarim Ibragimov and Nodir Eshpulatov

E3S Web Conf., 226 (2021) 00002

### **Improvement Generative Growth of *Coffea arabica* L. Using Plant Growth Regulators and Pruning**

Ade Astri Muliastari, Ratih Kemala Dewi, Hidayati Fatchur Rochmah, Andoniana Rakoto Malala and Praptiningsih Gamawati Adinurani

E3S Web Conf., 226 (2021) 00003

### **Improving Margins of the Indonesian Seaweed Supply Chain Upstream Players: The application of the Kaizen Approach**

Agus Heri Purnomo, Rinta Kusumawati, Asri Pratitis, Ilham Alimin, Singgih Wibowo, Mike Rimmer and Nick Paul

E3S Web Conf., 226 (2021) 00004

### **Determinants of Technical In-efficiencies in Swamp Rice Farming - Ciamis District, Indonesia**

Agus Yuniawan Isyanto, Sudrajat Sudrajat and Muhamad Nurdin Yusuf

E3S Web Conf., 226 (2021) 00005

### **Chemical Characteristics and Viability of Starter Cultures of Freeze–Dried Sweet Potato Extract–Supplemented Synbiotic Yogurt**

Agustina Intan Niken Tari, Catur Budi Handayani, Sri Hartati, Damat Damat and Karina Stankeviča

E3S Web Conf., 226 (2021) 00006

### **Biomass Enhancement of *Stevia rebaudiana* Bertoni Shoot Culture in Temporary Immersion System (TIS) RITA® Bioreactor Optimized in Two Different Immersion Periods**

Agustine Christela Melviana, Rizkita Rachmi Esyanti, Maizirwan Mel and Roy Hendroko Setyobudi

E3S Web Conf., 226 (2021) 00007

### **Physical Treatment of Oil Palm Shell for Briquette Production as Bioenergy at Remote Area**

Amaliyah Rohsari Indah Utami, Suwandi Suwandi, Yoga Alun Mustafa and Maizirwan Mel

E3S Web Conf., 226 (2021) 00008

### **The Potential of Cashew Apple Juice as Anti Hypercholesterol Agent on Whistar Rats (*Rattus norvegicus* Berkenhout, 1769)**

Asmawati Asmawati, Marianah Marianah, Abubakar Yaro and Roy Hendroko Setyobudi

E3S Web Conf., 226 (2021) 00009

### **The Ability of Water Hyacinth (*Eichhornia crasipes* Mart.) and Water Lettuce (*Pistia stratiotes* Linn.) for Reducing Pollutants in *Batik* Wastewater**

Bunyamin Muchtasjar, Hadiyanto Hadiyanto, Munifatul Izzati, Zane Vincēviča–Gaile and Roy Hendroko Setyobudi

E3S Web Conf., 226 (2021) 00010

### **Potential Analysis of Low Economic Value Fish in Lamongan Regency, East Java, Indonesia**

Choirul Anam, Noor Harini, Damat Damat, Ahmad Wahyudi, Yuli Witono, Nita Kuswardhani, Moh Azus Shony Azar, Olga Anne and Diana Rachmawati  
E3S Web Conf., 226 (2021) 00011

**Techno-Economic Analysis of Photovoltaic Utilization for Lighting and Cooling System of Ferry Ro/Ro Ship 500 GT**

Danny Faturachman, Erkata Yandri, Endang Tri Pujiastuti, Olga Anne, Roy Hendroko Setyobudi, Yahya Yani, Herry Susanto, Washington Purba and Satriyo Krido Wahono  
E3S Web Conf., 226 (2021) 00012

**Morphological and Physiological Responses of *Indigofera tinctoria* L. to Light Intensity**

Desy Setyaningrum, Maria Theresia Sri Budiastuti, Bambang Pujiasmanto, Djoko Purnomo and Supriyono Supriyono  
E3S Web Conf., 226 (2021) 00013

**Utilization of Tofu Industry Waste and Banana Plant Waste for Growing Medium of Brown Oyster Mushrooms (*Pleurotus cystidiosus* [Jacq. Fr.] P.Kumm.)**

Dian Indratmi, Yossy Dian Kurniasari, Hartawati Hartawati and Ali Ikhwan  
E3S Web Conf., 226 (2021) 00014

**The Technical Design Concept of Hi-Tech Cook Stove for Urban Communities using Non-Wood Agricultural Waste as Fuel Sources**

Erkata Yandri, Bangun Novianto, Fridolini Fridolini, Roy Hendroko Setyabudi, Haryo Wibowo, Satriyo Krido Wahono, Kamaruddin Abdullah, Washington Purba and Yogo Adhi Nugroho  
E3S Web Conf., 226 (2021) 00015

**Detergents Effect on Egg Hatchability, Morphometry and Larval Bone Structure of Native Indonesian Fish: Wader Pari (*Rasbora lateristriata* Bleeker, 1854)**

Farahsani Umi Abida, Parvez Alam and Bambang Retnoaji  
E3S Web Conf., 226 (2021) 00016

**Modelling Biodiesel Supply Chain: Current State and Opportunities for Future Research**

Fitriani Tupa Ronauli Silalahi, Togar Mangihut Simatupang, Manahan Parlindungan Siallagan and Rizal Horas Manahan Sinaga  
E3S Web Conf., 226 (2021) 00017

**Vinasse as Cultivation Medium of *Chlorella* sp. to Produce Poly-Hydroxy Butyrate in Various Limited Low-Cost Primary Nutrient**

Gregorius Prima Indra Budianto, Yari Mukti Wibowo, Hadiyanto Hadiyanto, Widayat Widayat and Wisnu Arfian Anditya Sudjarwo  
E3S Web Conf., 226 (2021) 00018

**Relationship of Group Dynamics and Fishermen Independence in Fisheries Agribusiness Attaining Maximum Sustainable Yield**

Hamdi Rosyidi, Jabal Tarik Ibrahim, Sutawi Sutawi, Olga Anne and Diana Rachmawati  
E3S Web Conf., 226 (2021) 00019

**Degradation of Phorbol Esters on the *Jatropha curcas* Linn. Seed by Biological Detoxification**

Hany Handajani, Riza Rahman Hakim, Ganjar Adhywirawan Sutaro, Boy Ronald Mavuso, Zhong-Wen Chang and Soni Andriawan  
E3S Web Conf., 226 (2021) 00020

**Durian Rind Micro Composter Model: A Case of Kampung Durian, Ngrogung, Ponorogo, Indonesia**  
Haris Setyaningrum, Atika Rukminastiti Masrifah, Adib Susilo and Imam Haryadi  
E3S Web Conf., 226 (2021) 00021

**Exploration and Effectiveness of *Trichoderma* sp. from Jember and Trenggalek, East Java, Indonesia Cacao Plantation as A Biological Control of *Phytophthora palmivora***  
Henik Sukorini, Feby Wirasdenty Aigahayunindy, Erfan Dani Septia and Netnapis Khewkhom  
E3S Web Conf., 226 (2021) 00022

**Variability of *Fusarium oxysporum* f. sp. *lycopersici* from different altitudes in East Java, Indonesia**  
Henik Sukorini, Erfan Dani Septia and Netnapis Khewkhom  
E3S Web Conf., 226 (2021) 00023

**Design of Rotary Dryer for Sand Drying using Biomass Energy Sources**  
Herry Susanto, Roy Hendroko Setyobudi, Didik Sugiyanto, Yefri Chan, Erkata Yandri, Satriyo Krido Wahono, Kamaruddin Abdullah, Juris Burlakovs, Wahyu Widodo, Yogo Adhi Nugroho and Abubakar Yaro  
E3S Web Conf., 226 (2021) 00024

**The Use of Probiotic and Antioxidants to Improve Welfare and Production of Layer Duck at Commercial Farms for Global Warming Mitigation**  
Imam Suswoyo, Ismoyowati Ismoyowati, Wahyu Widodo and Zane Vincēviča–Gaile  
E3S Web Conf., 226 (2021) 00025

**Entrapment Formulation for *env-Tm* Gene Based on Chitosan Low Molecular Weight as a Jembrana Disease Virus Vaccine Candidate**  
Indra Lesmana Rahayu and Asmarani Kusumawati  
E3S Web Conf., 226 (2021) 00026

**Environment Identification of Plantation Plant Development for Competitive in Sukoharjo Districts, Indonesia**  
Irma Wardani and Tria Rosana Dewi  
E3S Web Conf., 226 (2021) 00027

**Conceptual Design of Inventory Analysis Software to Support the Life Cycle Assessment in Palm Oil Production**  
Kiman Siregar, Supriyanto Supriyanto, Devitra Saka Rani, Yanuar Nurdiansyah and Feri Wijayanto  
E3S Web Conf., 226 (2021) 00028

**Fasciolosis Infection Level of Various Breed Cattle in Batu and Pujon District, East Java, Indonesia**  
Lili Zalizar, Khusnul Rahmawati and Abubakar Yaro  
E3S Web Conf., 226 (2021) 00029

**Factors that Influence Farmer's Behavior Towards Risk**  
Muhamad Nurdin Yusuf, Agus Yuniawan Isyanto and Sudradjat Sudradjat  
E3S Web Conf., 226 (2021) 00030

**Effectiveness of Mycorrhiza, Plant Growth Promoting Rhizobacteria and Inorganic Fertilizer on Chlorophyll Content in *Glycine max* (L.) cv. Detam-4 Prida**  
Muhammad Muhammad, Umi Isnatin, Peeyush Soni and Praptiningsih Gamawati Adinurani  
E3S Web Conf., 226 (2021) 00031



**Microalgae Microbial Fuel Cell (MMFC) using *Chlorella vulgaris* and “Batik” Wastewater as Bioelectricity**

Nadiyah Faizi Polontalo, Falvocha Alifsmara Joelyna, Abdullah Malik Islam Filardli, Hadiyanto Hadiyanto and Zainul Akmar Zakaria

E3S Web Conf., 226 (2021) 00032

**Addition of *Moringa oleifera* Lam. Leaves Flour for Increasing the Nutritional Value of Modified Cassava Flour–Based Breakfast Cereal**

Novian Wely Asmoro, Agustina Intan Niken Tari, Retno Widyastuti and Chandra Kurnia Setiawan

E3S Web Conf., 226 (2021) 00033

**Adoption Level of Integrated Farming System Based on Rice–Cattle and Its Determinants Related to Sustainable Agriculture**

Novitri Kurniati, Ketut Sukiyono, Purmini Purmini and Mutyarsih Oryza Sativa

E3S Web Conf., 226 (2021) 00034

**Eco-agriculture and Farming in the Anthropocene Epoch: A Philosophical Review**

Rangga Kala Mahaswa, Agung Widhianto and Nurul Hasanah

E3S Web Conf., 226 (2021) 00035

**The Strategy of Salt Business Development: A Case Study in Sumenep, Indonesia**

Rika Diananing, Amilia Destryana, Ribut Santosa, Noor Illi Mohamad Puad and Agustine Christela Melviana

E3S Web Conf., 226 (2021) 00036

**Analysis of Taking Decision of Farmers in Choosing Rice Cultivars: Case of Pakel District, Tulungagung, Indonesia**

Rima Dewi Oryza Sativa, Jabal Tarik Ibrahim and Sutawi Sutawi

E3S Web Conf., 226 (2021) 00037

**Pyrolysis of Water Hyacinth [*Eichhornia crassipes* (Mart.) Solms] for Liquid Smoke Production**

Rita Dwi Ratnani, Hadiyanto Hadiyanto, Widiyanto Widiyanto and Maizirwan Mel

E3S Web Conf., 226 (2021) 00038

**Effect and Effectivity of Granular Organic Fertilizer on Growth and Yield of Lowland Rice**

Rohmad Budiono, Fuad Nur Aziz, Endang Dwi Purbajanti, Tsitsino Turkadze and Praptiningsih Gamawati Adinurani

E3S Web Conf., 226 (2021) 00039

**Techno Economic Analysis of Biomass to Methanol Plant Based on Gasification of Palm Empty Fruit Bunch**

Rudy Heryadi and Syukri Muhammad Nur

E3S Web Conf., 226 (2021) 00040

**Risk Analysis of Partnership Broiler Farm in Blitar District, East Java, Indonesia**

Septi Nur Wulan Mulatmi, Apriliana Devi Anggraini, Febrianti Shaywont Pratami and Martina Motalova

E3S Web Conf., 226 (2021) 00041

**Hydrolysis of Cellulose from Oil Palm Empty Fruit Bunch using *Aspergillus niger***

Sri Sugiwati, Suaidah Suaidah, Eka Triwahyuni, Muryanto Muryanto, Yosie Andriani and Haznan Abimanyu

E3S Web Conf., 226 (2021) 00042

**Lignin and Cellulose Content of Fermented Rice Straw with *Aspergillus niger* (van Tieghem) and *Trichoderma mutan* AA1**

Sri Sukaryani, Engkus Ainul Yakin, Yos Wahyu Harinta, Zane Vincēviča–Gaile and Endang Dwi Purbajanti

E3S Web Conf., 226 (2021) 00043

**Multiplication Arbuscular Mycorrhizal Fungi in Corn (*Zea mays* L.) with Pots Culture at Greenhouse**

Sukmawati Sukmawati, Adnyana Adnyana, Dewa Nengah Suprpta, Meitini Proborini, Peeyush Soni and Praptiningsih Gamawati Adinurani

E3S Web Conf., 226 (2021) 00044

**Modified Off–Season Technology to the Flowering Time and Fruit Yield of *Arumanis* Mango (*Mangifera indica* L.)**

Syarif Husen, Erny Ishartati, Muhidin Muhidin, Devi Dwi Siskawardani, Anjar Rizky, Akhmad Syaifudin and Jumpen Onthong

E3S Web Conf., 226 (2021) 00045

**Entrepreneurship Orientation, Eco-innovation, Information and Communication Technology (ICT) Learning Adoption Capability: A case Study of Food SME’s in Central Java, Indonesia**

Vincent Didiek Wiet Aryanto, Kunio Kondo, Yohan Wismantoro and Pulung Nurtantyo Andono

E3S Web Conf., 226 (2021) 00046

**Potentials of Gas Emission Reduction (GHG) by the Glass Sheet Industry through Energy Conservation**

Washington Purba, Erkata Yandri, Roy Hendroko Setyobudi, Hery Susanto, Satriyo Krido Wahono, Kiman Siregar, Yogo Adhi Nugroho, Abubakar Yaro, Kamaruddin Abdullah, Yahya Jani and Danny Faturahman

E3S Web Conf., 226 (2021) 00047

**The Use of Rumen Contents as Bio–Activators for Fermentation in Goat Manure Fertilizer Production**

Wehandaka Pancapalaga, Suyatno Suyatno and David Sedlacek

E3S Web Conf., 226 (2021) 00048

**Exploration and Characterization of “Uwi” Plant (*Dioscorea* sp.) in East Java Uplands, Indonesia**

Wuryantoro Wuryantoro, Ratna Mustika Wardhani, Indah Rekyani Puspitawati, Praptiningsih Gamawati Adinurani and Bohari Mohammad Yamin

E3S Web Conf., 226 (2021) 00049

**Sweet Potatoes: Development and Potential as Alternative Food Ingredients in Karanganyar Regency, Indonesia**

Yoesti Silvana Arianti and Yos Wahyu Harinta

E3S Web Conf., 226 (2021) 00050

**Study of Agronomic Characteristics of Robusta Coffee at Coffee Plantations in Temanggung, Indonesia**

Yohana Theresia Maria Astuti, Enny Rahayu, Tri Nugraha Budi Santosa, Dian Pratama Putra, Agus Solifudin, Yureana Wijayanti and Marcus Fittkow

E3S Web Conf., 226 (2021) 00051

# Factors that Influence Farmer's Behavior Towards Risk

Muhamad Nurdin Yusuf\*, Agus Yuniawan Isyanto, and Sudradjat Sudradjat

Department of Agribusiness, Faculty of Agriculture, Galuh University, Jl. R. E. Martadinata No.150, Ciamis 46274, Indonesia

**Abstract.** The research was carried out with the aim to find out the behavior of farmers towards risk and the factors that influence it. The research sample was 100 paddy farmers in flood-prone area paddy fields in Pangandaran District, West Java Province, Indonesia. Farmer's behavior towards risk was analyzed using quadratic utility functions, while the factors that influence farmer's behavior towards risk were analyzed using logistic regression. The results showed farmers 87 was risk neutral, while 13 farmer risk takers were farmers. Education, familys size and income significantly influence farmer's behavior towards risk; while age, experience, land area, production risk, price risk, income risk and group did not significantly influence farmer's behavior towards risk.

