



APTİKOM

The 7th International Conference
on Informatics and Computing (ICIC) 2022



ICIC 2022 PROGRAM BOOK

8 - 9 DECEMBER 2022

TABLE OF CONTENT

	FRONT MATTER	ii-iv
	PREFACE	v
	COMMITTEES	vi-vii
	TABLE OF CONTENT	viii-xxi
1	Aw...The Museum is so "Dark": The Effect of Thermal Stimuli for Virtual Reality Experience and Emotion <i>Gabriel Indra Widi Tamtama, Halim Budi Santoso, Nila Armelia Windasari, Jyun-Cheng Wang</i>	1-7
2	Optimized Random Forest Classifier Based on Genetic Algorithm for Heart Failure Prediction <i>Maria Ulfah Siregar, Ichsan Setiawan, Najmunda Zia Akmal, Dewi Wardani, Yessi Yunitasari, Ardhi Wijayanto</i>	8-13
3	The Estimating of Nutrient Value in Apples Based on Size Employing the Canny Edge Detection Algorithm <i>Anis Fitri Nur Masruriyah, Muhammad Haidar Ijlal, Rahmat Rahmat, Hanny Hikmayanti Handayani, Deden Wahiddin, Ahmad Fauzi</i>	14-19
4	Influence of Electronic Word Of Mouth (e-WOM), Hedonic Motivation, and Price Value On Consumer's Purchase Intention Using Social Commerce "TikTok Shop" <i>Mutia Maulida, Yuslena Sari, Siti Rohmah</i>	20-26
5	The Influence of The COVID-19 Pandemics in Indonesia On Predicting Economic Sectors <i>Syafrial Fachri Pane, Heriyanto, Aji Gautama Putrada, Nur Alamsyah, Mohamad Nurkamal Fauzan</i>	27-32
6	A PSO-GBR Solution for Association Rule Optimization on Supermarket Sales <i>Syafrial Fachri Pane, Aji Gautama Putrada, Nur Alamsyah, Mohamad Nurkamal Fauzan</i>	33-38
7	SI-BIME Smart Learning Multimedia Platform for Students: a Solution for the Pandemic-19 in the Regions <i>Dina Fitria Murad, Titan, Taufik Darwis, Hardyansyah</i>	39-43

8	Garbage Classification Using CNN Architecture ShuffleNet v2 <i>Eka Setya Wijaya, Andy Mizwar, Achmad Mujaddid Islami, Yuslena Sari, Erika Maulidiya, Irham Maulani Abdul Gani</i>	44-47
9	Bankruptcy Prediction using Ensemble Support Vector Machine <i>Nurul Fathanah Mustamin, Jeffry, Supriyadi La Wungo, Firman Aziz, Nurafni Shahnyb, Ampauleng</i>	48-51
10	Text Normalization on Code-Mixed Twitter Text using Language Detection <i>Rafi Dwi Rizqullah, Indra Budi</i>	52-55
11	Mobile Application Performance Improvement with the Implementation of Code Refactor Based on Code Smells Identification: Dutataniku Agriculture Mobile App Case Study <i>Argo Wibowo, Antonius Rachmat Chrismanto, Maria Nila Anggia Rini, Lukas Chrisantyo</i>	56-62
12	Public Sentiment Analysis of Indonesian Tweets About COVID-19 Vaccination Using Different Machine Learning Approaches <i>Valentinus Paramarta, Adele Mailangkay, Hilda Amalia, Desta Chrismas</i>	63-67
13	Modeling and Simulation of Long Range (LoRa) Communication System on Smart Grid <i>Ismindari, Syafaruddin, Amil Ahmad Ilham, Ardiaty Arief</i>	68-73
14	Validation and Verification of Business Architecture Process Based On The V . Model <i>Widia Febriyani, Firna Muningar Kistianti, Muharman Lubis</i>	74-79
15	Fire Detection In Wetland Using YOLOv4 And Deep Learning Architecture <i>Andreyan Rizky Baskara, Yuslena Sari, Auria Andeni Anugerah, Eka Setya Wijaya, Ricardus Anggi Pramunendar</i>	80-85
16	Design and Build a Attendance System and Employee Performance Assessment with a Website-Based Profile Matching Method <i>Hata Maulana, Noorlela Marcheta, Asep Taufik Muharram, Kamil Raihan Permana, Alifah Putri Aisyah</i>	86-90
17	Comparison of the K-Nearest Neighbor and Decision Tree algorithm to the Sentiment Analysis of Investment Applications Users in Indonesia <i>Doni Purnama Alamsyah, Rizkiansyah, Asti Herliana, Tjia Fie Tjoe</i>	91-96

18	Investigation of Netizen Sentiment Analysis Toward The Controversy of Information and Electronic Transaction Law <i>Fahdi Saidi Lubis, Muharman Lubis, Lukmanul Hakim</i>	97-103
19	A Systematic Literature Review Enhanced Felder Silverman Learning Style Models (FSLSM) <i>Supangat, Mohd Zainuri Bin Saringat</i>	104-110
20	Prediction of Automobiles Prices Using Exploratory Data Analysis Based on Improved Machine Learning Techniques <i>Fadhil Muhammad Basysyar, Ferisanti, Maryam Wulandari, Indah Sucitra, Dian Ade Kurnia, Solikin Solikin</i>	111-116
21	A Systematic Literature Review of Barriers and Drivers E-Government in Developing Countries: TOE Framework Perspective <i>Dony Martinus Sihotang, Bambang Aria Yudhistira, Solikin Solikin, Widijanto Satyo Nugroho, Wahyu Catur Wibowo, Dana I. Sensuse, Achmad Nizar Hidayanto</i>	117-122
22	User Experience Analysis Using Usability Testing on Library and Knowledge Center BINUS University with SmartPLS <i>Dyaz Aerlangga, Rifky Muhammad Arsy, Gunawan Sunardy, Teguh Prasandy</i>	123-127
23	Acceptance Rate Analysis of Internal Management Operational Application on Pt. Sigma Cipta Caraka Using Technology Acceptance Model (TAM) <i>Fatimah Azzahra Ashari, Muhammad Qamra Zahran Muharam, Junia Himmayati, Teguh Prasandy</i>	128-131
24	Examining User Acceptance of MOOCs: The Role of Openness, Task Technology Fit, and Self-Efficacy <i>Bernardinus Harnadi, Albertus Dwiyooga Widianoro, FX. Hendra Prasetya</i>	132-137
25	Follicle Detection Model on Ovarian Ultrasound Image <i>Sri Hartati, Aina Musdholifah, Putu Desiana Wulaning Ayu</i>	138-145
26	Sentiment Analysis of "Hepatitis of Unknown Origin" on Social Media using Machine Learning <i>Nova Agustina, Harya Gusdevi, Diyah Wijayati, Iis Ismawati, Candra Nur Ihsan</i>	146-151
27	Online Learning and Students' Ethical Behavior During Covid-19: For Better or for Worse? <i>Febri Tri Intan Azhana, Rosita Widjojo, Doni Purnama Alamsyah, Khusnul Khotimah, Muchamad Rizky Zakaria</i>	152-156

