

Proceedings of

2020 International Conference on
Information Management and Technology
(ICIMTech)

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Indonesia



ICIMTech 2020

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Greetings!



Dear Esteemed Participants/Researchers/Delegates/Professors
Distinguish Guests
Ladies and Gentlemen

Welcome to 2020 International Conference on Information Management and Technology (ICIMTech 2020) held virtually in Indonesia. This is the 5th international conference that annually organized by School of Information Systems, Bina Nusantara University. Today ICT plays a very important role in the industry community to interact, exchange information, and to support business processes that they move to digital transformation. So, our theme of this conference is **Fostering Innovation in The ICT Ecosystem**.

First of all, I would like to extend my sincere appreciation to IEEE Indonesian Section for continuous support and to the honorable keynote speakers for sharing knowledge and research experiences. I thank you very much to committees and volunteers, especially from School of Information Systems. I proudly inform that ICIMTech 2020 received 392 papers and 178 high quality of papers were accepted and would be presented in this conference. They are from several countries overseas and Indonesia. More than that we have experts from academia and professionals will share their knowledge and research experiences related with our theme of conference. We believe you will enjoy and improve your knowledge and experiences as well.

This event is a great opportunity for social networking and there are discussions among us in current and latest Information Management and Technology. Hopefully, as researchers, academicians, professionals, and students from various research background will contribute on improvement of knowledge and experiences, especially in the area of Big Data and Data Mining, Business Intelligent, e-Business, Human-Computer Interaction, Information Engineering, Knowledge Management, Information System Audit, Management Information System and Strategic Information System. On behalf of the committee, let me extend a warm welcome to Indonesia, especially to all foreign participants. I hope that this event will be pleasant and memorable. Thank you and enjoy the conference!

Sincerely Yours,

Dr. Tanty Oktavia
Conference Chair ICIMTech 2020





WELCOMING REMARKS

General Chair

BINUS Joint International Conference (BJIC) 2020

The 5th International Conference on Information Management and Technology (ICIMTech)

Jakarta, 13 August 2020

H.E. Prof. Dr. Ir. Harjanto Prabowo, MM., Rector, BINUS University
Vice rectors, Directors, Deans, and Professors,

Distinguished guests, ladies, and gentlemen,

Let us praise to God the Almighty for His merciful and blessings as we gather here to attend The 5th International Conference on Information Management and Technology (ICIMTech) 2020 as part of BINUS Joint International Conference (BJIC) 2020.

This year BJIC consists of 5 international conferences covering many disciplines ranging from sustainability and development, information management, engineering, technology, computer science, business, international relations, social science, and humanities, namely:

1. International Conference on Biospheric Harmony (ICOBAR), chaired by Dr.Eng. Nico Surantha, S.T., M.T., was held virtually, 23 -24 June 2020
2. International Conference on Information Management and Technology (ICIMTech), chaired by Dr. Tanty Oktavia., S.Kom., MM., is held today, 13 – 14 August 2020.
3. International Conference on Business, International Relations and Diplomacy (ICOBIRD), chaired by Dr. Lili Yulyadi, B.IRK., B.HSc., M.HSc. will be held virtually, 24-25 September 2020
4. International Conference on Eco Engineering Development (ICEED), chaired by Religiana Hendarti, ST, MT, Ph.D, IAI, will be held virtually, 10 – 11 November 2020.
5. International Conference on Computer Science and Computational Intelligence (CCSCI), chaired by Dr. Aditya Kurniawan, S.Kom., MMSI., will be held virtually, 19 – 20 November 2020



The 5th ICIMTech, specifically, aims to bring together researchers and experts in information systems to share their ideas, experiences, and insights. ICIMTech is organized by School of Information Systems, Bina Nusantara University and supported by IEEE Indonesia Section. ICIMTech 2020 would focus on the issues and challenges of Fostering Innovation in the ICT Ecosystems; delivered through the keynote speakers and distinguished lecturers.

Distinguished guests, ladies, and gentlemen,

This conference is also very special, because our keynote speakers are prominent scholars and professionals from New Zealand, Japan, and Indonesia who contribute to the discussion of new insights about information systems from their perspective as academician, professionals and expert from different fields. This conference shows the bold commitment of BINUS University as world class university that ranked 801-1000 in QS WUR 2020 to continuously produce, share knowledge, and foster and empower the society. Therefore, I do appreciate for their contribution to these conferences.

Last but not least, I would like to appreciate all chairpersons of the 5 conferences and committee members who have been working very hard to make this conference possible. I would also like to thank presenters, participants, our reviewers, and publishers of the paper presented in the conferences as well as sponsor of this event. I hope you enjoy the conference!

Thank you abundantly.