**Keywords:** Land area, logistic regression, risk taker, quadratic utility.

## 1 Introduction

The impact of global climate change has an effect on paddy production in Indonesia in the form of flooding which results in crop failure or a decrease in paddy production [1]. Climate change has occurred in Indonesia with indications of an increase in temperature and changes in rainfall patterns. Agriculture is very vulnerable to the effects of climate change with an indication of the high level of danger in decreasing paddy production as a result of increasing temperatures and changes in rainfall patterns. The average decline in paddy production is 1.37 % yr<sup>-1</sup> which has the potential to cause a decline in national food production [2].

The threat of flooding in paddy fields can lead to reduced harvest area and paddy production [3]. Production is related to the nature of farming which is always dependent on nature supported by risk factors [4]. The risk of failure in farming comes from the use of new technology, prices of agricultural production, capital, government policies and individual behavior of farmers in dealing with outsiders [5], as well as climate change and weather that are not in accordance with crop needs [6]. The main risks farming include flooding [7].

Farmer's behavior towards risk consists of risk averter, risk neutral, and risk taker. Farmer behavior is the basis of farmers' decision making in carrying out their farming [1]. Farmer's behavior towards risk has an important role in influencing the productivity of agricultural products which has an impact on production efficiency [8]. Factors that

---

\* Corresponding author: [muhamadnurdinyusuf@gmail.com](mailto:muhamadnurdinyusuf@gmail.com)

influence farmer behavior towards risk are the area of planting, age, education, experience, family size, income and productivity risk [8].

## 2 Research methodology

Amount ten villages in Padoherang and Kalipucang Subdistricts in Pangandaran District were taken purposively as a sample area with consideration of being areas that have flood-prone rice fields. From each village a sample of ten farmers was taken, so that the total number of samples was 100 farmers.

Farmer's behavior towards farming risk was analyzed using the quadratic utility Equation (1):

$$U = \tau_1 + \tau_2 M + \tau_3 M^2 \quad (1)$$

Where:

U : utility for expected income (in util)

$\tau_1$  : intercept

M : expected income at the balance point (rupiah value from certainty equivalent (CE)

$\tau_2$  : indifference income coefficient (CE)

$\tau_3$  : farmer risk coefficient

The risk preference coefficient shows the farmer's attitude to risk, namely:

$\tau_3 = 0$  : Risk neutral

$\tau_3 < 0$  : Risk averse

$\tau_3 > 0$  : Risk taker

The factors that influence farmers' behavior towards risk are analyzed using ordinal logit regression with the following Equation (2):

$$P_i = F(Y_i) = F(\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} D) \quad (2)$$

$Y_i$  values are calculated using the following Equation (3):

$$Y_i = \text{Log} [P_i / (1 - P_i)] = (\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} D + e) \quad (3)$$

Where:

$Y_i$  = Opportunities for farmers to make decisions, where:

$Y_1$  = 1 for the farmer who are risk averse

$Y_2$  = 2 for the farmer who are risk neutral

$Y_3$  = 3 for the farmer who are risk taker

$\alpha$  = Intercept

$\beta_i$  = Parameter regression coefficient ( $i = 1, 2, 3, \dots, 10$ )

$X_1$  = Age (year)

$X_2$  = Education (year)

$X_3$  = Family size (person)

$X_4$  = Experience (year)

$X_5$  = Land area (ha)

$X_6$  = Farm income (IDR)

$X_7$  = Production risk

$X_8$  = Price risk

$X_9$  = Income risk

D = Membership in groups (1 if being a member of a group, 0 if not)

e = error term

### 3 Results and discussion

#### 3.1 Farmer's behavior towards risk

Farmer's behavior towards risk in paddy farming in flood-prone paddy fields can be seen in Table 1.

**Table 1.** Farmer's behavior towards risk

Farmer's behavior towards risk	Number of people	Percentage
Risk Neutral	87	87.00
Risk Taker	13	13.00
Total	100	100.00

Table 1 shows that most farmers (87 %) are risk neutral, while the rest (13 %) are risk takers. There are no risk averse farmers. According to [9], the absence of risk averse farmers show that there are no farmers who are willing to sacrifice their income or potential income to reduce opportunities for loss or low income. According to [1], farmers will try to avoid failure and not get big profits by taking risks. Such behavior is called safety first, which is characteristic of most farmers.

Farmers who are risk neutral are farmers who have a rational attitude in facing risks [9]. Risk neutral farmers tend to cultivate based on hereditary habits. They only seek income that can meet their family's needs [10]. If there is additional capital for risk neutral farmers, then they might add input to get higher income [11]. The availability of capital for farmers is a risk factor that is considered to affect farmers to the farming they are doing [12].

Risk taker farmers are farmers who are willing to allocate and use their production factors to the maximum, even though there are risks that must be faced with the aim of obtaining optimal results. [8] states that conceptually farmers are able to reduce production risk and price risk by improving their productivity, the use of diversification, the use of appropriate cropping patterns, strengthening farmer institutions, and bargaining position of farmers can increase farmers' production and income [7].

#### 3.2 Factors that influence farmer's behavior toward risk

The results of the analysis of factors that influence farmer behavior on risk in paddy farming in flood-prone paddy fields can be seen in Table 2.

**Table 2.** Factors that influence farmer's behavior towards risk

Variabel	B	Wald	Exp(B)
Age	0.788	0.020	2.199
Education	7.139	3.452**	1.260E3
Family size	4.983	4.303*	145.958
Experience	-0.149	0.003	0.861
Land area	0.687	0.279	1.988
Farm income	2.896	4.313*	18.103

(Continued on next page)

**Table 2.** Continued

Variabel	B	Wald	Exp(B)
Production risk	1.029	0.407	2.799
Price risk	-0.834	1.016	0.434
Income risk	-0.134	0.014	0.875
Group	1.795	0.946	6.020
Constant	-69.854	3.703**	0.000
Model Summary			
-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Chi-square
19.158	0.441	0.819	18.307*

\*, \*\* = significant at 5 %, 10 %

Table 2 shows that age is not significant influence farmers' behavior towards risk. This shows that the difference in age of farmers does not affect the behavior of farmers in dealing with risk. Education significantly influences farmer's behavior towards risk. The results of this study are in accordance with the results of research from [13]. The higher the level of education of farmers, the more courageous farmers face risks [5, 7]. According to [13], the level of education of farmers who are still low makes the main cause of the majority of farmers who choose safety first (zero risk) behavior in developing their farming.

Family size significantly influences farmer's behavior towards risk. The results of this study are in accordance with the results of research by [14]. According to [9], family size affects the outpouring of time that can be allocated for farming. According to [14], the more number of members of the farmer's family, the higher the capacity of the workforce owned by the farmer in facing the risk.

Experience does not significantly influence farmers' behavior towards risk. The longer the farmer's experience, the more careful it will be in carrying out farming so that it tends to be more neutral to risk. The results of this study are in accordance with the results of research from [7].

Land area does not significantly affect farmer's behavior to risk. The results of this study are consistent with the results of a study from [5] which shows that the addition or reduction of land area will not reduce risk aversion or that farmers are neutral towards risk.

Revenue significantly influences farmer's behavior towards risk. The greater the income the farmer receives from the farming that is carried out, the farmer will be more courageous in accepting the risk. The results of this study are in accordance with the results of research from [8, 14, 5]. According to [8], the higher the farm income received by farmers, the farmers will be more willing to accept the risk.

Production risk does not significantly influence farmer's behavior towards risk. According to [7], the magnitude of the risk of production faced by farmers due to the uncertainty of results as a result of natural factors and income as a result of price fluctuations, causes farmers to tend to reject the possibility of accepting the risks and uncertainties of the business. According to [15], efforts to handle production risk can be done by implementing a diversification and agricultural insurance program.

Price risk does not significantly influence farmer's behavior towards risk. According to [16], farmers' household attitudes in carrying out production activities can be seen from variations in prices as a measure of price risk. According to [17], the behavior of farmers who accept price risk is caused by the expectation of expected price reductions compared to the actual prices that make farmers continue to carry out farming as long as they provide benefits. According to [18], the behavior of farmers does not dare to risk due to fluctuations

in production and selling prices which will have an impact on farmers' income.

Income risk does not significantly influence farmer behavior towards risk. The higher the income risk faced by farmers, the more farmers will behave neutrally against risk. Membership in groups does not significantly influence farmers' behavior towards risk. According to [19], group membership is one of the efforts of farmers to reduce the risk of farming by cooperating with each other, exchanging information in managing their farming with fellow farmers.

## 4 Conclusion

Amount 87 farmers are risk neutral and 13 farmers are risk takers. Education, family size and income significantly influence farmer's behavior towards risk; while age, experience, land area, production risk, price risk, income risk and group did not significantly influence farmer's behavior towards risk.

## References

1. C. Gardebroek, M.D. Chavez, A.O. Lansink, J. Agric. Econ. **61**,1:60–75(2010).  
<https://doi.org/10.1111/j.1477-9552.2009.00222.x>
2. Ruminta, Handoko, T. Nurmala. Jurnal Agro. **5**,1:48–60(2018). [in Bahasa Indonesia].  
[https://journal.uinsgd.ac.id/index.php/ja/article/download/1607/pdf\\_16](https://journal.uinsgd.ac.id/index.php/ja/article/download/1607/pdf_16)
3. Shahab. E. Saqib, Mokbul. M. Ahmad, Sanallah. P, Irfan. A Rana, Int. J. Disaster Risk Reduc. **18**:107–114(2016).  
[https://www.researchgate.net/profile/Shahab\\_E\\_Saqib/publication/304305997\\_An\\_Empirical\\_Assessment\\_of\\_Farmers%27\\_Risk\\_Attitudes\\_in\\_Flood-Prone\\_Areas\\_of\\_Pakistan/links/5bf55cd2299bf1124fe32898/An-Empirical-Assessment-of-Farmers-Risk-Attitudes-in-Flood-Prone-Areas-of-Pakistan.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Shahab_E_Saqib/publication/304305997_An_Empirical_Assessment_of_Farmers%27_Risk_Attitudes_in_Flood-Prone_Areas_of_Pakistan/links/5bf55cd2299bf1124fe32898/An-Empirical-Assessment-of-Farmers-Risk-Attitudes-in-Flood-Prone-Areas-of-Pakistan.pdf?origin=publication_detail)
4. C. Gardebroek, Eur. Rev. Agric. Econ. **33**,4:485–510(2006).  
<https://doi.org/10.1093/erae/jbl029>
5. M.P. Lucas, I.M. Pabuayon., Asian J. Agric. Dev. **8**,2:61–77(2011).  
[https://tind-customer-agecon.s3.amazonaws.com/9fdd6f1e-7e97-4413-a5f2-ffb38a8fea0c?response-content-disposition=attachment%3B%20filename%2A%3DUTF-8%27%27AJAD\\_2011\\_8\\_2\\_5Lucas.pdf&response-content-type=application%2Fpdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Expires=86400&X-Amz-Credential=AKIAXL7W7Q3XHXDQYS%2F20200908%2Feu-west-1%2Fs%2Faws4\\_request&X-Amz-SignedHeaders=host&X-Amz-Date=20200908T165030Z&X-Amz-Signature=20ca172c04b02c087149aa1ba32cc86309bf574faede65f1910b98ade0e76e34](https://tind-customer-agecon.s3.amazonaws.com/9fdd6f1e-7e97-4413-a5f2-ffb38a8fea0c?response-content-disposition=attachment%3B%20filename%2A%3DUTF-8%27%27AJAD_2011_8_2_5Lucas.pdf&response-content-type=application%2Fpdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Expires=86400&X-Amz-Credential=AKIAXL7W7Q3XHXDQYS%2F20200908%2Feu-west-1%2Fs%2Faws4_request&X-Amz-SignedHeaders=host&X-Amz-Date=20200908T165030Z&X-Amz-Signature=20ca172c04b02c087149aa1ba32cc86309bf574faede65f1910b98ade0e76e34)
6. T. Tiedemann, U.L. Lohman, J. Agric. Econ. **64**,1:73–96(2012).  
<https://doi.org/10.1111/j.1477-9552.2012.00364.x>
7. J.N. Nmadu, G.P. Eze, A.J. Jirgi. British J. Econ. Manag. Trade, **2**,2:92–108(2012).  
<https://www.journaljemt.com/index.php/JEMT/article/download/30022/56339>
8. R. Darma, T.N.A. Rahmadanih, R. Amandaria. Int. J. Agric. Syst. **2**,1:77–89(2014).  
<http://pasca.unhas.ac.id/ojs/index.php/ijas/article/download/24/23>
9. E.D. Oruonye, IJFSE. **3**,4:113–117(2013).  
[http://www.ijfse.com/uploadedfiles/IJFSEArchive/IJFSE2013/3\(4\)/01.pdf](http://www.ijfse.com/uploadedfiles/IJFSEArchive/IJFSE2013/3(4)/01.pdf)
10. M.C. Plaxedes, P. Mafongoya, Clim. Risk Manag. **16**:145–163(2017).  
<https://doi.org/10.1016/j.crm.2017.02.001>