28	ISO 15489 Attributes Prioritization in Electronic Document Management System of the First Level Healthcare Facilities <i>Intan Dzikria, Luvia Friska Narulita, Agus Hermanto, Geri Kusnanto</i>	157-162
29	Vanishing Point Detection using Angle-based Hough Transform and RANSAC <i>Dea Angelia Kamil, Wahyono, Agus Harjoko</i>	163-167
30	Classification and Sentiment Analysis on Tweets of the Ministry of Health Republic of Indonesia <i>Apriandy Angdresey, Indah Yessi Kairupan, Kenshin Geraldly Emor</i>	168-173
31	An Electricity Consumption Monitoring and Prediction System Based on The Internet of Things <i>Apriandy Angdresey, Lanny Sitanayah, Zefanya Marieke Philia Rumpesak</i>	174-179
32	Conditional Random Field for Crime News Information Extraction with Enhancement of SMOTE <i>Viny Christanti M., Veronika, Dali S. Naga</i>	180-185
33	The Implementation of Real-ESRGAN as An Anticipation to Reduce CER Value in Plate Number Extraction Results Employing EasyOCR <i>Geo Septian, Deden Wahiddin, Hilda Yulia Novita, Hanny Hikmayanti Handayani, Ayu Ratna Juwita, Anis Fitri Nur Masruriyah</i>	186-190
34	Learner Action Patterns in the Problem-Solving Process Related to Program Code Composition Based on Tracking System Activities <i>Aulia Akhrian Syahidi, Ahmad Afif Supianto, Tsukasa Hirashima, Yutaka Watanobe</i>	191-197
35	Mobile Device Positioning by Using Dynamic Weighted Centroid Model <i>Rifki Kosasih, Ahmad Sabri</i>	198-201
36	Multiclass Intent Classification for Chatbot Based on Machine Learning Algorithm <i>W. M. Amir Fazamin W. Hamzah, Mohd Kamir Yusof, Ismahafezi Ismail, Mokhairi Makhtar, Hasnah Nawang, Azwa Abdul Aziz</i>	202-207
37	IoT-Agri: IoT-based Environment Control and Monitoring System for Agriculture <i>Adimas Ketut Nalendra, Dona Wahyudi, M. Mujiono, M. Nur Fuad, Ni'ma Kholila</i>	208-213

38	Analysis of Design Implementation Guidelines for Data Governance Management Based on DAMA-DMBOKv2 <i>Fadhil Rozi Hendrawan, Tien Fabrianti Kusumasari, Rokhman Fauzi</i>	214-219
39	Implementation of Modified Linear Congruent Methods in Randomizing Exam Questions to Optimize the Learning Environment <i>Maxrizal, Sujono, Baiq Desy Aniska Prayanti, Syafrul Irawadi</i>	220-223
40	Enterprise Architecture Planning based on One Data in Indonesian Higher Education <i>Hery Dian Septama, Muhamad Komarudin, Puput Budi Wintoro, Mahendra Pratama, Titin Yulianti, Bambang Sundari</i>	224-229
41	Spelling Correction Using the Levenshtein Distance and Nazief and Adriani Algorithm for Keyword Search Process Indonesian Qur'an Translation <i>Muhammad Iskandar Yahya, Arini, Victor Amrizal, Iik Muhamad Malik Matin, Dewi Khairani</i>	230-235
42	A Study on Text Feature Selection Using Ant Colony and Grey Wolf Optimization <i>Joan Angelina Widians, Retantyo Wardoyo, Sri Hartati</i>	236-242
43	Improvising Low Contrast Malaria Images Using Contrast Enhancement Techniques on Various Color Models <i>Doni Setyawan, Retantyo Wardoyo, Moh Edi Wibowo, E. Elsa Herdiana Murhandarwati</i>	243-248
44	Comparison of Smoothing Methods to Remove Artifacts in Emotion Recognition based on Electroencephalogram Signals <i>I Made Agus Wirawan, Retantyo Wardoyo, Danang Lelono, Sri Kusrohmaniah</i>	249-256
45	New Approach of Covid-19 Prevention by Implemented Combination of Decision Support System Algorithm <i>Eddy Soeryanto Soegoto, Yeffry Handoko Putra, Rahma Wahdiniwaty, Zuriani Ahmad Zukarnain, Noorihan Abdul Rahman</i>	257-263
46	An experimental study on binary optimization using quantum annealing in D-Wave <i>Nongmeikapam Brajabidhu Singh, Gopal Krishna, Arnab Roy, Joseph L Pachuau, Anish Kumar Saha</i>	264-268

47	Oil Well Monitoring System Based on IoT Technology and Machine Learning <i>Evizal Abdul Kadir, Muslim Abdurrahman, Sharul Kamal Abdul Rahim, Agus Arsad, Sri Listia Rosa, Apri Siswanto</i>	269-274
48	Gamification using Octalysis Framework in Knowledge Management System for Vocational High Schools during the Covid-19 Pandemic <i>Mgs. Afriyan Firdaus, Dwi Rosa Indah, Yoppy Sazaki, Eka Prasetyo Ariefin, Muhammad Fachri Nuriza, Muhammad Rafly</i>	275-282
49	Classification of Chili Plant Condition based on Color and Texture Features <i>Deffa Rahadiyan, Sri Hartati, Wahyono, Andri Prima Nugroho</i>	283-289
50	Face Recognition System Using Feature Extraction Method of 2-D Gabor Wavelet Filter Bank and Distance-Based Similarity Measures <i>R. Rizal Isnanto, Ajub Ajulian Zahra, Andre Lukito Kurniawan, Ike Pertiwi Windasari</i>	290-293
51	Design of Blind Community Assistance Devices with Indoor Positioning System Technology <i>Bong Cen Choi, David Habsara Hareva, Samuel Lukas</i>	294-299
52	The Follower-Influencer Experience Affecting the Intention to Follow Recommendation: PAD Perspective <i>Dedi I. Inan, Achmad Nizar Hidayanto, Ratna Juita, Adam Maulana, Dinda Mutiara Qur'ani Putri, Muhammad Fariz Farhan, Siti Kaamiliaa Hasnaa, Marlinda Sanglise</i>	300-305
53	Adaptive Cooling System for Comfortable Learning <i>David Habsara Hareva, Andre Andre, Benny Hardjono, Calandra Alencia Haryani, Irene Astuti Lazarusli</i>	306-310
54	Motivation and Drivers for Online Fashion Rental: Study by Social Networking Sites in Indonesia <i>Margareth Setiawan, Sandy Setiawan, Aris Darisman, Rosyidah Rahmah</i>	311-316
55	UT Metaverse: Beyond Universitas Terbuka Governance Transformation and Open Challenges <i>Antares Firman, Ali Muktiyanto, Dedi I. Inan, Ratna Juita, Ghassan Beydoun, Daryono</i>	317-322
	Analysis of Face Data Augmentation in Various Poses for Face Recognition Model	