Jakarta, 13 August 2020

Prof. Dr. Tirta N. Mursitama, PhD
General Chair BJIC 2020

Welcome Message



Welcome to the 5th International Conference on Information Management and Technology (ICIMTech 2020) held from 13-14 August virtually. This is the fifth conference hosted by School of Information Systems, BINUS University (Bina Nusantara University). And for this year more than 200 delegates worldwide participate in the conference as participants and presenters. We are very excited to have all of you to join in this great event.

Since five years ago through this conference, we believe many young researchers have been helped to develop their research work and skills through constructive interaction with experienced academics. We find this encouraging and we will continue to develop initiatives that provide information, communication and technology of young researchers with opportunities to develop their research potential and ideas.

Learning from mature research and stimulating discussion with academics, practitioners, and more experienced researchers in the conference has turned ICIMTech to be a melting pot of multi-generation researchers. This is important for developing countries and many high-quality papers related to this issues will be presented in the conference. In addition to paper presentation, we also invite experts from academia to share their knowledge and research experience in keynote speeches session. We believe you will find the conference very fruitful in enhancing your knowledge.

We congratulate the authors of papers that made it into the proceedings and to IEEE Xplore, for the job well done. We wish to express strong appreciation to our most important sponsors: BINUS University and IEEE Indonesia Section. We are also blessed to have three distinguished Guest Speakers: Professor Michael D. Myers, Professor Seiichi Kawata, and Professor Dr. Wisnu Jatmiko. As always, many thanks are due to all members of ICIMTech committee for their dedication for making this conference a success. Above all, thank you to all of you for participating to this conference. Our conference next year ICIMTech 2021 in Indonesia and we look forward to seeing all of you again and hope you enjoy the virtual conference this year.

Sincerely Yours,

Yohannes Kurniawan
Dean of School of Information Systems
Bina Nusantara University



WELCOMING REMARKS

Rector BINUS University



Distinguished keynote speakers,
Fellow professors and presenters,
Ladies and gentlemen,

It is a great honor for me to welcome you to the 5th International Conference on Information Management and Technology (ICIMTech) virtually hosted by BINUS University. This year marks the success of BINUS university achieving vision of 2020 as World Class University. We have been ranked 801 – 1000 in QS World University Ranking 2021 and ranked 7th among public and private universities in Indonesia.

We realized that contribution of research and publication is indispensable in achieving this prestigious status. This conference is also part of continuing efforts in producing, deliberating, and disseminating knowledge as well as creating research partnerships between faculty members and distinguished scholars from many universities in the world.

This year is a historical moment for BINUS University as we have launched our new vision 2035 that underlined the clear message of fostering and empowering the society in building and serving the nation. In the area of research, we would produce high impact research for society. Therefore, an international conference that focuses on creating the future by improvement and advancement of information systems and aims to encourage fostering innovation in ICT ecosystem is essential to make university stay relevant to the needs of the modern societies.

Ladies and gentlemen,

I would like to express my highest appreciation to all invited keynote speakers and invited plenary session speakers and all presenters and participants who will make this conference meaningful. I strongly advice to make use of this conference wisely, not limited to discussing about research but also actively trying to build connections for a new joint research, publication, faculty exchanges and so on.

Finally, I also thank all the chairmen and committee members of the conference. I wish all of you great conference and make new acquaintances during the conferences virtually.

Thank you very much.
Jakarta, 13 August 2020

Prof. Dr. Ir. Harjanto Prabowo, MM
Rector, BINUS University



WELCOMING REMARKS IEEE INDONESIA SECTION



Prof. Dr. Eng Wisnu Jatmiko, SMIEEE
Chair, IEEE Indonesia Section



Dr. Kurnianingsih, SMIEEE
Vice-Chair, IEEE Indonesia Section

Dear Distinguished Guests, Colleagues, researchers, professionals, ladies, and gentlemen.

Good morning, a prosperous, warm, and spirited greeting.

On behalf of IEEE Indonesia Section, we would like to extend our warmest welcome to all keynote speakers, presenters, and participants to the 5th International Conference on Information Management and Technology (ICIMTech 2020). The conference theme is "**Fostering Innovation in The ICT Ecosystem**". Due to this year's pandemic situation, ICIMTech 2020 was held as a completely virtual conference. I also want to thank all of you who have joined this conference.

ICIMTech is an annual international conference organized by the School of Information Systems, Bina Nusantara University and technically co-sponsored by IEEE Indonesia Section. The conference aims to bring together researchers and experts in information systems to share their ideas, experiences, and insights.

IEEE Indonesia Section has conducted many activities over 32 years in Indonesia. In terms of collaboration, IEEE Indonesia section has a good and mutual relationship with ICT organizations, Industries, Government, Universities as well as the Community in Indonesia. IEEE Indonesia Section has contributed to about 50 different International conferences annually, and this conference is one of the conferences that were initiated by IEEE Indonesia Section. As the fifth year of ICIMTech, this conference shows it's sustainability due to the hard work of the conference organizers, well-organized conference and high-quality papers. We do hope in the near future some high-quality conferences will be continued and strengthened, so the result will give more benefit and positive impact on the human being, especially to Indonesian people.