11. Y. Ferrianta, M.F. Makki, Suprijanto, Rifiana. *Int. J. Agric. Manag. Dev.* **5**,2:133–139(2014).  
[https://www.researchgate.net/publication/272667859\\_Risk\\_Analysis\\_and\\_Strategy\\_of\\_Rice\\_Farmers\\_in\\_Swampland\\_in\\_the\\_Face\\_of\\_Climate\\_Change\\_Impact\\_Case\\_in\\_South\\_Kalimantan\\_Province-Indonesia/fulltext/57a79def08aee07544c1d003/Risk-Analysis-and-Strategy-of-Rice-Farmers-in-Swampland-in-the-Face-of-Climate-Change-Impact-Case-in-South-Kalimantan-Province-Indonesia.pdf?origin=publication\\_detail](https://www.researchgate.net/publication/272667859_Risk_Analysis_and_Strategy_of_Rice_Farmers_in_Swampland_in_the_Face_of_Climate_Change_Impact_Case_in_South_Kalimantan_Province-Indonesia/fulltext/57a79def08aee07544c1d003/Risk-Analysis-and-Strategy-of-Rice-Farmers-in-Swampland-in-the-Face-of-Climate-Change-Impact-Case-in-South-Kalimantan-Province-Indonesia.pdf?origin=publication_detail)
12. A.D. Brauw, P. Eozenou. *J. Dev. Econ.* **111**:61–74(2014).  
[https://www.researchgate.net/profile/Patrick\\_Eozenou/publication/266617635\\_Measuring\\_risk\\_attitudes\\_among\\_Mozambican\\_farmers/links/5435ad990cf2643ab9867e0d/Measuring-risk-attitudes-among-Mozambican-farmers.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Patrick_Eozenou/publication/266617635_Measuring_risk_attitudes_among_Mozambican_farmers/links/5435ad990cf2643ab9867e0d/Measuring-risk-attitudes-among-Mozambican-farmers.pdf?origin=publication_detail)
13. C.A. Kalu, J.A. Mbanasor. *NAPReJ*, **1**,1:1–10(2016).  
<https://econpapers.repec.org/scripts/redir.pf?u=https%3A%2F%2Fdoi.org%2F10.22004%2F252Fag.econ.292052;h=repec:ags:naprej:292052>
14. M.M. Haque, S. Bremer, S. Aziz, J.P. Sluijs, *Clim. Risk Manag.* **16**:43–58(2017).  
<https://dx.doi.org/10.1016/j.crm.2016.12.002>
15. S. Dadzie, N. Kwesi, H. de Graft. A, *Int. J. Agric. For.* **2**,2:29–37(2012).  
[https://www.researchgate.net/profile/Samuel\\_Dadzie/publication/241699647\\_Attitudes\\_Toward\\_Risk\\_and\\_Coping\\_Responses\\_The\\_Case\\_of\\_Food\\_Crop\\_Farmers\\_at\\_Agona\\_Duakwa\\_in\\_Agona\\_East\\_District\\_of\\_Ghana/links/0046351caa436af152000000/Attitudes-Toward-Risk-and-Coping-Responses-The-Case-of-Food-Crop-Farmers-at-Agona-Duakwa-in-Agona-East-District-of-Ghana.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Samuel_Dadzie/publication/241699647_Attitudes_Toward_Risk_and_Coping_Responses_The_Case_of_Food_Crop_Farmers_at_Agona_Duakwa_in_Agona_East_District_of_Ghana/links/0046351caa436af152000000/Attitudes-Toward-Risk-and-Coping-Responses-The-Case-of-Food-Crop-Farmers-at-Agona-Duakwa-in-Agona-East-District-of-Ghana.pdf?origin=publication_detail)
16. S.R. Fajri, E. Fauziyah. *J. Hort. Indonesia*, **9**,3:188–196(2018). [in Bahasa Indonesia]  
<https://journal.ipb.ac.id/index.php/jhi/article/download/26496/17128/>
17. C. Mulwa, P. Marennya, D.B. Rahut, M. Kassie, *Clim. Risk Manag.* **16**:208–221(2017).  
<https://reader.elsevier.com/reader/sd/pii/S2212096317300062?token=8C6D3F91A4BEF28A0A8335A476A7B6B75EB4D84ED7742D9C358F0465D68675FD002D8C4A371BC054A01FAF3CD18289A8>
18. A. Ali, O. Erenstein, *Clim. Risk Manag.* **16**:1–12(2017).  
[https://www.researchgate.net/profile/Olaf\\_Erenstein/publication/311879490\\_Assessing\\_farmer\\_use\\_of\\_climate\\_change\\_adaptation\\_practices\\_and\\_impacts\\_on\\_food\\_security\\_and\\_poverty\\_in\\_Pakistan/links/58b71affaca27261e51a4134/Assessing-farmer-use-of-climate-change-adaptation-practices-and-impacts-on-food-security-and-poverty-in-Pakistan.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Olaf_Erenstein/publication/311879490_Assessing_farmer_use_of_climate_change_adaptation_practices_and_impacts_on_food_security_and_poverty_in_Pakistan/links/58b71affaca27261e51a4134/Assessing-farmer-use-of-climate-change-adaptation-practices-and-impacts-on-food-security-and-poverty-in-Pakistan.pdf?origin=publication_detail)
19. A. Tripathi, A.K. Mishra. *Clim. Risk Manag.* **16**:1–37(2017).  
[https://www.researchgate.net/publication/310815962\\_Knowledge\\_And\\_Passive\\_Adaptation\\_to\\_Climate\\_Change\\_an\\_Example\\_From\\_Indian\\_Farmers/fulltext/583a4d6308ae3a74b49ea7e4/Knowledge-And-Passive-Adaptation-to-Climate-Change-an-Example-From-Indian-Farmers.pdf?origin=publication\\_detail](https://www.researchgate.net/publication/310815962_Knowledge_And_Passive_Adaptation_to_Climate_Change_an_Example_From_Indian_Farmers/fulltext/583a4d6308ae3a74b49ea7e4/Knowledge-And-Passive-Adaptation-to-Climate-Change-an-Example-From-Indian-Farmers.pdf?origin=publication_detail)



PAPER NAME

**e3sconf\_icon-beat2019\_00030.pdf**

WORD COUNT

**2592 Words**

CHARACTER COUNT

**14492 Characters**

PAGE COUNT

**6 Pages**

FILE SIZE

**186.1KB**

SUBMISSION DATE

**Apr 4, 2023 12:37 PM GMT+7**

REPORT DATE

**Apr 4, 2023 12:37 PM GMT+7****● 2% Overall Similarity**

The combined total of all matches, including overlapping sources, for each database.

- 2% Publications database
- Crossref Posted Content database

**● Excluded from Similarity Report**

- Internet database
- Crossref database
- Bibliographic material
- Cited material

# Factors that Influence Farmer's Behavior Towards Risk

Muhamad Nurdin Yusuf\*, Agus Yuniawan Isyanto, and Sudradjat Sudradjat

Department of Agribusiness, Faculty of Agriculture, Galuh University, Jl. R. E. Martadinata No.150, Ciamis 46274, Indonesia

**Abstract.** The research was carried out with the aim to find out the behavior of farmers towards risk and the factors that influence it. The research sample was 100 paddy farmers in flood-prone area paddy fields in Pangandaran District, West Java Province, Indonesia. Farmer's behavior towards risk was analyzed using quadratic utility functions, while the factors that influence farmer's behavior towards risk were analyzed using logistic regression. The results showed farmers 87 was risk neutral, while 13 farmer risk takers were farmers. Education, familys size and income significantly influence farmer's behavior towards risk; while age, experience, land area, production risk, price risk, income risk and group did not significantly influence farmer's behavior towards risk.

**Keywords:** Land area, logistic regression, risk taker, quadratic utility.

## 1 Introduction

The impact of global climate change has an effect on paddy production in Indonesia in the form of flooding which results in crop failure or a decrease in paddy production [1]. Climate change has occurred in Indonesia with indications of an increase in temperature and changes in rainfall patterns. Agriculture is very vulnerable to the effects of climate change with an indication of the high level of danger in decreasing paddy production as a result of increasing temperatures and changes in rainfall patterns. The average decline in paddy production is 1.37 % yr<sup>-1</sup> which has the potential to cause a decline in national food production [2].

The threat of flooding in paddy fields can lead to reduced harvest area and paddy production [3]. Production is related to the nature of farming which is always dependent on nature supported by risk factors [4]. The risk of failure in farming comes from the use of new technology, prices of agricultural production, capital, government policies and individual behavior of farmers in dealing with outsiders [5], as well as climate change and weather that are not in accordance with crop needs [6]. The main risks farming include flooding [7].

Farmer's behavior towards risk consists of risk averter, risk neutral, and risk taker. Farmer behavior is the basis of farmers' decision making in carrying out their farming [1]. Farmer's behavior towards risk has an important role in influencing the productivity of agricultural products which has an impact on production efficiency [8]. Factors that

---

\* Corresponding author: [muhamadnurdinyusuf@gmail.com](mailto:muhamadnurdinyusuf@gmail.com)

influence farmer behavior towards risk are the area of planting, age, education, experience, family size, income and productivity risk [8].

## 2 Research methodology

Amount ten villages in Padaherang and Kalipucang Subdistricts in Pangandaran District were taken purposively as a sample area with consideration of being areas that have flood-prone rice fields. From each village a sample of ten farmers was taken, so that the total number of samples was 100 farmers.

Farmer's behavior towards farming risk was analyzed using the quadratic utility Equation (1):

$$U = \tau_1 + \tau_2 M + \tau_3 M^2 \quad (1)$$

Where:

U : utility for expected income (in util)

$\tau_1$  : intercept

M : expected income at the balance point (rupiah value from certainty equivalent (CE)

$\tau_2$  : indifference income coefficient (CE)

$\tau_3$  : farmer risk coefficient

The risk preference coefficient shows the farmer's attitude to risk, namely:

$\tau_3 = 0$  : Risk neutral

$\tau_3 < 0$  : Risk averse

$\tau_3 > 0$  : Risk taker

The factors that influence farmers' behavior towards risk are analyzed using ordinal logit regression with the following Equation (2):

$$P_i = F(Y_i) = F(\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_8 D_8 + \beta_9 D_9 + \beta_{10} D) \quad (2)$$

$Y_i$  values are calculated using the following Equation (3):

$$Y_i = \text{Log} [P_i / (1 - P_i)] = (\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} D + e) \quad (3)$$

Where:

$Y_i$  = Opportunities for farmers to make decisions, where:

$Y_1$  = 1 for the farmer who are risk averse

$Y_2$  = 2 for the farmer who are risk neutral

$Y_3$  = 3 for the farmer who are risk taker

$\alpha$  = Intercept

$\beta_i$  = Parameter regression coefficient ( $i = 1, 2, 3, \dots, 10$ )

$X_1$  = Age (year)

$X_2$  = Education (year)

$X_3$  = Family size (person)

$X_4$  = Experience (year)

$X_5$  = Land area (ha)

$X_6$  = Farm income (IDR)

$X_7$  = Production risk

$X_8$  = Price risk

$X_9$  = Income risk

D = Membership in groups (1 if being a member of a group, 0 if not)

e = error term

### 3 Results and discussion

#### 3.1 Farmer's behavior towards risk

Farmer's behavior towards risk in paddy farming in flood-prone paddy fields can be seen in Table 1.

**Table 1.** Farmer's behavior towards risk

Farmer's behavior towards risk	Number of people	Percentage
Risk Neutral	87	87.00
Risk Taker	13	13.00
Total	100	100.00

Table 1 shows that most farmers (87 %) are risk neutral, while the rest (13 %) are risk takers. There are no risk averse farmers. According to [9], the absence of risk averse farmers show that there are no farmers who are willing to sacrifice their income or potential income to reduce opportunities for loss or low income. According to [1], farmers will try to avoid failure and not get big profits by taking risks. Such behavior is called safety first, which is characteristic of most farmers.

Farmers who are risk neutral are farmers who have a rational attitude in facing risks [9]. Risk neutral farmers tend to cultivate based on hereditary habits. They only seek income that can meet their family's needs [10]. If there is additional capital for risk neutral farmers, then they might add input to get higher income [11]. The availability of capital for farmers is a risk factor that is considered to affect farmers to the farming they are doing [12].

Risk taker farmers are farmers who are willing to allocate and use their production factors to the maximum, even though there are risks that must be faced with the aim of obtaining optimal results. [8] states that conceptually farmers are able to reduce production risk and price risk by improving their productivity, the use of diversification, the use of appropriate cropping patterns, strengthening farmer institutions, and bargaining position of farmers can increase farmers' production and income [7].

#### 3.2 Factors that influence farmer's behavior toward risk

The results of the analysis of factors that influence farmer behavior on risk in paddy farming in flood-prone paddy fields can be seen in Table 2.

**Table 2.** Factors that influence farmer's behavior towards risk

Variabel	B	Wald	Exp(B)
Age	0.788	0.020	2.199
Education	7.139	3.452**	1.260E3
Family size	4.983	4.303*	145.958
Experience	-0.149	0.003	0.861
Land area	0.687	0.279	1.988
Farm income	2.896	4.313*	18.103

(Continued on next page)

**Table 2.** Continued

Variabel	B	Wald	Exp(B)
Production risk	1.029	0.407	2.799
Price risk	-0.834	1.016	0.434
Income risk	-0.134	0.014	0.875
Group	1.795	0.946	6.020
Constant	-69.854	3.703**	0.000
<b>Model Summary</b>			
-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Chi-square
19.158	0.441	0.819	18.307*

\*, \*\* = significant at 5 %, 10 %

Table 2 shows that age is not significant influence farmers' behavior towards risk. This shows that the difference in age of farmers does not affect the behavior of farmers in dealing with risk. Education significantly influences farmer's behavior towards risk. The results of this study are in accordance with the results of research from [13]. The higher the level of education of farmers, the more courageous farmers face risks [5, 7]. According to [13], the level of education of farmers who are still low makes the main cause of the majority of farmers who choose safety first (zero risk) behavior in developing their farming.

Family size significantly influences farmer's behavior towards risk. The results of this study are in accordance with the results of research by [14]. According to [9], family size affects the outpouring of time that can be allocated for farming. According to [14], the more number of members of the farmer's family, the higher the capacity of the workforce owned by the farmer in facing the risk.

Experience does not significantly influence farmers' behavior towards risk. The longer the farmer's experience, the more careful it will be in carrying out farming so that it tends to be more neutral to risk. The results of this study are in accordance with the results of research from [7].

Land area does not significantly affect farmer's behavior to risk. The results of this study are consistent with the results of a study from [5] which shows that the addition or reduction of land area will not reduce risk aversion or that farmers are neutral towards risk.

Revenue significantly influences farmer's behavior towards risk. The greater the income the farmer receives from the farming that is carried out, the farmer will be more courageous in accepting the risk. The results of this study are in accordance with the results of research from [8, 14, 5]. According to [8], the higher the farm income received by farmers, the farmers will be more willing to accept the risk.

Production risk does not significantly influence farmer's behavior towards risk. According to [7], the magnitude of the risk of production faced by farmers due to the uncertainty of results as a result of natural factors and income as a result of price fluctuations, causes farmers to tend to reject the possibility of accepting the risks and uncertainties of the business. According to [15], efforts to handle production risk can be done by implementing a diversification and agricultural insurance program.

Price risk does not significantly influence farmer's behavior towards risk. According to [16], farmers' household attitudes in carrying out production activities can be seen from variations in prices as a measure of price risk. According to [17], the behavior of farmers who accept price risk is caused by the expectation of expected price reductions compared to the actual prices that make farmers continue to carry out farming as long as they provide benefits. According to [18], the behavior of farmers does not dare to risk due to fluctuations

in production and selling prices which will have an impact on farmers' income.

Income risk does not significantly influence farmer behavior towards risk. The higher the income risk faced by farmers, the more farmers will behave neutrally against risk. Membership in groups does not significantly influence farmers' behavior towards risk. According to [19], group membership is one of the efforts of farmers to reduce the risk of farming by cooperating with each other, exchanging information in managing their farming with fellow farmers.

## 4 Conclusion

Amount 87 farmers are risk neutral and 13 farmers are risk takers. Education, family size and income significantly influence farmer's behavior towards risk; while age, experience, land area, production risk, price risk, income risk and group did not significantly influence farmer's behavior towards risk.