56	<i>T. M. Syahril Nur Alamsyah, Taufik Fuadi Abidin, Ridha Ferdhiana, M. Dirhamsyah, Muhammad Chaidir</i>	323-328
	Utilization of Linguistic Data for Learner Assessment on e-Learning: Instrument and Processing	
57	<i>Wenty Dwi Yuniarti, Sri Hartati, Sigit Priyanta, Herman Dwi Surjono</i>	329-333
	Grading Problem-Solving for Clustering Students' Score Using Dynamic Programming Procedure in The Context of Dynamic Time Warping	
58	<i>Mochamad Nizar Palefi Ma'ady, Tabina Shafa Nabila Syahda, Muhammad Nasrullah, Anindya Salwa Salsabila, Uily Asfari, Hawwin Mardhiana</i>	334-338
	The 7-Phases Preprocessing Based On Extractive Text Summarization	
59	<i>Adhika Pramita Widyassari, Edy Noersasongko, Abdul Syukur, Affandy</i>	339-344
	Dual Cluster Head Selection Based on LEACH and Differential Search Algorithm to Extend Network Lifetime in Wireless Sensor Network	
60	<i>Kun Nursyaiful Priyo Pamungkas, Supeno Djanali, Radityo Anggoro, Paliling, Puhriani Burhan, Feriyadi</i>	345-351
	The Evaluation on Acceptance of the Use of Social Media in the Implementation of Blended Learning in Private Higher Education in Indonesia	
61	<i>Fahmi Yusuf, A'ang Subiyakto, Titik Khawa</i>	352-358
	Blockchain-Based Multiple Server Database System Prototype on BMKG Automatic Weather Station (AWS) Center Architecture	
62	<i>Handi Sutriyan, Agung Sunaryadi, Marzuki Sinambela</i>	359-364
	Low Cloud Type Classification System Using Convolutional Neural Network Algorithm	
63	<i>Muhammad Naufal Fikriansyah, Hapsoro Agung Nugroho, Marzuki Sinambela</i>	365-370
	Dynamic Pricing Analytic of Airbnb Amsterdam Using K-Means Clustering	
64	<i>Fitrianingsih, Dewi Agushinta Rahayu, Figa Rizfa Zazila</i>	371-377
	Systematic Literature Review of Text Feature Extraction	
65	<i>Agus Mulyanto, Sri Hartati, Retantyo Wardoyo</i>	378-383

66	<p>Food Vloggers: Mapping the Relationships between Personal Relevance, Customer Engagement, and Repurchase Decision</p> <p><i>Arif Murti Rozamuri, Johan Setiawan, Christian Haposan Pangaribuan, Hidayanti, Tri Wismiarsi, Maria Wahyuni</i></p>	384-389
67	<p>Model Implementation of Application Programming Interface for E-Government Data Integration</p> <p><i>Agus Sifaunajah, Tholib Hariono, Moh. Anshori Aris Widya, Primaadi Airlangga, Sujono, Siti Sufaidah</i></p>	390-395
68	<p>A Time-Window Approach to Recommending Emerging and On-the-rise Items</p> <p><i>Tubagus Mohammad Akhriza, Indah Dwi Mumpuni</i></p>	396-403
69	<p>Topic Modeling on Covid-19 Vaccination in Indonesia Using LDA Model</p> <p><i>Nurul Mutiah, Dian Prawira, Ibnur Rusi</i></p>	404-409
70	<p>Prediction of Work From Home Post COVID-19 using Classification Model</p> <p><i>Risanti Galuh, Johan Setiawan</i></p>	410-415
71	<p>Automatic Determination of Seeded Region Growing Parameters in Watershed Regions to Segmentation of Tuna</p> <p><i>Wanvy Arifha Saputra, Agus Zainal Arifin, Nuruddin Wiranda, Edi Yohanes, Zainal Abidin, Bambang Suriansyah</i></p>	416-423
72	<p>GeoJSON Implementation for Demographic and Geographic Data Integration Using RESTful Web Services</p> <p><i>Alam Rahmatulloh, Bambang Tri Handoko, Rahmi Nur Shofa, Irfan Darmawan</i></p>	424-429
73	<p>Android-based Matrix Learning Media to Increase Student Interest in Learning</p> <p><i>Isna Wardiah, Rahimi Fitri, Reza Fauzan, Seberan, Fuad Sholihin</i></p>	430-435
74	<p>M-Government Adoption in Indonesia: Self-Determination Theory</p> <p><i>Dedi I. Inan, Achmad Nizar Hidayanto, Ratna Juita, Antares Firman, Ali Muktiyanto, Hermawan Wibisana Arifin, Muhammad Rizky Darmawan, Nabilla Yuli Shafira, Cassie Michelle</i></p>	436-441
75	<p>Games for Scrum Team Collaboration in the Global Software Development Environment: A Literature Review</p> <p><i>Anita Hidayati, Iklima Ermis Ismail, Ade Rahma Yuly, Henry Edison</i></p>	442-446

	Digital Transformation Impact Analysis towards Transition in the Role of Information Technology for Organization in New Digital Bank	
76	<i>Yosua Pangihutan Sagala, Muhammad Akmal Juniawan, Vina Ardelia Effendy, Rahmawati Putrianasari, Vien Aulia Rahmatika, Muhammad Rifki Shihab, Benny Ranti</i>	447-452
	Analysis of Critical Success Factors in Information Technology Projects: A National Shipping Company Case Study	
77	<i>Ivan Eka Aditya, Ardhy Wisdarianto, Teguh Raharjo</i>	453-459
	Rice seed classification using machine learning and deep learning	
78	<i>Budi Dwi Satoto, Devie Rosa Anamisa, Muhammad Yusuf, M Kautsar Sophan, Siti Oryza Khairunnisa, Budi Irmawati</i>	460-466
	1D Convolutional Neural Network to Detect Ventricular Fibrillation	
79	<i>Sava Savero, David Agustriawan, Muammar Sadrawi</i>	467-471
	Analysis for Data Mobility and Covid-19 Positive Rate with Multilayer Perceptron	
80	<i>Arie Vatesia, Ruvita Faurina, Rizki Zulfahmi</i>	472-477
	Multibranch Convolutional Neural Network For Gender And Age Identification Using Multiclass Classification And FaceNet Model	
81	<i>Haris Setiawan, Mudrik Alaydrus, Abdi Wahab</i>	478-483
	Detecting Online Outlier for Data Streams using Recursive Residual	
82	<i>Yasi Dani, Agus Yodi Gunawan, Sapto Wahyu Indratno</i>	484-490
	Implementation of Adaptive Bit Decision Point to Improve Receiver Performance in Li-Fi System	
83	<i>Juan Salao Biantong, Mudrik Alaydrus, Ahmad Sony Alfathany</i>	491-496
	Adoption Technology at MSMEs: A Conceptual Model with TOE	
84	<i>Evi Triandini, I Gusti Ngurah Satria Wijaya, I Ketut Putu Suniantara, Sugiarto, Djoko Budiyanto Setyohadi</i>	497-501
	Chunk Learning Media for Cognitive Load Optimization on Science Learning	
85	<i>Ng Melissa Angga, Cicilia Caroline Phieranto, Fonny Tejo, Dionisius Yovan, Angelica Angelica, Felicia Sumarsono Putri</i>	502-507
	Topic Modeling for Cyber Threat Intelligence (CTI)	

86	<i>Hatma Suryotrisongko, Hari Ginardi, Henning Titi Ciptaningtyas, Saeed Dehqan, Yasuo Musashi</i>	508-514
	LongSpam: Spam Email Detection Using LSTM Algorithm	
87	<i>Nurhadi Wijaya, Yudianingsih, Evrita Lusiana, Sugeng Winardi, Zaidir, Agus Qomaruddin Munir</i>	515-520
	Improving Candle Direction Classification in Forex Market using Support Vector Machine with Hyperparameters Tuning	
88	<i>Raymond Sunardi Oetama, Yaya Heryadi, Lukas Lukas, Wayan Suparta</i>	521-526
	Energy Efficiency in Buildings Using Multivariate Extreme Gradient Boosting	
89	<i>Triando Hamonangan Saragih, Rahmat Ramadhani, Muhammad Itqan Mazdadi, Muhammad Haekal</i>	527-531
	LSTM and ARIMA for Forecasting COVID-19 Positive and Mortality Cases in DKI Jakarta and West Java	
90	<i>Syafrial Fachri Pane, Adiwijaya, Mahmud Dwi Sulistiyo, Alfian Akbar Gozali</i>	532-537
	Sentiment Analysis on Cryptocurrency Based on Tweets and Retweets Using Support Vector Machines and Chi-Square	
91	<i>Isabella Donita Hasan, Raymond Sunardi Oetama, Aldo Lionel Saonard</i>	538-543
	Augmented Reality English Education Based iOS with MobileNetV2 Image Recognition Model	
92	<i>Doni Purnama Alamsyah, Yudi Ramdhani, Agus Tiyansyah Syam, Ahmad Setiadi</i>	544-548
	Sentiment Classification of Visitors in Yogyakarta Palace using Support Vector Machine	
93	<i>Cahaya Damarjati, Fadia Rani, Slamet Riyadi, Gan Kok Beng</i>	549-553
	The Comparison of Sentiment Analysis Algorithm for Fake Review Detection of The Leading Online Stores in Indonesia	
94	<i>Pius Hans Christian, Ririn Ikana Desanti</i>	554-557
	Hate Speech Detection in Code-Mixed Indonesian Social Media: Exploiting Multilingual Languages Resources	
95	<i>Endang Wahyu Pamungkas, Azizah Fatmawati, Yusuf Sulisty Nugroho, Dedi Gunawan, Endah Sudarmilah</i>	558-562
	Semantic Segmentation of Landsat Satellite Imagery	
96	<i>Herlawati Herlawati, Rahmadya Trias Handayanto, Prima Dina Atika, Sugiyatno Sugiyatno, Rasim Rasim, Mugiarto Mugiarto, Andy Achmad Hendharsetiawan, Jaja Jaja, Santi Purwanti</i>	563-568

97	DeepRec: Efficient Product Recommendation Model for E-Commerce using CNN <i>Hamzah, Erizal, Mohammad Diqi</i>	569-574
98	Comparison of Convolutional Neural Network Models to Detect Covid-19 on CT-Scan Images <i>Slamet Riyadi, Suci Rahmadina M. Rasyid, Cahya Damarjati</i>	575-579
99	Data Pipeline Framework for AIS Data Processing <i>Ni Kadek Bumi Krismentari, I Made Oka Widyantara, Ngurah Indra ER, I Made Dwi Putra Asana, I Putu Noven Hartawan, I Gede Sudiantara</i>	580-585
100	User Experience Evaluation of IT Support Mobile Application Using System Usability Scale (SUS) and Retrospective Think Aloud (RTA) <i>Immanuel Revelino Murmanto, Sunardi, Ratih Muthiah Kamilia, Ganis Maulia Yusuf, Rizki Kurniawan</i>	586-593
101	Development of Portal Signer for Digital Products by Using Iterative Model at PT RST <i>Manogunawan Resqi Gultom, Riyanthi Angrainy Sianturi, Rince Septriana Parhusip, Ova Ferdinan Marbun, Yohanssen Pratama</i>	594-602
102	Portable Monitoring Systems for Rivers Waste Based on Internet of Things <i>Henderi Henderi, Mumammad Hudzaifah Nasrullah, Laura Belani Nudiyah, Po Abas Sunarya, Sofa Sofiana, Didik Setiyadi</i>	603-607
103	Monitoring Indoor Air Quality for Thermal Comfort using Internet of Things <i>Rahmi Andarini, Moeljono Widjaja</i>	608-613
104	Adopting Haar Cascade Algorithm on Mask Detection System Based on Distance <i>Jemakmun, Rudi Suhirja, Darius Antoni, Hadi Syaputra</i>	614-618
105	Impact of Leadership in Transitioning IT Roles from Turnaround to Strategic: Case Study of PT. XYZ <i>Paulus Donny Junianto</i>	619-624
106	Usability Evaluation on Educational Chatbot using the System Usability Scale (SUS) <i>Arief Hidayat, Agung Nugroho, Safa'ah Nurfa'izin</i>	625-629