## References

1. C. Gardebroek, M.D. Chavez, A.O. Lansink, J. Agric. Econ. **61**,1:60–75(2010).  
<https://doi.org/10.1111/j.1477-9552.2009.00222.x>
2. Ruminta, Handoko, T. Nurmala. Jurnal Agro. **5**,1:48–60(2018). [in Bahasa Indonesia].  
[https://journal.uinsgd.ac.id/index.php/ja/article/download/1607/pdf\\_16](https://journal.uinsgd.ac.id/index.php/ja/article/download/1607/pdf_16)
3. Shahab. E. Saqib, Mokbul. M. Ahmad, Sanaullah. P, Irfan. A Rana, Int. J. Disaster Risk Reduc. **18**:107–114(2016).  
[https://www.researchgate.net/profile/Shahab\\_E\\_Saqib/publication/304305997\\_An\\_Empirical\\_Assessment\\_of\\_Farmers%27\\_Risk\\_Attitudes\\_in\\_Flood-Prone\\_Areas\\_of\\_Pakistan/links/5bf55cd2299bf1124fe32898/An-Empirical-Assessment-of-Farmers-Risk-Attitudes-in-Flood-Prone-Areas-of-Pakistan.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Shahab_E_Saqib/publication/304305997_An_Empirical_Assessment_of_Farmers%27_Risk_Attitudes_in_Flood-Prone_Areas_of_Pakistan/links/5bf55cd2299bf1124fe32898/An-Empirical-Assessment-of-Farmers-Risk-Attitudes-in-Flood-Prone-Areas-of-Pakistan.pdf?origin=publication_detail)
4. C. Gardebroek, Eur. Rev. Agric. Econ. **33**,4:485–510(2006).  
<https://doi.org/10.1093/erae/jbl029>
5. M.P. Lucas, I.M. Pabuayon., Asian J. Agric. Dev. **8**,2:61–77(2011).  
[https://tind-customer-agecon.s3.amazonaws.com/9fdd6f1e-7e97-4413-a5f2-ffb38a8fea0c?response-content-disposition=attachment%3B%20filename%2A%3DUTF-8%27%27AJAD\\_2011\\_8\\_2\\_5Lucas.pdf&response-content-type=application%2Fpdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Expires=86400&X-Amz-Credential=AKIAXL7W7Q3XHXDQYS%2F20200908%2Feu-west-1%2Fs%2Faws4\\_request&X-Amz-SignedHeaders=host&X-Amz-Date=20200908T165030Z&X-Amz-Signature=20ca172c04b02c087149aa1ba32cc86309bf574faede65f1910b98ade0e76e34](https://tind-customer-agecon.s3.amazonaws.com/9fdd6f1e-7e97-4413-a5f2-ffb38a8fea0c?response-content-disposition=attachment%3B%20filename%2A%3DUTF-8%27%27AJAD_2011_8_2_5Lucas.pdf&response-content-type=application%2Fpdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Expires=86400&X-Amz-Credential=AKIAXL7W7Q3XHXDQYS%2F20200908%2Feu-west-1%2Fs%2Faws4_request&X-Amz-SignedHeaders=host&X-Amz-Date=20200908T165030Z&X-Amz-Signature=20ca172c04b02c087149aa1ba32cc86309bf574faede65f1910b98ade0e76e34)
6. T. Tiedemann, U.L. Lohman, J. Agric. Econ. **64**,1:73–96(2012).  
<https://doi.org/10.1111/j.1477-9552.2012.00364.x>
7. J.N. Nmadu, G.P. Eze, A.J. Jirgi. British J. Econ. Manag. Trade, **2**,2:92–108(2012).  
<https://www.journaljemt.com/index.php/JEMT/article/download/30022/56339>
8. R. Darma, T.N.A. Rahmadanih, R. Amandaria. Int. J. Agric. Syst. **2**,1:77–89(2014).  
<http://pasca.unhas.ac.id/ojs/index.php/ijas/article/download/24/23>
9. E.D. Oruonye, IJFSE. **3**,4:113–117(2013).  
[http://www.ijfse.com/uploadedfiles/IJFSEArchive/IJFSE2013/3\(4\)/01.pdf](http://www.ijfse.com/uploadedfiles/IJFSEArchive/IJFSE2013/3(4)/01.pdf)
10. M.C. Plaxedes, P. Mafongoya, Clim. Risk Manag. **16**:145–163(2017).  
<https://doi.org/10.1016/j.crm.2017.02.001>

11. Y. Ferrianta, M.F. Makki, Suprijanto, Rifiana. *Int. J. Agric. Manag. Dev.* **5**,2:133–139(2014).  
[https://www.researchgate.net/publication/272667859\\_Risk\\_Analysis\\_and\\_Strategy\\_of\\_Rice\\_Farmers\\_in\\_Swampland\\_in\\_the\\_Face\\_of\\_Climate\\_Change\\_Impact\\_Case\\_in\\_South\\_Kalimantan\\_Province-Indonesia/fulltext/57a79def08aee07544c1d003/Risk-Analysis-and-Strategy-of-Rice-Farmers-in-Swampland-in-the-Face-of-Climate-Change-Impact-Case-in-South-Kalimantan-Province-Indonesia.pdf?origin=publication\\_detail](https://www.researchgate.net/publication/272667859_Risk_Analysis_and_Strategy_of_Rice_Farmers_in_Swampland_in_the_Face_of_Climate_Change_Impact_Case_in_South_Kalimantan_Province-Indonesia/fulltext/57a79def08aee07544c1d003/Risk-Analysis-and-Strategy-of-Rice-Farmers-in-Swampland-in-the-Face-of-Climate-Change-Impact-Case-in-South-Kalimantan-Province-Indonesia.pdf?origin=publication_detail)
12. A.D. Brauw, P. Eozenou. *J. Dev. Econ.* **111**:61–74(2014).  
[https://www.researchgate.net/profile/Patrick\\_Eozenou/publication/266617635\\_Measuring\\_risk\\_attitudes\\_among\\_Mozambican\\_farmers/links/5435ad990cf2643ab9867e0d/Measuring-risk-attitudes-among-Mozambican-farmers.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Patrick_Eozenou/publication/266617635_Measuring_risk_attitudes_among_Mozambican_farmers/links/5435ad990cf2643ab9867e0d/Measuring-risk-attitudes-among-Mozambican-farmers.pdf?origin=publication_detail)
13. C.A. Kalu, J.A. Mbanasor. *NAPReJ*, **1**,1:1–10(2016).  
<https://econpapers.repec.org/scripts/redir.pf?u=https%3A%2F%2Fdoi.org%2F10.22004%2F252Fag.econ.292052;h=repec:ags:naprej:292052>
14. M.M. Haque, S. Bremer, S. Aziz, J.P. Sluijs, *Clim. Risk Manag.* **16**:43–58(2017).  
<https://dx.doi.org/10.1016/j.crm.2016.12.002>
15. S. Dadzie, N. Kwesi, H. de Graft. A, *Int. J. Agric. For.* **2**,2:29–37(2012).  
[https://www.researchgate.net/profile/Samuel\\_Dadzie/publication/241699647\\_Attitudes\\_Toward\\_Risk\\_and\\_Coping\\_Responses\\_The\\_Case\\_of\\_Food\\_Crop\\_Farmers\\_at\\_Agona\\_Duakwa\\_in\\_Agona\\_East\\_District\\_of\\_Ghana/links/0046351caa436af152000000/Attitudes-Toward-Risk-and-Coping-Responses-The-Case-of-Food-Crop-Farmers-at-Agona-Duakwa-in-Agona-East-District-of-Ghana.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Samuel_Dadzie/publication/241699647_Attitudes_Toward_Risk_and_Coping_Responses_The_Case_of_Food_Crop_Farmers_at_Agona_Duakwa_in_Agona_East_District_of_Ghana/links/0046351caa436af152000000/Attitudes-Toward-Risk-and-Coping-Responses-The-Case-of-Food-Crop-Farmers-at-Agona-Duakwa-in-Agona-East-District-of-Ghana.pdf?origin=publication_detail)
16. S.R. Fajri, E. Fauziyah. *J. Hort. Indonesia*, **9**,3:188–196(2018). [in Bahasa Indonesia]  
<https://journal.ipb.ac.id/index.php/jhi/article/download/26496/17128/>
17. C. Mulwa, P. Marennya, D.B. Rahut, M. Kassie, *Clim. Risk Manag.* **16**:208–221(2017).  
<https://reader.elsevier.com/reader/sd/pii/S2212096317300062?token=8C6D3F91A4BEF28A0A8335A476A7B6B75EB4D84ED7742D9C358F0465D68675FD002D8C4A371BC054A01FAF3CD18289A8>
18. A. Ali, O. Erenstein, *Clim. Risk Manag.* **16**:1–12(2017).  
[https://www.researchgate.net/profile/Olaf\\_Erenstein/publication/311879490\\_Assessing\\_farmer\\_use\\_of\\_climate\\_change\\_adaptation\\_practices\\_and\\_impacts\\_on\\_food\\_security\\_and\\_poverty\\_in\\_Pakistan/links/58b71affaca27261e51a4134/Assessing-farmer-use-of-climate-change-adaptation-practices-and-impacts-on-food-security-and-poverty-in-Pakistan.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Olaf_Erenstein/publication/311879490_Assessing_farmer_use_of_climate_change_adaptation_practices_and_impacts_on_food_security_and_poverty_in_Pakistan/links/58b71affaca27261e51a4134/Assessing-farmer-use-of-climate-change-adaptation-practices-and-impacts-on-food-security-and-poverty-in-Pakistan.pdf?origin=publication_detail)
19. A. Tripathi, A.K. Mishra. *Clim. Risk Manag.* **16**:1–37(2017).  
[https://www.researchgate.net/publication/310815962\\_Knowledge\\_And\\_Passive\\_Adaptation\\_to\\_Climate\\_Change\\_an\\_Example\\_From\\_Indian\\_Farmers/fulltext/583a4d6308ae3a74b49ea7e4/Knowledge-And-Passive-Adaptation-to-Climate-Change-an-Example-From-Indian-Farmers.pdf?origin=publication\\_detail](https://www.researchgate.net/publication/310815962_Knowledge_And_Passive_Adaptation_to_Climate_Change_an_Example_From_Indian_Farmers/fulltext/583a4d6308ae3a74b49ea7e4/Knowledge-And-Passive-Adaptation-to-Climate-Change-an-Example-From-Indian-Farmers.pdf?origin=publication_detail)

## ● 2% Overall Similarity

Top sources found in the following databases:

- 2% Publications database
- Crossref Posted Content database

---

### TOP SOURCES

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

1	<b>Taja Chayeb Lucia Guadalupe. "Análisis mutacional de los genes EGFR ..."</b>	1%
	Publication	
2	<b>Banking Academy</b>	<1%
	Publication	



PAPER NAME

**2020 Desember 2.pdf**

---

WORD COUNT

**8207 Words**

CHARACTER COUNT

**47482 Characters**

PAGE COUNT

**24 Pages**

FILE SIZE

**1.8MB**

SUBMISSION DATE

**Apr 6, 2023 10:27 AM GMT+7**

REPORT DATE

**Apr 6, 2023 10:28 AM GMT+7**

---

**● 1% Overall Similarity**

The combined total of all matches, including overlapping sources, for each database.

- 1% Publications database
- Crossref Posted Content database

**● Excluded from Similarity Report**

- Internet database
- Crossref database
- Bibliographic material
- Cited material



# **E3S** **Web of Conferences**



## **PREFACE: the 1<sup>st</sup> ICoN-BEAT 2019**

On behalf of the organizing committee of the 1<sup>st</sup> International Conference on Bioenergy and Environmentally Sustainable Agriculture Technology (ICoN-BEAT 2019) and conjunction with the 2<sup>nd</sup> Congress Indonesian Agriculture Private University Association (APTSIPI - *Asosiasi Perguruan Tinggi Swasta Ilmu Pertanian Indonesia*). It is an honor and delight to welcome all participants to this conference which be held at the Campus III, University of Muhammadiyah Malang (UMM), Indonesia on November 7<sup>th</sup> to 8<sup>th</sup>, 2019. The conference theme is “Bioenergy and Environmentally Sustainable Agriculture Technologies: Toward Food, Energy and Water Sovereignty”.

This conference has been organized by Faculty of Agriculture and Animal Science, University of Muhammadiyah Malang. Two main topics have been discussed, i.e. bioenergy and other renewable energy, and environmentally sustainable agriculture. We are perceived confidently that this conference will provide positive influence and contribute to develop the academic field.

Supporting two main topics, the 1<sup>st</sup> ICoN - BEAT invited five experts in the fields of energy, environment and agriculture from Indonesia, Malaysia, and Thailand. The speakers are Mr. Arfie Thahar (Research and Development Division of the Indonesian Palm Oil Plantation Fund Management Agency, Jakarta), Assoc. Prof. Dr. Maizirwan Mel (Department of Biotechnology Engineering, International Islam University, Malaysia), Asst. Prof. Dr. Khwunta Khwamee (Department of Earth Science, Faculty of Natural Resources, Prince of Songkla University, Thailand), Mr. Paulus Tjakrawan (Executive Chairman of the Indonesian Biofuel Entrepreneurs Association, Jakarta), and Assoc. Prof. Dr. Tatang Hernas Soerawidjaja (Chairman of the Indonesian Bioenergy Association, Indonesian Research Council Commission, and Department of Chemical Engineering - Bandung Institute of Technology).

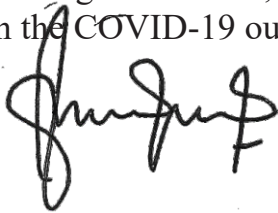
A pride because the number of participants who already send the paper about 116 presenters. After a rigorous selection process, the Scientific & Editorial Board of the 1<sup>st</sup> ICoN - BEAT 2019 decided to publish 51 papers in E3S Web of Conferences, an open-access proceedings in environment, energy and earth sciences, managed by EDP Sciences, Paris, France and indexed on Scopus, Scimago, Conference Proceedings Citation Index-Science (CPCI-S) of Clarivate Analytics's Web of Science, and DOAJ (Directory of Open Access Journals).

The Proceeding of the 1<sup>st</sup> ICoN - BEAT 2019, consists of 51 selected papers, amount 38 papers were the results of joint research by Indonesian and overseas scholars. In the collaboration research, 71 institutions were involved 20 of which were from abroad Indonesia. The overseas institutions are from: Australia, Austria, Czech, Estonia, Eswani, Georgia, Germany, India, Japan, Latvia, Lithuania, Madagascar, Malaysia, the Netherlands, P.R. China, Sweden, Taiwan - ROC, Thailand, the United Kingdom, and Uzbekistan. Each of the papers submitted in E3S Web of Conferences was reviewed by at least two experts using the double-blind system. The published papers have passed all necessary improvement requirements in accordance to the Web of Conferences standard, reviewer's comments, SI (*Système International d'Unités*), similarity tests by Turnitin program (with the highest threshold of 20 %), 90 % of references must be at least dated from 15 years, and reflected on Google, as well as editing procedure by professional editors from four countries (Estonia, Indonesia, Lithuania, and Malaysia).

Last but not least, I personally would like to thank you the official committees, organizing partners, and scientific & editorial board. Special thanks as well to our co-host partners: i) APTSIPI, ii) ILUNET (*Ikatan Alumni Energi Terbarukan*) University of Darma Persada, Jakarta, iii) Konsorsium Bioteknologi Indonesia, iv) Merdeka University of Madiun, v) University of Veteran Bangun Nusantara, Sukoharjo, vi) C- BIORE (Center of Biomass and Renewable Energy), vii) ITENAS (*Institut Teknologi Nasional*), viii) ILCAN (Indonesian Life Cycle Assessment Network), ix) *Rumah Paper Kita* as editing and proofreading services for supporting the 1<sup>st</sup> ICoN - BEAT 2019.

Finally, I would like to express my gratitude feeling for your participations, and please prepare yourself to gain the treasure of knowledge from the passionate experts. Then share the valuable enlightenment for a better future. It is my pleasure to see many of you in the 1<sup>st</sup> ICoN - BEAT 2019, and see you again in the 2<sup>nd</sup> ICoN - BEAT 2021.  
Stay safe and stay healthy in COVID-19 pandemic.