107	Real Time Web-based Facemask Detection <i>Geraldo Pan, Suryasari, Haditya Setiawan, Aminuddin Rizal</i>	630-634
108	Interaction Design of Indonesian Anti Hoax Chatbot using User Centered Design <i>Ryan Daniel, Ayu Purwarianti, Dessi Puji Lestari</i>	635-640
109	Mobile Augmented Reality for Japanese Vocabulary and Hiragana Letters Learning with Mnemonic Method <i>Riri Safitri, Resnia Trya Muslima, Sandra Herlina</i>	641-647
110	Analysis of Discussion Tendency on Twitter using Text Classification <i>Reyvan Rizky Irsandi, Ayu Purwarianti</i>	648-654
111	Usability Improvement Through User Interface Design With Human Centered Design (HCD) Method On Junior High School Websites <i>Saepul Aripriyanto, Muhamad Azhari, Riana Munawarohman, Siti Ummi Masruroh, Dewi Khairani, Husni Teja Sukmana</i>	655-661
112	Educational Question Classification with Pre-trained Language Models <i>Said Al Faraby, Adiwijaya, Ade Romadhony</i>	662-667
113	Evaluation of Enterprise Resource Planning (ERP) and Open-source ERP Modification for Performance Improvement <i>Ananda, Jansen Wiratama</i>	668-676
114	Adaptivo: A Personalized Adaptive E-Learning System based on Learning Styles and Prior Knowledge <i>M.A.M Rishard, S.L Jayasekara, E.M.P.U Ekanayake, K.M.J.S Wickramathilake, Shyam Reyal, Kalpani Manathunga, Jagath Wickramarathne</i>	677-685
115	Data Balance Optimization of Fraud Classification for E-Commerce Transaction <i>Aida Fitriyani, Wowon Priatna, Tyastuti Sri Lestari, Dwipa Handayani, TB Ai Munandar, Amri</i>	686-689
116	YoBagi's User Experience Evaluation using User Experience Questionnaire <i>Fransiskus Panca Juniawan, Dwi Yuny Sylfania, Rendy Rian Chrisna Putra, Henderi Henderi</i>	690-693
	A Floor Cleaning Based-Robotic Combines A Microcontroller And A Smartphone	

117	<i>Jafar Shadiq, Rita Wahyuni Arifin, Bayu Aji Prayoga, Sumardiono S., Ari Nurul Alfian, Solikin Solikin</i>	694-698
	Implementation of Internship Decision Support System Using Simple Multi Attribute Rating Technique (SMART)	
118	<i>Pajri Aprilio, SY Yuliani</i>	699-705
	Implementation of One Data-based Lecturer Profile Information System for Key Performance Indicator Monitoring	
119	<i>Hery Dian Septama, Muhamad Komarudin, Puput Budi Wintoro, Mahendra Pratama, Titin Yulianti, Wahyu Eko Sulistiono</i>	706-712
	Travel Budget Prediction for Determining Tourism Objects Using Simple Additive Weighting (SAW) Algorithm	
120	<i>H Hartatik, Nurul Firdaus, Rudi Hartono, Berliana Kusuma Riasti, Agus Purbayu, Fiddin Yusfida A'la</i>	713-718
	Optimization Analysis of Neural Network Algorithms Using Bagging Techniques on Classification of Date Fruit Types	
121	<i>Rully Pramudita, Solikin Solikin, Nadya Safitri</i>	719-723
	Machine Learning Model Based on REST API for Predicting Tenders Winner	
122	<i>Mardi Yudhi Putra, Rachmad Nur Hayat, Ahmad Chusyairi, Dwi Ismiyana Putri, Solikin Solikin</i>	724-728
	IoT-Based Smart Bin Using Smell, Weight, And Height Sensors	
123	<i>Abraham Bulyan Zebua, Muhammad Fahrul Azmi Husni, Muhammad Naufal, Andri Andri, Syanti Irviantina</i>	729-733
	The role of management technology and innovation strategy in business strategy based on a user perspective	
124	<i>Nina Kurnia Hikmawati, Yusuf Durachman, Husni Teja Sukmana, Herlino Nanang</i>	734-738
	Implementation of Discrete Cosine Transform and Permutation-Substitution Scheme Based on Henon Chaotic Map for Images	
125	<i>Irpan Adiputra Pardosi</i>	739-743
	E-Archive Document Clustering Information System Using K-Means Algorithm	
126	<i>Aida Fitriyani, Dwipa Handayani, Achmad Noeman, Asep Ramdhani Mahbub, Ratna Salkiawati, Ahmad Fathurrozi</i>	744-748
	Usability Testing Analysis of Company Website System In Indonesia	

127	<i>Rangga Firdaus, Nina Kurnia Hikmawati, Yusuf Durachman, Herlino Nanang, Dewi Khairani, Muhammad Syauqi Hazimi</i>	749-754
	Towards Tourism Management Platform for Culinary Tourism Management and Merchandise E-Catalogs	
128	<i>Nurul Firdaus, Salsabila Fithriyah, Hartatik, Agus Purbayu, Fiddin Yusufida A'la, Berliana Kusuma Riasti</i>	755-760
	The Influence of Blended Learning with Flipped Classroom Model on Motivation in Learning Geography	
129	<i>Nur Azizah, Jakiatin Nisa, Syairul Bahar, Andri Noor Ardiansyah, Abd. Rozak</i>	761-764
	Design and Implementation of Free Ambulance Service System in Bandar Lampung City Based on Android Mobile Application	
130	<i>Gigih Forda Nama, Candra Kurnia Nugraha, Hery Dian Septama</i>	765-771
	AUTHOR INDEX	772-783

Adoption Technology at MSME: A Conceptual Model with TOE

Evi Triandini
Information System
ITB Stikom Bali
Denpasar, Indonesia
evi@stikom-bali.ac.id

I Gusti Ngurah Satria Wijaya
Business Digital
ITB Stikom Bali
Denpasar, Indonesia
ngurah_satria@stikom-bali.ac.id

I Ketut Putu Suniantara
Information System
ITB Stikom Bali
Denpasar, Indonesia
suniantara@stikom-bali.ac.id

Sugiarto
Data Science
UPN "Veteran" East Java
Surabaya, Indonesia
sugiarto.if@upnjatim.ac.id

Djoko Budiyanto Setyohadi
Magister Teknik Informatika
Universitas Atmajaya
Yogyakarta, Indonesia
djoko.bdy@gmail.com

Abstract—Strengthening MSMEs (Micro, Small and Medium Enterprises) in an era of overall change (globalization) and a high level of competitiveness, already requires MSMEs to be able to withstand global challenges, such as creating goods and service innovations, making changes in human resources and technology to better direction, as well as widen the reach of marketing. MSMEs as the pillars of the Indonesian economy show a low contribution to exports because they only reach 14% of the total export value of the non-oil and gas sector, which is inversely proportional to the data on amount of MSMEs stack up to the amount large businesses. Build upon the literature review, this research proposes identify the part of the variables of each TOE dimension in adopting Digital Technology to increase the competitiveness of MSMEs export oriented. The research output will be able to contribute to the regulation of MSMEs in managing their business to increase export competitiveness by taking into account the factors resulting from the TOE framework.

Keywords— Conceptual Model, Technology Adoption, TOE, MSMEs, Framework.

I. INTRODUCTION

Strengthening MSMEs (Micro, Small and Medium Enterprises) in an era of overall change (globalization) and a high level of competitiveness, already requires MSMEs to be able to withstand global challenges, such as creating goods and service innovations, making changes in human resources and technology to better direction, as well as widen the reach of marketing[1]. These efforts need to be carried out to raise the brand and selling value of MSMEs themselves, mainly reliable in dealing with the onslaught of foreign products that are widely available in the market and industry in Indonesia, where MSMEs are the foundation of the economic sector that is able to accommodate large numbers of workers in Indonesia[2].

MSMEs as the pillars of the Indonesian economy show a low contribution to exports because they only reach 14% of the total export value of the non-oil and gas sector. In fact, build upon data compiled by the Ministry of Cooperatives and SMEs in 2019, the amount MSMEs in Indonesia is very large because it reaches 99.99% compared to the number of Large Enterprises reaching 0.01%. The lack of a strong economic base in Indonesia has provided a driving force for the government to strengthen the structure of the economy by continuously building the presence of MSMEs. The existence or existence of MSMEs cannot be denied because

it provides evidence to be able to survive and become the driving force of the economy, especially after the economic crisis. From another point of view, MSMEs also experience many obstacles or problems, such as lack of working capital, inadequate levels of human resources, and inappropriate absorption of science and technology.

Electronic commerce is a step or stage of the process of buying and selling, distributing or changing the owner of goods, services or information via the internet or computer networks. A suite of uses for e-commerce: establishing global regional marketing; lower costs; increased speed of marketing time; improving service to consumers, and increasing income. For various levels of organization, especially for the category of small and medium businesses, the existence of e-commerce has a good effect [3].

Studies on the role of digital technology to increase the competitiveness of MSMEs have also been carried out by several researchers. Foroudi et. al. [4] carry out the process of identifying the two dominant parts of digital technology, namely as service convenience and information quality. In addition, the influence of digital technology, marketing capabilities, assets or assets has an important role as a provider of facilities in the company's growth and development. Malesev & Cherry [5] in their research confirms massive recognition of the benefits of digital marketing tactics in the MSME ecosystem, but in the process of absorption and effective use of digital marketing is hindered by the lack of observation from the outside environment, lack of investment and training of effective and up-to-date marketing mix, strategies and objectives.

Currently, information technology (IT) is universally considered as an important tool in increasing the competitiveness of a country's economy. There is a consensus that IT has a significant influence on company productivity. This effect will only materialize if IT is widely spread to use. It is very important to understand the determinants of IT adoption. The following are some excerpts about the comparison of IT adoption models at the small or individual level and the enterprise-scale level. Oliveira & Martins [6] stated that The TOE model introduces or identifies three parts of the company's dimensions that have an influence on the acceptance or adoption and implementation of technological innovations, namely the technological, organizational and environmental dimension. Setiyani & Yeny Rostiani [7] stated that The technological aspect does not have a significant effect on the

intention to accept and implement e-commerce, but the organizational and environmental aspects have a significant influence on the intention to accept and implement e-commerce. All technology variables or indicators have evidence to significantly support the technological aspects of the intention to accept and implement e-commerce. Other studies also reveal different results in terms of indicators that make up the dimensions, such as Low et. al. [8] revealing that top management support, pressure characteristics of trading partners, relative advantage, competitive pressure, and company size have a significant effect on the adoption of cloud computing. Gui et. al. [9] also stated relative advantage, and top management encouragement have a positive effect on cloud computing adoption from Indonesian MSMEs. While other indicators such as complexity, and compatibility do not have a significant relationship to the adoption of technology [8], [9], [10]. Borgman et.al. [10] also stated that firm size has no significant relationship to technology adoption.

Based on the background, research gap, and the development of previous research, this research purposes to propose a conceptual model of the Technology, Organization, and Environment (TOE) Framework in identifying the role of the variables of each TOE dimension in adopting Digital Technology to increase the competitiveness of MSMEs export oriented.

II. LITERATURE REVIEW

A. MSMEs and Digital Technology

The definition of MSME various definitions based on country, generally based on measurable characteristics, namely number of workers, level of capital, sales and ownership of property. In Indonesia, a small company is defined as having less than 100 employees. In the US, small company means a company with under 500 employees.

Although there is no broad understanding of MSMEs, they are divided into several dominant characteristics such as limited resources from technology, capital, and members), the simplicity of the core business, dynamic tactics, sensitivity to change, and a relatively narrow market scope. The success of SMEs also mainly depends on the owner. Owners make policies based on the owner's individual characteristics, close relationships with consumers, employees and upstream businesses [11]

Recently, together with extreme changes or digital disruptions, this has provided opportunities and challenges for MSMEs. With digital tools, MSME marketing has a global reach with a high level of effectiveness and efficiency. However, this also provides a very high level of competition against traditional MSMEs. So MSMEs are encouraged to carry out digitalization by adhering to three pillars: customer knowledge and insight, business forms, and forms of operation. Conventional MSMEs are prone to failure coupled with a lack of digital knowledge and skills and high quality employees, making it an obstacle in the acceptance or adoption of digital technology in this sector. [11].

B. Information Technology Adoption Model

There are various theories applied in the study, especially technology adoption. The most commonly applied theories are the technology acceptance model (TAM), the theory of planned behavior (TPB), the integrated theory of technology

acceptance and use (UTAUT), the Diffusion of Innovation (DOI), and technology, organization, and environment (TOE). On a company scale, the theory of DOI and TOE is widely used. On an individual scale, TAM, TPB, and UTAUT are used [7].

C. Technology, Organization, and Environment Framework

TOE was created in 1990 with originators by Tornatzky and Fleischer. This theory explains three aspects of the company's dimensions that have an influence on the process or stages of the adoption and implementation of technological innovations, namely the technological dimension, the organizational dimension and the environmental dimension. Can be seen in figure 1.

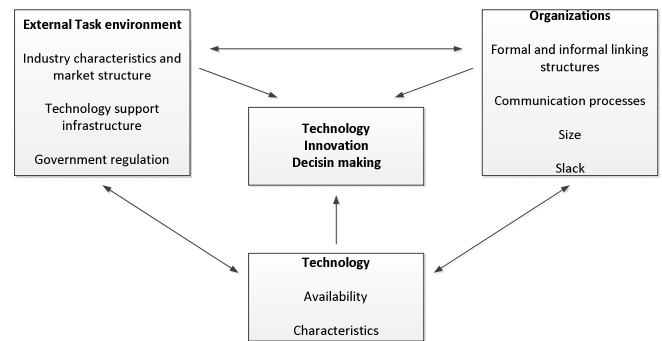


Fig. 1. TOE Framework

The technology dimension describes the internal and external technology that has a relationship with the company. The organizational dimension refers to the size of the description of the organization such as organizational boundaries, company scale, and managerial core. The environmental context is the company's relationship with industry groups, competitors and governments [11]

III. THE PROPOSED CONCEPTUAL MODEL

Build upon the previous research gaps, the model is modified into the framework of the research below:

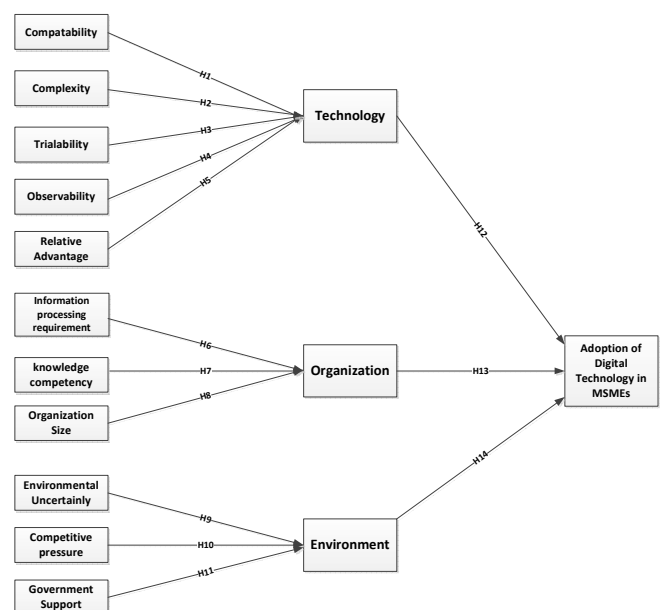


Fig. 2. Research TOE Model

Build upon the literature study, the research variables used in this study are in accordance with the proposed model concept, namely:

- a. Complexity is a barrier to innovation in understanding and applying digital technology to achieve business goals, which requires more effort to find ways to use innovation [7].
- b. Digital technology compatibility can be defined as the extent to which digital technology is consistent with technology that has the infrastructure, culture, values, and work practices preferred by MSMEs [12].
- c. Trialability is the extent to which an innovation can be tested on a limited basis or the more innovations that are tried, the faster the adoption [13].
- d. Observability is defined as the extent to which the results of an innovation are visible to others [14], [15].
- e. Relative advantage is defined as the degree to which an innovation is perceived as better than the idea it replaces.
- f. Information processing needs are defined as the gap between the information required by an organization and the information available in the application of digital technology [12].
- g. Knowledge Competencies are HR competencies that have skills in the field of digital technology so that MSMEs must also have digital technology knowledge competencies [12].
- h. Organization size implies that the larger the organization/company tends to adopt more information technology innovations in terms of flexibility and risk, and vice versa. [7].
- i. Environmental uncertainty is an environment that can undermine the use of new technologies, environmental vulnerabilities occur when complex and rapid changes occur. Organizations in high uncertainty may not adopt new technologies without supporting infrastructure and clear operating standards [12].
- j. Competitive pressure refers to the degree to which an organization reacts to competitive pressures, thereby encouraging the firm to use new technologies. It is concluded that competitive pressure is the strength of the organization's reaction to competitive pressure and compliance with industry requirements [12], [7].
- k. Government support can be defined as initiatives and opportunities from the government to encourage the adoption of digital technology [7].

The indicators of the variables used in this study can be seen in the table below

TABLE I. THE INDICATORS OF THE VARIABLES

Variables	Indicators	Ref
Relatif Advantage	Digital technology already or if implemented can reduce costs to the company	[9], [16],[17]

	Digital technology has been or if implemented can increase the efficiency of business operations at the company	[9], [16],[17]
	Digital technology has or if implemented can accelerate business processes in the company	[9], [16],[17]
	Digital technology already or if implemented can improve the relationship with the company's customers and business partners (vendors and customers) in the company	[9], [16],[17]
	Using digital technology makes it easier to perform business tasks.	[9], [16],[17]
	The use of Digital technology allows greater control over the business	[9], [16],[17]
Complexity	Digital technology is easy to implement in companies	[9], [16],[17]
	Digital technology is easy for employees to understand in the company	[9], [16],[17]
	Digital technology is trusted by employees at the company	[9], [16],[17]
	Digital technology requires a high level of expertise for companies to implement	[9], [16],[17]
Compatibility	Digital technology fits into the organisation culture in the company	[9], [16],[17]
	Digital technology matches the organisation value in the company	[9], [16],[17]
	Digital technology fits into the work habits of the company	[9], [16],[17]
	Digital technolog should be compatible with existing enterprise technology infrastructure.	[16],[17]
	Digital technolog should be fully integrated with enterprise information systems, software tools, and software solutions	[16],[17]
Trialability	I intend to try out Digital technology in before deciding whether to adopt it in practice	[18]
	A trial period before adopting Digital technology will reduce the perceived risks	[18]
	Trying out Digital technology is not important in my decision to adopt	[18]
	In the trial period, I will try to transform the saved records to Digital technology	[18]
Observability	The application of digital technology to MSMEs provides convenience in observing or observing it	[15]
	The application of digital technology to MSMEs makes it easy to communicate to others	[15]
	The benefits of applying digital technology to MSMEs can be felt for others	[15]
Knowledge Competencies	The adoption of digital technology requires an understanding of the application of the technology	[16]

	Adoption of digital technology requires the ability of organizations to adapt to technology	[16],[17]
	The adoption of digital technology requires the availability of organizational resources	[16],[17]
	Digital technology adoption requires top management support	[16],[17]
Organization Size	The adoption of digital technology can be applied to the size of MSMEs for small business scale	Author
	The adoption of digital technology can be applied to the size of MSMEs for medium-scale businesses	Author
	The adoption of digital technology can be applied to the size of MSMEs for large scale businesses	Author
Information processing needs	The data we currently use in our business is reliable.	[16]
	There is an agreement on clearly defined business rules and a set of data definitions.	[16]
	The search for and use of data/information to support decision-making is encouraged.	[16]
	Decision-making processes involving quantitative/numerical analysis are encouraged	[16]
Competitive pressure	Competitor companies influence the company's decision to adopt digital technology	[9]
	Pressure from the industrial sector influenced the company's decision to adopt digital technology	[9]
	Your business partners (vendors and customers) influence the company to adopt digital technology	[9]
Environmental uncertainty	The adoption of digital technology for MSMEs is an encouragement and demand from consumers	[19]
	The adoption of digital technology for MSMEs is an encouragement and demand from suppliers	[19]
	The adoption of digital technology for MSMEs is an encouragement and a demand for the development of the business world	[19]
	The adoption of digital technology for MSMEs is a push and a demand from competitors	[19]
Government Support	The government supports digital technology adoption	[9]
	The government sponsors digital technology workshops and conferences	[9]
	Law in Indonesia provides legal protection in the use of digital technology	[9]
	Indonesian laws and regulations facilitate the use of digital technology	[9]

This research is part of a larger research work, which is still ongoing. To get a complete picture of the conceptual model of the results of this study, data collection will be carried out from Indonesian information technology adoption experts. The questionnaire was distributed offline with the assistance of the research team to MSME management respondents in Blitar Regency, East Java Province, and Badung, Gianyar, Buleleng and Denpasar Municipalities, Bali Province.

The data collected from MSMEs will be analyzed first using the Structural Equation Modeling (SEM) technique through the use of Partial Least Squares (PLS-SEM) with the help of SmartPLS3 software. The purpose of this method is to find a causal relationship in a theoretical model based on empirical data. The benefits of this research are useful for identifying the role of Digital Technology to increase the competitiveness of export-oriented SMEs.