With warmest regards  
Malang - Indonesia, Dec 12, 2020  
in the COVID-19 outbreak



**Dr. Ir. Listiari Hendraningsih, M.P.**  
**Conference Chair**

**Principal Editor:** Roy Hendroko Setyobudi (Malang, IDN)

**Board of Editor:** Aris Winaya (Malang, IDN), Juris Burlakovs (Tartu, EST), Maizirwan Mel (Kualalumpur, MYS), and Olga Anne (Klaipėda, LTU).



## SCIENTIFIC & EDITORIAL BOARD

- Abubakar Yaro, Strathclyde Institute of Pharmacy & Biomedical Sciences, University of Strathclyde, Scotland (GBR)
- Andoniana Rakoto Malala, *Centre de Formation et d'Application du Machinisme Agricole* - CFAMA (MDG)
- Aris Winaya, Department of Animal Science – University of Muhammadiyah Malang (IDN)
- Bayu Prabowo, Renewable Energy Development Research, Research and Technology Center – PT Pertamina, Jakarta (IDN)
- Budi Siswanto, Merdeka University of Madiun and *Rumah Paper Kita* (Our House of Papers) RP Editing & Proofreading Servives (IDN)
- David Hermawan, Department of Fisheries – University of Muhammadiyah Malang (IDN)
- Erkata Yandri, Graduate School of Renewable Energy - Darma Persada University, Jakarta (IDN)
- Haryo Wibowo, Institute for Thermal Power Engineering (ITPE) – Zhejiang University of China (CHN)
- Henik Sukorini, Department of Agrotechnology – University of Muhammadiyah Malang (IDN)
- Jumpen Onthong, Department of Earth Science – Prince of Songkla University, Songkhla (THA)
- Juris Burlakovs Department of Water Management, Estonian University of Life Sciences, Tartu (EST)
- Ima Yudha Perwira, Department of Aquatic Resources Management– University of Udayana, Bali (IDN)
- Lili Zalizar, Department of Animal Science – University of Muhammadiyah Malang (IDN)
- Listiari Hendraningsih, Department of Animal Science – University of Muhammadiyah Malang (IDN)
- Maizirwan Mel, Dept. of Biotechnology Engineering – International Islamic University Malaysia, (MYS)
- Marlina Achmad, Department of Fisheries – University of Hasanuddin, Makassar (IDN)
- Muhammad Danang Birowosuto, CNRS International NTU Thales Research Alliance – Nanyang Technological University (SGP)
- Mohammad Syaifudin Zuhri, Merdeka University of Madiun and RP Editing & Proofreading Servives (IDN)
- Mulyoto Pangestu, Department Obstetrics and Gynaecology - Monash University (AUS)
- Nugroho Triwaskito, Department of Forestry - University of Muhammadiyah Malang (IDN)
- Olga Anne, Department of the Natural Sciences of Maritime Engineering, Klaipeda University (LTU)
- Peeyush Soni, Dept. of Agriculture and Food Engineering, Indian Institute of Technology Kharagpur (IND)
- Praptiningsih Gamawati Adinurani, Department of Agrotechnology – Merdeka University of Madiun and RP Editing & Proofreading Servives (IDN)
- Rangga Kala Mahaswa, Universitas Gadjah Mada and RP Editing & Proofreading Servives (IDN)
- Roy Hendroko Setyobudi, Department of Agriculture Science, Postgraduate Program, University of Muhammadiyah Malang and RP Editing & Proofreading Servives (IDN)
- Tsitsino Turkadze, Dept. of Chemical and Environmental Technologies, Akaki Tsereteli State University (GEO)
- Warkoyo, Department of Food Science & Technology - University of Muhammadiyah Malang (IDN)
- Yahya Jani, Department of Built Environment and Energy Technology, Linnaeus University (SWE)
- Zane Vincevica-Gaile, Department of Environmental Science, University of Latvia (LVA)

**E3S Web of Conferences**

**Volume 226 (2021)**

**The 1<sup>st</sup> International Conference on Bioenergy and Environmentally Sustainable Agriculture  
Technology (ICoN BEAT 2019)**

**Malang, East Java, Indonesia, November 7-8, 2019**

R. Hendroko Setyobudi, A. Winaya, J. Burlakovs, M. Mel and O. Anne (Eds.)

## Table of Contents

### **Analysis of Methods for Determining the Characteristics of a Single Spatial Electromagnetic Field**

Abdulahak Khalikov

E3S Web Conf., 226 (2021) 00001

### **The Study of the Electrical Conductivity of Apples and Grapes as an Object of Electrical Processing**

Abdurahman Radjabov, Matkarim Ibragimov and Nodir Eshpulatov

E3S Web Conf., 226 (2021) 00002

### **Improvement Generative Growth of *Coffea arabica* L. Using Plant Growth Regulators and Pruning**

Ade Astri Muliastari, Ratih Kemala Dewi, Hidayati Fatchur Rochmah, Andoniana Rakoto Malala and Praptiningsih Gamawati Adinurani

E3S Web Conf., 226 (2021) 00003

### **Improving Margins of the Indonesian Seaweed Supply Chain Upstream Players: The application of the Kaizen Approach**

Agus Heri Purnomo, Rinta Kusumawati, Asri Pratitis, Ilham Alimin, Singgih Wibowo, Mike Rimmer and Nick Paul

E3S Web Conf., 226 (2021) 00004

### **Determinants of Technical In-efficiencies in Swamp Rice Farming - Ciamis District, Indonesia**

Agus Yuniawan Isyanto, Sudrajat Sudrajat and Muhamad Nurdin Yusuf

E3S Web Conf., 226 (2021) 00005

### **Chemical Characteristics and Viability of Starter Cultures of Freeze–Dried Sweet Potato Extract–Supplemented Synbiotic Yogurt**

Agustina Intan Niken Tari, Catur Budi Handayani, Sri Hartati, Damat Damat and Karina Stankeviča

E3S Web Conf., 226 (2021) 00006

### **Biomass Enhancement of *Stevia rebaudiana* Bertoni Shoot Culture in Temporary Immersion System (TIS) RITA® Bioreactor Optimized in Two Different Immersion Periods**

Agustine Christela Melviana, Rizkita Rachmi Esyanti, Maizirwan Mel and Roy Hendroko Setyobudi

E3S Web Conf., 226 (2021) 00007

### **Physical Treatment of Oil Palm Shell for Briquette Production as Bioenergy at Remote Area**

Amaliyah Rohsari Indah Utami, Suwandi Suwandi, Yoga Alun Mustafa and Maizirwan Mel

E3S Web Conf., 226 (2021) 00008

### **The Potential of Cashew Apple Juice as Anti Hypercholesterol Agent on Whistar Rats (*Rattus norvegicus* Berkenhout, 1769)**

Asmawati Asmawati, Marianah Marianah, Abubakar Yaro and Roy Hendroko Setyobudi

E3S Web Conf., 226 (2021) 00009

### **The Ability of Water Hyacinth (*Eichhornia crasipes* Mart.) and Water Lettuce (*Pistia stratiotes* Linn.) for Reducing Pollutants in *Batik* Wastewater**

Bunyamin Muchtasjar, Hadiyanto Hadiyanto, Munifatul Izzati, Zane Vincēviča–Gaile and Roy Hendroko Setyobudi

E3S Web Conf., 226 (2021) 00010

### **Potential Analysis of Low Economic Value Fish in Lamongan Regency, East Java, Indonesia**

Choirul Anam, Noor Harini, Damat Damat, Ahmad Wahyudi, Yuli Witono, Nita Kuswardhani, Moh Azus Shony Azar, Olga Anne and Diana Rachmawati  
E3S Web Conf., 226 (2021) 00011

**Techno-Economic Analysis of Photovoltaic Utilization for Lighting and Cooling System of Ferry Ro/Ro Ship 500 GT**

Danny Faturachman, Erkata Yandri, Endang Tri Pujiastuti, Olga Anne, Roy Hendroko Setyobudi, Yahya Yani, Herry Susanto, Washington Purba and Satriyo Krido Wahono  
E3S Web Conf., 226 (2021) 00012

**Morphological and Physiological Responses of *Indigofera tinctoria* L. to Light Intensity**

Desy Setyaningrum, Maria Theresia Sri Budiastuti, Bambang Pujiasmanto, Djoko Purnomo and Supriyono Supriyono  
E3S Web Conf., 226 (2021) 00013

**Utilization of Tofu Industry Waste and Banana Plant Waste for Growing Medium of Brown Oyster Mushrooms (*Pleurotus cystidiosus* [Jacq. Fr.] P.Kumm.)**

Dian Indratmi, Yossy Dian Kurniasari, Hartawati Hartawati and Ali Ikhwan  
E3S Web Conf., 226 (2021) 00014

**The Technical Design Concept of Hi-Tech Cook Stove for Urban Communities using Non-Wood Agricultural Waste as Fuel Sources**

Erkata Yandri, Bangun Novianto, Fridolini Fridolini, Roy Hendroko Setyabudi, Haryo Wibowo, Satriyo Krido Wahono, Kamaruddin Abdullah, Washington Purba and Yogo Adhi Nugroho  
E3S Web Conf., 226 (2021) 00015

**Detergents Effect on Egg Hatchability, Morphometry and Larval Bone Structure of Native Indonesian Fish: Wader Pari (*Rasbora lateristriata* Bleeker, 1854)**

Farahsani Umi Abida, Parvez Alam and Bambang Retnoaji  
E3S Web Conf., 226 (2021) 00016

**Modelling Biodiesel Supply Chain: Current State and Opportunities for Future Research**

Fitriani Tupa Ronauli Silalahi, Togar Mangihut Simatupang, Manahan Parlindungan Siallagan and Rizal Horas Manahan Sinaga  
E3S Web Conf., 226 (2021) 00017

**Vinasse as Cultivation Medium of *Chlorella* sp. to Produce Poly-Hydroxy Butyrate in Various Limited Low-Cost Primary Nutrient**

Gregorius Prima Indra Budianto, Yari Mukti Wibowo, Hadiyanto Hadiyanto, Widayat Widayat and Wisnu Arfian Anditya Sudjarwo  
E3S Web Conf., 226 (2021) 00018

**Relationship of Group Dynamics and Fishermen Independence in Fisheries Agribusiness Attaining Maximum Sustainable Yield**

Hamdi Rosyidi, Jabal Tarik Ibrahim, Sutawi Sutawi, Olga Anne and Diana Rachmawati  
E3S Web Conf., 226 (2021) 00019

**Degradation of Phorbol Esters on the *Jatropha curcas* Linn. Seed by Biological Detoxification**

Hany Handajani, Riza Rahman Hakim, Ganjar Adhywirawan Sutaro, Boy Ronald Mavuso, Zhong-Wen Chang and Soni Andriawan  
E3S Web Conf., 226 (2021) 00020



**Durian Rind Micro Composter Model: A Case of Kampung Durian, Ngrogung, Ponorogo, Indonesia**  
Haris Setyaningrum, Atika Rukminastiti Masrifah, Adib Susilo and Imam Haryadi  
E3S Web Conf., 226 (2021) 00021

**Exploration and Effectiveness of *Trichoderma* sp. from Jember and Trenggalek, East Java, Indonesia Cacao Plantation as A Biological Control of *Phytophthora palmivora***  
Henik Sukorini, Feby Wirasdenty Aigahayunindy, Erfan Dani Septia and Netnapis Khewkhom  
E3S Web Conf., 226 (2021) 00022

**Variability of *Fusarium oxysporum* f. sp. *lycopersici* from different altitudes in East Java, Indonesia**  
Henik Sukorini, Erfan Dani Septia and Netnapis Khewkhom  
E3S Web Conf., 226 (2021) 00023

**Design of Rotary Dryer for Sand Drying using Biomass Energy Sources**  
Herry Susanto, Roy Hendroko Setyobudi, Didik Sugiyanto, Yefri Chan, Erkata Yandri, Satriyo Krido Wahono, Kamaruddin Abdullah, Juris Burlakovs, Wahyu Widodo, Yogo Adhi Nugroho and Abubakar Yaro  
E3S Web Conf., 226 (2021) 00024

**The Use of Probiotic and Antioxidants to Improve Welfare and Production of Layer Duck at Commercial Farms for Global Warming Mitigation**  
Imam Suswoyo, Ismoyowati Ismoyowati, Wahyu Widodo and Zane Vincēviča–Gaile  
E3S Web Conf., 226 (2021) 00025

**Entrapment Formulation for *env-Tm* Gene Based on Chitosan Low Molecular Weight as a Jembrana Disease Virus Vaccine Candidate**  
Indra Lesmana Rahayu and Asmarani Kusumawati  
E3S Web Conf., 226 (2021) 00026

**Environment Identification of Plantation Plant Development for Competitive in Sukoharjo Districts, Indonesia**  
Irma Wardani and Tria Rosana Dewi  
E3S Web Conf., 226 (2021) 00027

**Conceptual Design of Inventory Analysis Software to Support the Life Cycle Assessment in Palm Oil Production**  
Kiman Siregar, Supriyanto Supriyanto, Devitra Saka Rani, Yanuar Nurdiansyah and Feri Wijayanto  
E3S Web Conf., 226 (2021) 00028

**Fasciolosis Infection Level of Various Breed Cattle in Batu and Pujon District, East Java, Indonesia**  
Lili Zalizar, Khusnul Rahmawati and Abubakar Yaro  
E3S Web Conf., 226 (2021) 00029

**Factors that Influence Farmer's Behavior Towards Risk**  
Muhamad Nurdin Yusuf, Agus Yuniawan Isyanto and Sudradjat Sudradjat  
E3S Web Conf., 226 (2021) 00030

**Effectiveness of Mycorrhiza, Plant Growth Promoting Rhizobacteria and Inorganic Fertilizer on Chlorophyll Content in *Glycine max* (L.) cv. Detam-4 Prida**  
Muhammad Muhammad, Umi Isnatin, Peeyush Soni and Praptiningsih Gamawati Adinurani  
E3S Web Conf., 226 (2021) 00031

**Microalgae Microbial Fuel Cell (MMFC) using *Chlorella vulgaris* and “Batik” Wastewater as Bioelectricity**

Nadiyah Faizi Polontalo, Falvocha Alifsmara Joelyna, Abdullah Malik Islam Filardli, Hadiyanto Hadiyanto and Zainul Akmar Zakaria

E3S Web Conf., 226 (2021) 00032

**Addition of *Moringa oleifera* Lam. Leaves Flour for Increasing the Nutritional Value of Modified Cassava Flour–Based Breakfast Cereal**

Novian Wely Asmoro, Agustina Intan Niken Tari, Retno Widyastuti and Chandra Kurnia Setiawan

E3S Web Conf., 226 (2021) 00033

**Adoption Level of Integrated Farming System Based on Rice–Cattle and Its Determinants Related to Sustainable Agriculture**

Novitri Kurniati, Ketut Sukiyono, Purmini Purmini and Mutyarsih Oryza Sativa

E3S Web Conf., 226 (2021) 00034

**Eco-agriculture and Farming in the Anthropocene Epoch: A Philosophical Review**

Rangga Kala Mahaswa, Agung Widhianto and Nurul Hasanah

E3S Web Conf., 226 (2021) 00035

**The Strategy of Salt Business Development: A Case Study in Sumenep, Indonesia**

Rika Diananing, Amilia Destryana, Ribut Santosa, Noor Illi Mohamad Puad and Agustine Christela Melviana

E3S Web Conf., 226 (2021) 00036

**Analysis of Taking Decision of Farmers in Choosing Rice Cultivars: Case of Pakel District, Tulungagung, Indonesia**

Rima Dewi Oryza Sativa, Jabal Tarik Ibrahim and Sutawi Sutawi

E3S Web Conf., 226 (2021) 00037

**Pyrolysis of Water Hyacinth [*Eichhornia crassipes* (Mart.) Solms] for Liquid Smoke Production**

Rita Dwi Ratnani, Hadiyanto Hadiyanto, Widiyanto Widiyanto and Maizirwan Mel

E3S Web Conf., 226 (2021) 00038

**Effect and Effectivity of Granular Organic Fertilizer on Growth and Yield of Lowland Rice**

Rohmad Budiono, Fuad Nur Aziz, Endang Dwi Purbajanti, Tsitsino Turkadze and Praptiningsih Gamawati Adinurani

E3S Web Conf., 226 (2021) 00039

**Techno Economic Analysis of Biomass to Methanol Plant Based on Gasification of Palm Empty Fruit Bunch**

Rudy Heryadi and Syukri Muhammad Nur

E3S Web Conf., 226 (2021) 00040

**Risk Analysis of Partnership Broiler Farm in Blitar District, East Java, Indonesia**

Septi Nur Wulan Mulatmi, Apriliana Devi Anggraini, Febrianti Shaywont Pratami and Martina Motalova

E3S Web Conf., 226 (2021) 00041

**Hydrolysis of Cellulose from Oil Palm Empty Fruit Bunch using *Aspergillus niger***

Sri Sugiwati, Suaidah Suaidah, Eka Triwahyuni, Muryanto Muryanto, Yosie Andriani and Haznan Abimanyu

E3S Web Conf., 226 (2021) 00042

**Lignin and Cellulose Content of Fermented Rice Straw with *Aspergillus niger* (van Tieghem) and *Trichoderma mutan* AA1**

Sri Sukaryani, Engkus Ainul Yakin, Yos Wahyu Harinta, Zane Vincēviča–Gaile and Endang Dwi Purbajanti

E3S Web Conf., 226 (2021) 00043

**Multiplication Arbuscular Mycorrhizal Fungi in Corn (*Zea mays* L.) with Pots Culture at Greenhouse**

Sukmawati Sukmawati, Adnyana Adnyana, Dewa Nengah Suprpta, Meitini Proborini, Peeyush Soni and Praptiningsih Gamawati Adinurani

E3S Web Conf., 226 (2021) 00044

**Modified Off–Season Technology to the Flowering Time and Fruit Yield of *Arumanis* Mango (*Mangifera indica* L.)**

Syarif Husen, Erny Ishartati, Muhidin Muhidin, Devi Dwi Siskawardani, Anjar Rizky, Akhmad Syaifudin and Jumpen Onthong

E3S Web Conf., 226 (2021) 00045

**Entrepreneurship Orientation, Eco-innovation, Information and Communication Technology (ICT) Learning Adoption Capability: A case Study of Food SME’s in Central Java, Indonesia**

Vincent Didiek Wiet Aryanto, Kunio Kondo, Yohan Wismantoro and Pulung Nurtantyo Andono

E3S Web Conf., 226 (2021) 00046

**Potentials of Gas Emission Reduction (GHG) by the Glass Sheet Industry through Energy Conservation**

Washington Purba, Erkata Yandri, Roy Hendroko Setyobudi, Hery Susanto, Satriyo Krido Wahono, Kiman Siregar, Yogo Adhi Nugroho, Abubakar Yaro, Kamaruddin Abdullah, Yahya Jani and Danny Faturahman

E3S Web Conf., 226 (2021) 00047

**The Use of Rumen Contents as Bio–Activators for Fermentation in Goat Manure Fertilizer Production**

Wehandaka Pancapalaga, Suyatno Suyatno and David Sedlacek

E3S Web Conf., 226 (2021) 00048

**Exploration and Characterization of “Uwi” Plant (*Dioscorea* sp.) in East Java Uplands, Indonesia**

Wuryantoro Wuryantoro, Ratna Mustika Wardhani, Indah Rekyani Puspitawati, Praptiningsih Gamawati Adinurani and Bohari Mohammad Yamin

E3S Web Conf., 226 (2021) 00049

**Sweet Potatoes: Development and Potential as Alternative Food Ingredients in Karanganyar Regency, Indonesia**

Yoesti Silvana Arianti and Yos Wahyu Harinta

E3S Web Conf., 226 (2021) 00050

**Study of Agronomic Characteristics of Robusta Coffee at Coffee Plantations in Temanggung, Indonesia**

Yohana Theresia Maria Astuti, Enny Rahayu, Tri Nugraha Budi Santosa, Dian Pratama Putra, Agus Solifudin, Yureana Wijayanti and Marcus Fittkow

E3S Web Conf., 226 (2021) 00051

# Factors that Influence Farmer's Behavior Towards Risk

Muhamad Nurdin Yusuf\*, Agus Yuniawan Isyanto, and Sudradjat Sudradjat

Department of Agribusiness, Faculty of Agriculture, Galuh University, Jl. R. E. Martadinata No.150, Ciamis 46274, Indonesia

**Abstract.** The research was carried out with the aim to find out the behavior of farmers towards risk and the factors that influence it. The research sample was 100 paddy farmers in flood-prone area paddy fields in Pangandaran District, West Java Province, Indonesia. Farmer's behavior towards risk was analyzed using quadratic utility functions, while the factors that influence farmer's behavior towards risk were analyzed using logistic regression. The results showed farmers 87 was risk neutral, while 13 farmer risk takers were farmers. Education, familys size and income significantly influence farmer's behavior towards risk; while age, experience, land area, production risk, price risk, income risk and group did not significantly influence farmer's behavior towards risk.

**Keywords:** Land area, logistic regression, risk taker, quadratic utility.

## 1 Introduction

The impact of global climate change has an effect on paddy production in Indonesia in the form of flooding which results in crop failure or a decrease in paddy production [1]. Climate change has occurred in Indonesia with indications of an increase in temperature and changes in rainfall patterns. Agriculture is very vulnerable to the effects of climate change with an indication of the high level of danger in decreasing paddy production as a result of increasing temperatures and changes in rainfall patterns. The average decline in paddy production is 1.37 % yr<sup>-1</sup> which has the potential to cause a decline in national food production [2].

The threat of flooding in paddy fields can lead to reduced harvest area and paddy production [3]. Production is related to the nature of farming which is always dependent on nature supported by risk factors [4]. The risk of failure in farming comes from the use of new technology, prices of agricultural production, capital, government policies and individual behavior of farmers in dealing with outsiders [5], as well as climate change and weather that are not in accordance with crop needs [6]. The main risks farming include flooding [7].

Farmer's behavior towards risk consists of risk averter, risk neutral, and risk taker. Farmer behavior is the basis of farmers' decision making in carrying out their farming [1]. Farmer's behavior towards risk has an important role in influencing the productivity of agricultural products which has an impact on production efficiency [8]. Factors that

---

\* Corresponding author: [muhamadnurdinyusuf@gmail.com](mailto:muhamadnurdinyusuf@gmail.com)

influence farmer behavior towards risk are the area of planting, age, education, experience, family size, income and productivity risk [8].

## 2 Research methodology

Amount ten villages in Padaherang and Kalipucang Subdistricts in Pangandaran District were taken purposively as a sample area with consideration of being areas that have flood-prone rice fields. From each village a sample of ten farmers was taken, so that the total number of samples was 100 farmers.

Farmer's behavior towards farming risk was analyzed using the quadratic utility Equation (1):

$$U = \tau_1 + \tau_2 M + \tau_3 M^2 \quad (1)$$

Where:

U : utility for expected income (in util)

$\tau_1$  : intercept

M : expected income at the balance point (rupiah value from certainty equivalent (CE)

$\tau_2$  : indifference income coefficient (CE)

$\tau_3$  : farmer risk coefficient

The risk preference coefficient shows the farmer's attitude to risk, namely:

$\tau_3 = 0$  : Risk neutral

$\tau_3 < 0$  : Risk averse

$\tau_3 > 0$  : Risk taker

The factors that influence farmers' behavior towards risk are analyzed using ordinal logit regression with the following Equation (2):

$$P_i = F(Y_i) = F(\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_8 D_8 + \beta_9 D_9 + \beta_{10} D) \quad (2)$$

$Y_i$  values are calculated using the following Equation (3):

$$Y_i = \text{Log} [P_i / (1 - P_i)] = (\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} D + e) \quad (3)$$

Where:

$Y_i$  = Opportunities for farmers to make decisions, where:

$Y_1$  = 1 for the farmer who are risk averse

$Y_2$  = 2 for the farmer who are risk neutral

$Y_3$  = 3 for the farmer who are risk taker

$\alpha$  = Intercept

$\beta_i$  = Parameter regression coefficient ( $i = 1, 2, 3, \dots, 10$ )

$X_1$  = Age (year)

$X_2$  = Education (year)

$X_3$  = Family size (person)

$X_4$  = Experience (year)

$X_5$  = Land area (ha)

$X_6$  = Farm income (IDR)

$X_7$  = Production risk

$X_8$  = Price risk

$X_9$  = Income risk

D = Membership in groups (1 if being a member of a group, 0 if not)

e = error term

### 3 Results and discussion

#### 3.1 Farmer's behavior towards risk

Farmer's behavior towards risk in paddy farming in flood-prone paddy fields can be seen in Table 1.

**Table 1.** Farmer's behavior towards risk

Farmer's behavior towards risk	Number of people	Percentage
Risk Neutral	87	87.00
Risk Taker	13	13.00
Total	100	100.00

Table 1 shows that most farmers (87 %) are risk neutral, while the rest (13 %) are risk takers. There are no risk averse farmers. According to [9], the absence of risk averse farmers show that there are no farmers who are willing to sacrifice their income or potential income to reduce opportunities for loss or low income. According to [1], farmers will try to avoid failure and not get big profits by taking risks. Such behavior is called safety first, which is characteristic of most farmers.

Farmers who are risk neutral are farmers who have a rational attitude in facing risks [9]. Risk neutral farmers tend to cultivate based on hereditary habits. They only seek income that can meet their family's needs [10]. If there is additional capital for risk neutral farmers, then they might add input to get higher income [11]. The availability of capital for farmers is a risk factor that is considered to affect farmers to the farming they are doing [12].

Risk taker farmers are farmers who are willing to allocate and use their production factors to the maximum, even though there are risks that must be faced with the aim of obtaining optimal results. [8] states that conceptually farmers are able to reduce production risk and price risk by improving their productivity, the use of diversification, the use of appropriate cropping patterns, strengthening farmer institutions, and bargaining position of farmers can increase farmers' production and income [7].

#### 3.2 Factors that influence farmer's behavior toward risk

The results of the analysis of factors that influence farmer behavior on risk in paddy farming in flood-prone paddy fields can be seen in Table 2.

**Table 2.** Factors that influence farmer's behavior towards risk

Variabel	B	Wald	Exp(B)
Age	0.788	0.020	2.199
Education	7.139	3.452**	1.260E3
Family size	4.983	4.303*	145.958
Experience	-0.149	0.003	0.861
Land area	0.687	0.279	1.988
Farm income	2.896	4.313*	18.103

(Continued on next page)

**Table 2.** Continued

Variabel	B	Wald	Exp(B)
Production risk	1.029	0.407	2.799
Price risk	-0.834	1.016	0.434
Income risk	-0.134	0.014	0.875
Group	1.795	0.946	6.020
Constant	-69.854	3.703**	0.000
<b>Model Summary</b>			
-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Chi-square
19.158	0.441	0.819	18.307*

\*, \*\* = significant at 5 %, 10 %

Table 2 shows that age is not significant influence farmers' behavior towards risk. This shows that the difference in age of farmers does not affect the behavior of farmers in dealing with risk. Education significantly influences farmer's behavior towards risk. The results of this study are in accordance with the results of research from [13]. The higher the level of education of farmers, the more courageous farmers face risks [5, 7]. According to [13], the level of education of farmers who are still low makes the main cause of the majority of farmers who choose safety first (zero risk) behavior in developing their farming.

Family size significantly influences farmer's behavior towards risk. The results of this study are in accordance with the results of research by [14]. According to [9], family size affects the outpouring of time that can be allocated for farming. According to [14], the more number of members of the farmer's family, the higher the capacity of the workforce owned by the farmer in facing the risk.

Experience does not significantly influence farmers' behavior towards risk. The longer the farmer's experience, the more careful it will be in carrying out farming so that it tends to be more neutral to risk. The results of this study are in accordance with the results of research from [7].

Land area does not significantly affect farmer's behavior to risk. The results of this study are consistent with the results of a study from [5] which shows that the addition or reduction of land area will not reduce risk aversion or that farmers are neutral towards risk.

Revenue significantly influences farmer's behavior towards risk. The greater the income the farmer receives from the farming that is carried out, the farmer will be more courageous in accepting the risk. The results of this study are in accordance with the results of research from [8, 14, 5]. According to [8], the higher the farm income received by farmers, the farmers will be more willing to accept the risk.

Production risk does not significantly influence farmer's behavior towards risk. According to [7], the magnitude of the risk of production faced by farmers due to the uncertainty of results as a result of natural factors and income as a result of price fluctuations, causes farmers to tend to reject the possibility of accepting the risks and uncertainties of the business. According to [15], efforts to handle production risk can be done by implementing a diversification and agricultural insurance program.

Price risk does not significantly influence farmer's behavior towards risk. According to [16], farmers' household attitudes in carrying out production activities can be seen from variations in prices as a measure of price risk. According to [17], the behavior of farmers who accept price risk is caused by the expectation of expected price reductions compared to the actual prices that make farmers continue to carry out farming as long as they provide benefits. According to [18], the behavior of farmers does not dare to risk due to fluctuations

in production and selling prices which will have an impact on farmers' income.

Income risk does not significantly influence farmer behavior towards risk. The higher the income risk faced by farmers, the more farmers will behave neutrally against risk. Membership in groups does not significantly influence farmers' behavior towards risk. According to [19], group membership is one of the efforts of farmers to reduce the risk of farming by cooperating with each other, exchanging information in managing their farming with fellow farmers.

## 4 Conclusion

Amount 87 farmers are risk neutral and 13 farmers are risk takers. Education, family size and income significantly influence farmer's behavior towards risk; while age, experience, land area, production risk, price risk, income risk and group did not significantly influence farmer's behavior towards risk.