IV. CONCLUSION

A conceptual model of TOE digital technology adoption has been proposed which is equipped with variables and indicators that affect the adoption of digital technology for export-oriented MSMEs. Together with the proposed technology adoption variables and indicators, the model can be used to assess the level of digital technology adoption by MSMEs. To get many benefits from the adoption of this technology, especially for application developers, this model can be used as a framework for the digital technology development process of the development company. Therefore, our future research will focus on developing a TOE digital technology adoption framework for poultry farmers based on this research. A survey instrument consisting of a set of questionnaires related to the variables and indicators of the TOE technology adoption model will be developed. In future research, empirical tests will also be used to determine the effect of causality on variables with the adoption of developed digital technology.

ACKNOWLEDGMENT

Praise the authors pray to God for the success in completing this research. The author also expresses gratitude to the management of ITB STIKOM in providing full support for this research..

REFERENCES

- [1] W. Fernanda Putri, S. Sinulingga, and J. Hidayati, "Micro, Small and Medium Enterprise strategy to improve competitiveness in the era of the ASEAN economic community (AEC)," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 801, no. 1, 2020, doi: 10.1088/1757-899X/801/1/012124.
- [2] D. Widiyati and N. Hasanah, "The Influence of Social Capital , Collaborative Competence and Entrepreneurial Behavior to Sustainable Competitive Advantage," vol. 3, no. 1, pp. 99–106, 2013.
- [3] E. Triandini, A. Djunaidi, and D. Siahaan, "Factors Influencing E-Commerce Adoption by SMES Indonesia : A Conceptual Model," vol. 4, no. 3, pp. 301–311, 2013.
- [4] P. Foroudi, S. Gupta, A. Nazarian, and M. Duda, "Digital technology and marketing management capability: achieving growth in SMEs," *Qual. Mark. Res. An Int. J.*, 2017.
- [5] S. Malesev and M. Cherry, "Digital and social media marketing-growing market share for construction smes," *Constr. Econ. Build.*, vol. 21, no. 1, pp. 65–82, 2021, doi: 10.5130/AJCEB.v21i1.7521.
- [6] T. Oliveira and M. F. Martins, "Information technology adoption models at Firm Level: Review of literature," *4th Eur. Conf. Inf. Manag. Eval. ECIME 2010*, vol. 14, no. 1, pp. 312–322, 2010.
- [7] L. Setiyani and Yeny Rostiani, "Analysis of E-Commerce Adoption by SMEs Using the Technology - Organization - Environment (TOE)

- Model: A Case Study in Karawang, Indonesia,” *Int. J. Sci. Technol. Manag.*, vol. 2, no. 4, pp. 1113–1132, 2021, doi: 10.46729/ijstm.v2i4.246.
- [8] C. Low, Y. Chen, and M. Wu, “Understanding the determinants of cloud computing adoption,” *Ind. Manag. Data Syst.*, vol. 111, no. 7, pp. 1006–1023, 2011, doi: 10.1108/02635571111161262.
- [9] A. Gui, Y. Fernando, M. S. Shaharudin, M. Mokhtar, I. G. M. Karmawan, and Suryanto, “Cloud computing adoption using toe framework for Indonesia’s micro small medium enterprises,” *Int. J. Informatics Vis.*, vol. 4, no. 4, pp. 237–242, 2020, doi: 10.30630/joiv.4.4.458.
- [10] H. P. Borgman, B. Bahli, H. Heier, and F. Schewski, “Cloudrise: Exploring cloud computing adoption and governance with the TOE framework,” *Proc. Annu. Hawaii Int. Conf. Syst. Sci.*, pp. 4425–4435, 2013, doi: 10.1109/HICSS.2013.132.
- [11] D. Sastararujii, D. Hoonsopon, P. Pitchayadol, and P. Chiwamit, “Cloud Accounting Adoption in Small and Medium Enterprises: An Integrated Conceptual Framework: Five factors of determinant were identified by integrated Technology-Organization-Environment (TOE) framework, Diffusion of Innovation (DOI), Institutional Theo,” *ACM Int. Conf. Proceeding Ser.*, pp. 32–38, 2021, doi: 10.1145/3447432.3447439.
- [12] M. Ghobakhloo and N. T. Ching, “Adoption of digital technologies of smart manufacturing in SMEs,” *J. Ind. Inf. Integr.*, vol. 16, p. 100107, 2019, doi: 10.1016/j.jii.2019.100107.
- [13] M. T. Amron, R. Ibrahim, N. A. Abu Bakar, and S. Chuprat, “Determining factors influencing the acceptance of cloud computing implementation,” *Procedia Comput. Sci.*, vol. 161, pp. 1055–1063, 2019, doi: 10.1016/j.procs.2019.11.216.
- [14] V. Christiansen, M. Haddara, and M. Langseth, “Factors Affecting Cloud ERP Adoption Decisions in Organizations,” *Procedia Comput. Sci.*, vol. 196, no. 2021, pp. 255–262, 2021, doi: 10.1016/j.procs.2021.12.012.
- [15] E. S. Alias, M. Mukhtar, and R. Jenal, “Adoption of unified communications and collaboration from the perspective of diffusion of innovation and service-dominant logic: A preliminary view,” *Int. J. Adv. Sci. Eng. Inf. Technol.*, vol. 8, no. 5, pp. 1882–1889, 2018, doi: 10.18517/ijaseit.8.5.6435.
- [16] A.-M. Stjepić, M. Pejić Bach, and V. Bosilj Vukšić, “Exploring Risks in the Adoption of Business Intelligence in SMEs Using the TOE Framework,” *J. Risk Financ. Manag.*, vol. 14, no. 2, p. 58, 2021, doi: 10.3390/jrfm14020058.
- [17] S. Malik, M. Chadhar, and M. Chetty, “Factors affecting the organizational adoption of blockchain technology: An Australian perspective,” *Proc. Annu. Hawaii Int. Conf. Syst. Sci.*, vol. 2020-Janua, pp. 5597–5606, 2021, doi: 10.24251/hicss.2021.680.
- [18] A. AL-Ashmori, P. D. D. Dominic, and N. S. S. Singh, “Items and Constructs of Blockchain Adoption in Software Development Industry: Experts Perspective,” *Sustainability*, vol. 14, no. 16, p. 10406, 2022, doi: 10.3390/su141610406.
- [19] B. Umam, A. K. Darmawan, A. Anwari, I. Santosa, M. Walid, and A. N. Hidayanto, “Mobile-based Smart Regency Adoption with TOE framework: An empirical inquiry from Madura Island Districts,” *ICICoS 2020 - Proceeding 4th Int. Conf. Informatics Comput. Sci.*, no. February 2021, 2020, doi: 10.1109/ICICoS51170.2020.9299025.