## References

1. C. Gardebroek, M.D. Chavez, A.O. Lansink, J. Agric. Econ. **61**,1:60–75(2010).  
<https://doi.org/10.1111/j.1477-9552.2009.00222.x>
2. Ruminta, Handoko, T. Nurmala. Jurnal Agro. **5**,1:48–60(2018). [in Bahasa Indonesia].  
[https://journal.uinsgd.ac.id/index.php/ja/article/download/1607/pdf\\_16](https://journal.uinsgd.ac.id/index.php/ja/article/download/1607/pdf_16)
3. Shahab. E. Saqib, Mokbul. M. Ahmad, Sanallah. P, Irfan. A Rana, Int. J. Disaster Risk Reduc. **18**:107–114(2016).  
[https://www.researchgate.net/profile/Shahab\\_E\\_Saqib/publication/304305997\\_An\\_Empirical\\_Assessment\\_of\\_Farmers%27\\_Risk\\_Attitudes\\_in\\_Flood-Prone\\_Areas\\_of\\_Pakistan/links/5bf55cd2299bf1124fe32898/An-Empirical-Assessment-of-Farmers-Risk-Attitudes-in-Flood-Prone-Areas-of-Pakistan.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Shahab_E_Saqib/publication/304305997_An_Empirical_Assessment_of_Farmers%27_Risk_Attitudes_in_Flood-Prone_Areas_of_Pakistan/links/5bf55cd2299bf1124fe32898/An-Empirical-Assessment-of-Farmers-Risk-Attitudes-in-Flood-Prone-Areas-of-Pakistan.pdf?origin=publication_detail)
4. C. Gardebroek, Eur. Rev. Agric. Econ. **33**,4:485–510(2006).  
<https://doi.org/10.1093/erae/jbl029>
5. M.P. Lucas, I.M. Pabuayon., Asian J. Agric. Dev. **8**,2:61–77(2011).  
[https://tind-customer-agecon.s3.amazonaws.com/9fdd6f1e-7e97-4413-a5f2-ffb38a8fea0c?response-content-disposition=attachment%3B%20filename%3DUTF-8%27%27AJAD\\_2011\\_8\\_2\\_5Lucas.pdf&response-content-type=application%2Fpdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Expires=86400&X-Amz-Credential=AKIAXL7W7Q3XHXDQYS%2F20200908%2Ffeu-west-1%2Fs3%2Faws4\\_request&X-Amz-SignedHeaders=host&X-Amz-Date=20200908T165030Z&X-Amz-Signature=20ca172c04b02c087149aa1ba32cc86309bf574faede65f1910b98ade0e76e34](https://tind-customer-agecon.s3.amazonaws.com/9fdd6f1e-7e97-4413-a5f2-ffb38a8fea0c?response-content-disposition=attachment%3B%20filename%3DUTF-8%27%27AJAD_2011_8_2_5Lucas.pdf&response-content-type=application%2Fpdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Expires=86400&X-Amz-Credential=AKIAXL7W7Q3XHXDQYS%2F20200908%2Ffeu-west-1%2Fs3%2Faws4_request&X-Amz-SignedHeaders=host&X-Amz-Date=20200908T165030Z&X-Amz-Signature=20ca172c04b02c087149aa1ba32cc86309bf574faede65f1910b98ade0e76e34)
6. T. Tiedemann, U.L. Lohman, J. Agric. Econ. **64**,1:73–96(2012).  
<https://doi.org/10.1111/j.1477-9552.2012.00364.x>
7. J.N. Nmadu, G.P. Eze, A.J. Jirgi. British J. Econ. Manag. Trade, **2**,2:92–108(2012).  
<https://www.journaljemt.com/index.php/JEMT/article/download/30022/56339>
8. R. Darma, T.N.A. Rahmadanih, R. Amandaria. Int. J. Agric. Syst. **2**,1:77–89(2014).  
<http://pasca.unhas.ac.id/ojs/index.php/ijas/article/download/24/23>
9. E.D. Oruonye, IJFSE. **3**,4:113–117(2013).  
[http://www.ijfse.com/uploadedfiles/IJFSEArchive/IJFSE2013/3\(4\)/01.pdf](http://www.ijfse.com/uploadedfiles/IJFSEArchive/IJFSE2013/3(4)/01.pdf)
10. M.C. Plaxedes, P. Mafongoya, Clim. Risk Manag. **16**:145–163(2017).  
<https://doi.org/10.1016/j.crm.2017.02.001>



11. Y. Ferrianta, M.F. Makki, Suprijanto, Rifiana. *Int. J. Agric. Manag. Dev.* **5**,2:133–139(2014).  
[https://www.researchgate.net/publication/272667859\\_Risk\\_Analysis\\_and\\_Strategy\\_of\\_Rice\\_Farmers\\_in\\_Swampland\\_in\\_the\\_Face\\_of\\_Climate\\_Change\\_Impact\\_Case\\_in\\_South\\_Kalimantan\\_Province-Indonesia/fulltext/57a79def08aee07544c1d003/Risk-Analysis-and-Strategy-of-Rice-Farmers-in-Swampland-in-the-Face-of-Climate-Change-Impact-Case-in-South-Kalimantan-Province-Indonesia.pdf?origin=publication\\_detail](https://www.researchgate.net/publication/272667859_Risk_Analysis_and_Strategy_of_Rice_Farmers_in_Swampland_in_the_Face_of_Climate_Change_Impact_Case_in_South_Kalimantan_Province-Indonesia/fulltext/57a79def08aee07544c1d003/Risk-Analysis-and-Strategy-of-Rice-Farmers-in-Swampland-in-the-Face-of-Climate-Change-Impact-Case-in-South-Kalimantan-Province-Indonesia.pdf?origin=publication_detail)
12. A.D. Brauw, P. Eozenou. *J. Dev. Econ.* **111**:61–74(2014).  
[https://www.researchgate.net/profile/Patrick\\_Eozenou/publication/266617635\\_Measuring\\_risk\\_attitudes\\_among\\_Mozambican\\_farmers/links/5435ad990cf2643ab9867e0d/Measuring-risk-attitudes-among-Mozambican-farmers.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Patrick_Eozenou/publication/266617635_Measuring_risk_attitudes_among_Mozambican_farmers/links/5435ad990cf2643ab9867e0d/Measuring-risk-attitudes-among-Mozambican-farmers.pdf?origin=publication_detail)
13. C.A. Kalu, J.A. Mbanasor. *NAPReJ*, **1**,1:1–10(2016).  
<https://econpapers.repec.org/scripts/redir.pf?u=https%3A%2F%2Fdoi.org%2F10.22004%2F252Fag.econ.292052;h=repec:ags:naprej:292052>
14. M.M. Haque, S. Bremer, S. Aziz, J.P. Sluijs, *Clim. Risk Manag.* **16**:43–58(2017).  
<https://dx.doi.org/10.1016/j.crm.2016.12.002>
15. S. Dadzie, N. Kwesi, H. de Graft. A, *Int. J. Agric. For.* **2**,2:29–37(2012).  
[https://www.researchgate.net/profile/Samuel\\_Dadzie/publication/241699647\\_Attitudes\\_Toward\\_Risk\\_and\\_Coping\\_Responses\\_The\\_Case\\_of\\_Food\\_Crop\\_Farmers\\_at\\_Agona\\_Duakwa\\_in\\_Agona\\_East\\_District\\_of\\_Ghana/links/0046351caa436af152000000/Attitudes-Toward-Risk-and-Coping-Responses-The-Case-of-Food-Crop-Farmers-at-Agona-Duakwa-in-Agona-East-District-of-Ghana.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Samuel_Dadzie/publication/241699647_Attitudes_Toward_Risk_and_Coping_Responses_The_Case_of_Food_Crop_Farmers_at_Agona_Duakwa_in_Agona_East_District_of_Ghana/links/0046351caa436af152000000/Attitudes-Toward-Risk-and-Coping-Responses-The-Case-of-Food-Crop-Farmers-at-Agona-Duakwa-in-Agona-East-District-of-Ghana.pdf?origin=publication_detail)
16. S.R. Fajri, E. Fauziyah. *J. Hort. Indonesia*, **9**,3:188–196(2018). [in Bahasa Indonesia]  
<https://journal.ipb.ac.id/index.php/jhi/article/download/26496/17128/>
17. C. Mulwa, P. Marennya, D.B. Rahut, M. Kassie, *Clim. Risk Manag.* **16**:208–221(2017).  
<https://reader.elsevier.com/reader/sd/pii/S2212096317300062?token=8C6D3F91A4BEF28A0A8335A476A7B6B75EB4D84ED7742D9C358F0465D68675FD002D8C4A371BC054A01FAF3CD18289A8>
18. A. Ali, O. Erenstein, *Clim. Risk Manag.* **16**:1–12(2017).  
[https://www.researchgate.net/profile/Olaf\\_Erenstein/publication/311879490\\_Assessing\\_farmer\\_use\\_of\\_climate\\_change\\_adaptation\\_practices\\_and\\_impacts\\_on\\_food\\_security\\_and\\_poverty\\_in\\_Pakistan/links/58b71affaca27261e51a4134/Assessing-farmer-use-of-climate-change-adaptation-practices-and-impacts-on-food-security-and-poverty-in-Pakistan.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Olaf_Erenstein/publication/311879490_Assessing_farmer_use_of_climate_change_adaptation_practices_and_impacts_on_food_security_and_poverty_in_Pakistan/links/58b71affaca27261e51a4134/Assessing-farmer-use-of-climate-change-adaptation-practices-and-impacts-on-food-security-and-poverty-in-Pakistan.pdf?origin=publication_detail)
19. A. Tripathi, A.K. Mishra. *Clim. Risk Manag.* **16**:1–37(2017).  
[https://www.researchgate.net/publication/310815962\\_Knowledge\\_And\\_Passive\\_Adaptation\\_to\\_Climate\\_Change\\_an\\_Example\\_From\\_Indian\\_Farmers/fulltext/583a4d6308ae3a74b49ea7e4/Knowledge-And-Passive-Adaptation-to-Climate-Change-an-Example-From-Indian-Farmers.pdf?origin=publication\\_detail](https://www.researchgate.net/publication/310815962_Knowledge_And_Passive_Adaptation_to_Climate_Change_an_Example_From_Indian_Farmers/fulltext/583a4d6308ae3a74b49ea7e4/Knowledge-And-Passive-Adaptation-to-Climate-Change-an-Example-From-Indian-Farmers.pdf?origin=publication_detail)

PAPER NAME

**e3sconf\_icon-beat2019\_00030.pdf**

---

WORD COUNT

**2592 Words**

CHARACTER COUNT

**14492 Characters**

PAGE COUNT

**6 Pages**

FILE SIZE

**186.1KB**

SUBMISSION DATE

**Apr 4, 2023 12:37 PM GMT+7**

REPORT DATE

**Apr 4, 2023 12:37 PM GMT+7**

---

**● 2% Overall Similarity**

The combined total of all matches, including overlapping sources, for each database.

- 2% Publications database
- Crossref Posted Content database

**● Excluded from Similarity Report**

- Internet database
- Crossref database
- Bibliographic material
- Cited material

# Factors that Influence Farmer's Behavior Towards Risk

Muhamad Nurdin Yusuf\*, Agus Yuniawan Isyanto, and Sudradjat Sudradjat

Department of Agribusiness, Faculty of Agriculture, Galuh University, Jl. R. E. Martadinata No.150, Ciamis 46274, Indonesia

**Abstract.** The research was carried out with the aim to find out the behavior of farmers towards risk and the factors that influence it. The research sample was 100 paddy farmers in flood-prone area paddy fields in Pangandaran District, West Java Province, Indonesia. Farmer's behavior towards risk was analyzed using quadratic utility functions, while the factors that influence farmer's behavior towards risk were analyzed using logistic regression. The results showed farmers 87 was risk neutral, while 13 farmer risk takers were farmers. Education, familys size and income significantly influence farmer's behavior towards risk; while age, experience, land area, production risk, price risk, income risk and group did not significantly influence farmer's behavior towards risk.

**Keywords:** Land area, logistic regression, risk taker, quadratic utility.

## 1 Introduction

The impact of global climate change has an effect on paddy production in Indonesia in the form of flooding which results in crop failure or a decrease in paddy production [1]. Climate change has occurred in Indonesia with indications of an increase in temperature and changes in rainfall patterns. Agriculture is very vulnerable to the effects of climate change with an indication of the high level of danger in decreasing paddy production as a result of increasing temperatures and changes in rainfall patterns. The average decline in paddy production is 1.37 % yr<sup>-1</sup> which has the potential to cause a decline in national food production [2].

The threat of flooding in paddy fields can lead to reduced harvest area and paddy production [3]. Production is related to the nature of farming which is always dependent on nature supported by risk factors [4]. The risk of failure in farming comes from the use of new technology, prices of agricultural production, capital, government policies and individual behavior of farmers in dealing with outsiders [5], as well as climate change and weather that are not in accordance with crop needs [6]. The main risks farming include flooding [7].

Farmer's behavior towards risk consists of risk averter, risk neutral, and risk taker. Farmer behavior is the basis of farmers' decision making in carrying out their farming [1]. Farmer's behavior towards risk has an important role in influencing the productivity of agricultural products which has an impact on production efficiency [8]. Factors that

---

\* Corresponding author: [muhamadnurdinyusuf@gmail.com](mailto:muhamadnurdinyusuf@gmail.com)

influence farmer behavior towards risk are the area of planting, age, education, experience, family size, income and productivity risk [8].

## 2 Research methodology

Amount ten villages in Padaherang and Kalipucang Subdistricts in Pangandaran District were taken purposively as a sample area with consideration of being areas that have flood-prone rice fields. From each village a sample of ten farmers was taken, so that the total number of samples was 100 farmers.

Farmer's behavior towards farming risk was analyzed using the quadratic utility Equation (1):

$$U = \tau_1 + \tau_2 M + \tau_3 M^2 \quad (1)$$

Where:

U : utility for expected income (in util)

$\tau_1$  : intercept

M : expected income at the balance point (rupiah value from certainty equivalent (CE)

$\tau_2$  : indifference income coefficient (CE)

$\tau_3$  : farmer risk coefficient

The risk preference coefficient shows the farmer's attitude to risk, namely:

$\tau_3 = 0$  : Risk neutral

$\tau_3 < 0$  : Risk averse

$\tau_3 > 0$  : Risk taker

The factors that influence farmers' behavior towards risk are analyzed using ordinal logit regression with the following Equation (2):

$$P_i = F(Y_i) = F(\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_8 D_8 + \beta_9 D_9 + \beta_{10} D) \quad (2)$$

$Y_i$  values are calculated using the following Equation (3):

$$Y_i = \text{Log} [P_i / (1 - P_i)] = (\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} D + e) \quad (3)$$

Where:

$Y_i$  = Opportunities for farmers to make decisions, where:

$Y_1$  = 1 for the farmer who are risk averse

$Y_2$  = 2 for the farmer who are risk neutral

$Y_3$  = 3 for the farmer who are risk taker

$\alpha$  = Intercept

$\beta_i$  = Parameter regression coefficient ( $i = 1, 2, 3, \dots, 10$ )

$X_1$  = Age (year)

$X_2$  = Education (year)

$X_3$  = Family size (person)

$X_4$  = Experience (year)

$X_5$  = Land area (ha)

$X_6$  = Farm income (IDR)

$X_7$  = Production risk

$X_8$  = Price risk

$X_9$  = Income risk

D = Membership in groups (1 if being a member of a group, 0 if not)

e = error term

### 3 Results and discussion

#### 3.1 Farmer's behavior towards risk

Farmer's behavior towards risk in paddy farming in flood-prone paddy fields can be seen in Table 1.

**Table 1.** Farmer's behavior towards risk

Farmer's behavior towards risk	Number of people	Percentage
Risk Neutral	87	87.00
Risk Taker	13	13.00
Total	100	100.00

Table 1 shows that most farmers (87 %) are risk neutral, while the rest (13 %) are risk takers. There are no risk averse farmers. According to [9], the absence of risk averse farmers show that there are no farmers who are willing to sacrifice their income or potential income to reduce opportunities for loss or low income. According to [1], farmers will try to avoid failure and not get big profits by taking risks. Such behavior is called safety first, which is characteristic of most farmers.

Farmers who are risk neutral are farmers who have a rational attitude in facing risks [9]. Risk neutral farmers tend to cultivate based on hereditary habits. They only seek income that can meet their family's needs [10]. If there is additional capital for risk neutral farmers, then they might add input to get higher income [11]. The availability of capital for farmers is a risk factor that is considered to affect farmers to the farming they are doing [12].

Risk taker farmers are farmers who are willing to allocate and use their production factors to the maximum, even though there are risks that must be faced with the aim of obtaining optimal results. [8] states that conceptually farmers are able to reduce production risk and price risk by improving their productivity, the use of diversification, the use of appropriate cropping patterns, strengthening farmer institutions, and bargaining position of farmers can increase farmers' production and income [7].

#### 3.2 Factors that influence farmer's behavior toward risk

The results of the analysis of factors that influence farmer behavior on risk in paddy farming in flood-prone paddy fields can be seen in Table 2.

**Table 2.** Factors that influence farmer's behavior towards risk

Variabel	B	Wald	Exp(B)
Age	0.788	0.020	2.199
Education	7.139	3.452**	1.260E3
Family size	4.983	4.303*	145.958
Experience	-0.149	0.003	0.861
Land area	0.687	0.279	1.988
Farm income	2.896	4.313*	18.103

(Continued on next page)

**Table 2.** Continued

Variabel	B	Wald	Exp(B)
Production risk	1.029	0.407	2.799
Price risk	-0.834	1.016	0.434
Income risk	-0.134	0.014	0.875
Group	1.795	0.946	6.020
Constant	-69.854	3.703**	0.000
<b>Model Summary</b>			
-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Chi-square
19.158	0.441	0.819	18.307*

\*, \*\* = significant at 5 %, 10 %

Table 2 shows that age is not significant influence farmers' behavior towards risk. This shows that the difference in age of farmers does not affect the behavior of farmers in dealing with risk. Education significantly influences farmer's behavior towards risk. The results of this study are in accordance with the results of research from [13]. The higher the level of education of farmers, the more courageous farmers face risks [5, 7]. According to [13], the level of education of farmers who are still low makes the main cause of the majority of farmers who choose safety first (zero risk) behavior in developing their farming.

Family size significantly influences farmer's behavior towards risk. The results of this study are in accordance with the results of research by [14]. According to [9], family size affects the outpouring of time that can be allocated for farming. According to [14], the more number of members of the farmer's family, the higher the capacity of the workforce owned by the farmer in facing the risk.

Experience does not significantly influence farmers' behavior towards risk. The longer the farmer's experience, the more careful it will be in carrying out farming so that it tends to be more neutral to risk. The results of this study are in accordance with the results of research from [7].

Land area does not significantly affect farmer's behavior to risk. The results of this study are consistent with the results of a study from [5] which shows that the addition or reduction of land area will not reduce risk aversion or that farmers are neutral towards risk.

Revenue significantly influences farmer's behavior towards risk. The greater the income the farmer receives from the farming that is carried out, the farmer will be more courageous in accepting the risk. The results of this study are in accordance with the results of research from [8, 14, 5]. According to [8], the higher the farm income received by farmers, the farmers will be more willing to accept the risk.

Production risk does not significantly influence farmer's behavior towards risk. According to [7], the magnitude of the risk of production faced by farmers due to the uncertainty of results as a result of natural factors and income as a result of price fluctuations, causes farmers to tend to reject the possibility of accepting the risks and uncertainties of the business. According to [15], efforts to handle production risk can be done by implementing a diversification and agricultural insurance program.

Price risk does not significantly influence farmer's behavior towards risk. According to [16], farmers' household attitudes in carrying out production activities can be seen from variations in prices as a measure of price risk. According to [17], the behavior of farmers who accept price risk is caused by the expectation of expected price reductions compared to the actual prices that make farmers continue to carry out farming as long as they provide benefits. According to [18], the behavior of farmers does not dare to risk due to fluctuations

in production and selling prices which will have an impact on farmers' income.

Income risk does not significantly influence farmer behavior towards risk. The higher the income risk faced by farmers, the more farmers will behave neutrally against risk. Membership in groups does not significantly influence farmers' behavior towards risk. According to [19], group membership is one of the efforts of farmers to reduce the risk of farming by cooperating with each other, exchanging information in managing their farming with fellow farmers.

## 4 Conclusion

Amount 87 farmers are risk neutral and 13 farmers are risk takers. Education, family size and income significantly influence farmer's behavior towards risk; while age, experience, land area, production risk, price risk, income risk and group did not significantly influence farmer's behavior towards risk.

## References

1. C. Gardebroek, M.D. Chavez, A.O. Lansink, J. Agric. Econ. **61**,1:60–75(2010).  
<https://doi.org/10.1111/j.1477-9552.2009.00222.x>
2. Ruminta, Handoko, T. Nurmala. Jurnal Agro. **5**,1:48–60(2018). [in Bahasa Indonesia].  
[https://journal.uinsgd.ac.id/index.php/ja/article/download/1607/pdf\\_16](https://journal.uinsgd.ac.id/index.php/ja/article/download/1607/pdf_16)
3. Shahab. E. Saqib, Mokbul. M. Ahmad, Sanaullah. P, Irfan. A Rana, Int. J. Disaster Risk Reduc. **18**:107–114(2016).  
[https://www.researchgate.net/profile/Shahab\\_E\\_Saqib/publication/304305997\\_An\\_Empirical\\_Assessment\\_of\\_Farmers%27\\_Risk\\_Attitudes\\_in\\_Flood-Prone\\_Areas\\_of\\_Pakistan/links/5bf55cd2299bf1124fe32898/An-Empirical-Assessment-of-Farmers-Risk-Attitudes-in-Flood-Prone-Areas-of-Pakistan.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Shahab_E_Saqib/publication/304305997_An_Empirical_Assessment_of_Farmers%27_Risk_Attitudes_in_Flood-Prone_Areas_of_Pakistan/links/5bf55cd2299bf1124fe32898/An-Empirical-Assessment-of-Farmers-Risk-Attitudes-in-Flood-Prone-Areas-of-Pakistan.pdf?origin=publication_detail)
4. C. Gardebroek, Eur. Rev. Agric. Econ. **33**,4:485–510(2006).  
<https://doi.org/10.1093/erae/jbl029>
5. M.P. Lucas, I.M. Pabuayon., Asian J. Agric. Dev. **8**,2:61–77(2011).  
[https://tind-customer-agecon.s3.amazonaws.com/9fdd6f1e-7e97-4413-a5f2-ffb38a8fea0c?response-content-disposition=attachment%3B%20filename%3DUTF-8%27%27AJAD\\_2011\\_8\\_2\\_5Lucas.pdf&response-content-type=application%2Fpdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Expires=86400&X-Amz-Credential=AKIAXL7W7Q3XHXDQYS%2F20200908%2Feu-west-1%2Fs%2Faws4\\_request&X-Amz-SignedHeaders=host&X-Amz-Date=20200908T165030Z&X-Amz-Signature=20ca172c04b02c087149aa1ba32cc86309bf574faede65f1910b98ade0e76e34](https://tind-customer-agecon.s3.amazonaws.com/9fdd6f1e-7e97-4413-a5f2-ffb38a8fea0c?response-content-disposition=attachment%3B%20filename%3DUTF-8%27%27AJAD_2011_8_2_5Lucas.pdf&response-content-type=application%2Fpdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Expires=86400&X-Amz-Credential=AKIAXL7W7Q3XHXDQYS%2F20200908%2Feu-west-1%2Fs%2Faws4_request&X-Amz-SignedHeaders=host&X-Amz-Date=20200908T165030Z&X-Amz-Signature=20ca172c04b02c087149aa1ba32cc86309bf574faede65f1910b98ade0e76e34)
6. T. Tiedemann, U.L. Lohman, J. Agric. Econ. **64**,1:73–96(2012).  
<https://doi.org/10.1111/j.1477-9552.2012.00364.x>
7. J.N. Nmadu, G.P. Eze, A.J. Jirgi. British J. Econ. Manag. Trade, **2**,2:92–108(2012).  
<https://www.journaljemt.com/index.php/JEMT/article/download/30022/56339>
8. R. Darma, T.N.A. Rahmadanih, R. Amandaria. Int. J. Agric. Syst. **2**,1:77–89(2014).  
<http://pasca.unhas.ac.id/ojs/index.php/ijas/article/download/24/23>
9. E.D. Oruonye, IJFSE. **3**,4:113–117(2013).  
[http://www.ijfse.com/uploadedfiles/IJFSEArchive/IJFSE2013/3\(4\)/01.pdf](http://www.ijfse.com/uploadedfiles/IJFSEArchive/IJFSE2013/3(4)/01.pdf)
10. M.C. Plaxedes, P. Mafongoya, Clim. Risk Manag. **16**:145–163(2017).  
<https://doi.org/10.1016/j.crm.2017.02.001>

11. Y. Ferrianta, M.F. Makki, Suprijanto, Rifiana. *Int. J. Agric. Manag. Dev.* **5**,2:133–139(2014).  
[https://www.researchgate.net/publication/272667859\\_Risk\\_Analysis\\_and\\_Strategy\\_of\\_Rice\\_Farmers\\_in\\_Swampland\\_in\\_the\\_Face\\_of\\_Climate\\_Change\\_Impact\\_Case\\_in\\_South\\_Kalimantan\\_Province-Indonesia/fulltext/57a79def08aee07544c1d003/Risk-Analysis-and-Strategy-of-Rice-Farmers-in-Swampland-in-the-Face-of-Climate-Change-Impact-Case-in-South-Kalimantan-Province-Indonesia.pdf?origin=publication\\_detail](https://www.researchgate.net/publication/272667859_Risk_Analysis_and_Strategy_of_Rice_Farmers_in_Swampland_in_the_Face_of_Climate_Change_Impact_Case_in_South_Kalimantan_Province-Indonesia/fulltext/57a79def08aee07544c1d003/Risk-Analysis-and-Strategy-of-Rice-Farmers-in-Swampland-in-the-Face-of-Climate-Change-Impact-Case-in-South-Kalimantan-Province-Indonesia.pdf?origin=publication_detail)
12. A.D. Brauw, P. Eozenou. *J. Dev. Econ.* **111**:61–74(2014).  
[https://www.researchgate.net/profile/Patrick\\_Eozenou/publication/266617635\\_Measuring\\_risk\\_attitudes\\_among\\_Mozambican\\_farmers/links/5435ad990cf2643ab9867e0d/Measuring-risk-attitudes-among-Mozambican-farmers.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Patrick_Eozenou/publication/266617635_Measuring_risk_attitudes_among_Mozambican_farmers/links/5435ad990cf2643ab9867e0d/Measuring-risk-attitudes-among-Mozambican-farmers.pdf?origin=publication_detail)
13. C.A. Kalu, J.A. Mbanasor. *NAPReJ*, **1**,1:1–10(2016).  
<https://econpapers.repec.org/scripts/redir.pf?u=https%3A%2F%2Fdoi.org%2F10.22004%2F252Fag.econ.292052;h=repec:ags:naprej:292052>
14. M.M. Haque, S. Bremer, S. Aziz, J.P. Sluijs, *Clim. Risk Manag.* **16**:43–58(2017).  
<https://dx.doi.org/10.1016/j.crm.2016.12.002>
15. S. Dadzie, N. Kwesi, H. de Graft. A, *Int. J. Agric. For.* **2**,2:29–37(2012).  
[https://www.researchgate.net/profile/Samuel\\_Dadzie/publication/241699647\\_Attitudes\\_Toward\\_Risk\\_and\\_Coping\\_Responses\\_The\\_Case\\_of\\_Food\\_Crop\\_Farmers\\_at\\_Agona\\_Duakwa\\_in\\_Agona\\_East\\_District\\_of\\_Ghana/links/0046351caa436af152000000/Attitudes-Toward-Risk-and-Coping-Responses-The-Case-of-Food-Crop-Farmers-at-Agona-Duakwa-in-Agona-East-District-of-Ghana.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Samuel_Dadzie/publication/241699647_Attitudes_Toward_Risk_and_Coping_Responses_The_Case_of_Food_Crop_Farmers_at_Agona_Duakwa_in_Agona_East_District_of_Ghana/links/0046351caa436af152000000/Attitudes-Toward-Risk-and-Coping-Responses-The-Case-of-Food-Crop-Farmers-at-Agona-Duakwa-in-Agona-East-District-of-Ghana.pdf?origin=publication_detail)
16. S.R. Fajri, E. Fauziyah. *J. Hort. Indonesia*, **9**,3:188–196(2018). [in Bahasa Indonesia]  
<https://journal.ipb.ac.id/index.php/jhi/article/download/26496/17128/>
17. C. Mulwa, P. Marennya, D.B. Rahut, M. Kassie, *Clim. Risk Manag.* **16**:208–221(2017).  
<https://reader.elsevier.com/reader/sd/pii/S2212096317300062?token=8C6D3F91A4BEF28A0A8335A476A7B6B75EB4D84ED7742D9C358F0465D68675FD002D8C4A371BC054A01FAF3CD18289A8>
18. A. Ali, O. Erenstein, *Clim. Risk Manag.* **16**:1–12(2017).  
[https://www.researchgate.net/profile/Olaf\\_Erenstein/publication/311879490\\_Assessing\\_farmer\\_use\\_of\\_climate\\_change\\_adaptation\\_practices\\_and\\_impacts\\_on\\_food\\_security\\_and\\_poverty\\_in\\_Pakistan/links/58b71affaca27261e51a4134/Assessing-farmer-use-of-climate-change-adaptation-practices-and-impacts-on-food-security-and-poverty-in-Pakistan.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Olaf_Erenstein/publication/311879490_Assessing_farmer_use_of_climate_change_adaptation_practices_and_impacts_on_food_security_and_poverty_in_Pakistan/links/58b71affaca27261e51a4134/Assessing-farmer-use-of-climate-change-adaptation-practices-and-impacts-on-food-security-and-poverty-in-Pakistan.pdf?origin=publication_detail)
19. A. Tripathi, A.K. Mishra. *Clim. Risk Manag.* **16**:1–37(2017).  
[https://www.researchgate.net/publication/310815962\\_Knowledge\\_And\\_Passive\\_Adaptation\\_to\\_Climate\\_Change\\_an\\_Example\\_From\\_Indian\\_Farmers/fulltext/583a4d6308ae3a74b49ea7e4/Knowledge-And-Passive-Adaptation-to-Climate-Change-an-Example-From-Indian-Farmers.pdf?origin=publication\\_detail](https://www.researchgate.net/publication/310815962_Knowledge_And_Passive_Adaptation_to_Climate_Change_an_Example_From_Indian_Farmers/fulltext/583a4d6308ae3a74b49ea7e4/Knowledge-And-Passive-Adaptation-to-Climate-Change-an-Example-From-Indian-Farmers.pdf?origin=publication_detail)



## ● 2% Overall Similarity

Top sources found in the following databases:

- 2% Publications database
- Crossref Posted Content database

---

### TOP SOURCES

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

<b>1</b>	<b>Taja Chayeb Lucia Guadalupe. "Análisis mutacional de los genes EGFR ..."</b>	<b>1%</b>
	Publication	
<b>2</b>	<b>Banking Academy</b>	<b>&lt;1%</b>
	Publication	

## ● 1% Overall Similarity

Top sources found in the following databases:

- 1% Publications database
- Crossref Posted Content database

### TOP SOURCES

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

- 1** **Meneses Moreno Niurka. "Estudio del secretoma de Rhizobium etli utili...** <1%  
Publication
- 2** **Banking Academy** <1%  
Publication
- 3** **Isabel Karkossa, Anne Bannuscher, Bryan Hellack, Wendel Wohlleben e...** <1%  
Crossref posted content
- 4** **Anmol Joy, Vandana Jain. "Fear of Failure among Indigent Adolescent...** <1%  
Crossref posted content