Finally, we do hope all of you will have an enjoyable and valuable experience during this event. You may share your best knowledge in your area of research and professional activities.

Thank you.

Jakarta, 13 August 2020

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ISBN: 978-1-7281-7071-8 IEEE Catalog Number: CFP20H83-ART

Table of Contents

Title	Page Range
Analysis of Digital Wallet for Higher Education Student using Online Transportation Network Services	1 - 5
Performance Evaluation of an IoT Device using a Cognitive Radio in GLRT Approach	6-10
Implementation of Augmented Reality in Ablution Learning Based on Android	11-16
Fine-tuning Organizational Citizenship Behaviour and Knowledge Management Behaviour in the Higher Education	17-22
Analysis of Early Detection System of Banking Industry in Indonesia on Shock	23-28
Competitive Advantage Strategy Model in the Banking Industry Through the Implementation of the National Payment Gateway	29-33
E-WOM and Social Commerce Purchase Intentions: Applying the Theory of Planned Behavior	34-39
Online Grocery Shopping Adoption: A Systematic Literature Review	40-45
The Effect of Web Quality on Visit Intention for Muslim Visitor: Study Case at Grand Indonesia Shopping Mall Jakarta	46-49
Consumers' Continuance Intention Use of Mobile Banking in Jakarta: Extending UTAUT Models with Trust	50-54
Knowledge Management Solution Development in Governmental Organization	55-60
Block Chain Model for Regional Elections in Indonesia	61-66
Analysis of the Effect of Baca Meter Implementation and User Ability on Employee Performance of Sub Bagian Pembaca Meter in PDAM Kota Balikpapan	67-70
Automatic License Plate Recognition for Parking System using Convolutional Neural Networks	71-74
The Effects of Hedonic and Utilitarian Motivation Toward Online Purchase Intention with Attitude as Intervening Variable	75-80
Factors Influencing Behavioral Intention in Purchasing Groceries Through E-commerce XYZ's Virtual Store	81-86
Perceived Risk in Online Purchase Intention	87-92
The Influence of Image of 10 New Prioritized Destinations on FOMO among Tourism Students	93-96
The Impact of Social Network Marketing and Customer Engagement on Purchase Intentions in Wedding Service Business	97-102
Assessment of Information Technology Governance Capability Levels and Recommendations Based on COBIT 5 Framework in PT Pertamina Geothermal Energy	103-107
Digital Literacy Research: A Scientometric Mapping over the Past 22 Years	108-113
How does E-commerce Affects a Brick and Mortar Department Store? A Qualitative Case Study Analysis at one of National Department Store in Indonesia	114-119
The Effect of Information Technology, Strategic Leadership and Knowledge Management on The Competitive Advantage in The Chemical Industry	120-125
Segmentation of Mobile Applications Users: Classification of Customer E-Loyalty Behavior in Online Shopping Platform	126-129
Mobile Cloud Computing Readiness Assessment Framework in Upstream Oil and Gas Using RAMI 4.0	130-135
Business Process Management Standardization in Operating Support System: Case Study of Fulfillment and Assurance Process in an Indonesian Telecommunication Company	136-141
Development Money Diary Application Models on Android	142-147
Selection of Web-based Framework for System Development Using AHP (Analytic Hierarchy Process) Method in PT.XYZ	148-152

2020 International Conference on Information Management and Technology (ICIMTech)

ISBN: 978-1-7281-7071-8 IEEE Catalog Number: CFP20H83-ART

Table of Contents

Title	Page Range
Fridge Inventory Management to Reduce Household Food Wastage	153-158
Tailoring TOGAF Architectural Development Method to Cloud Adoption Strategy	159-164
Digital Marketing Communication for Freelancer Job	165-169
Software as a Service Adoption in Micro, Small and Medium Enterprise in Indonesia: Examining the Environmental Factors	170-175
Raising Customer Experience to Maintain Loyalty (Case Study: Tinkerlust.com)	176-180
Influence of Social Media on Tourist Decision Making	181-184
Ten-Year Compilation of #SaveKPK Twitter Dataset	185-190
UTAUT 2 Model for Entrepreneurship Students on Adopting Technology	191-196
Sleep Quality and Daily Activity Association Assessment from Wearable Device Data	197-202
An investigation Effective Factors into the Usage of Smartphone for use Mobile Banking Services Case: Student University Customers	203-207
Why e-Service Quality Matters for Business Management Program	208-212
Enabling a Massive Data Collection for Hotel Receptionist Chatbot Using a Crowdsourcing Information System	213-217
An Implementation of Convolutional Neural Network for Coffee Beans Quality Classification in a Mobile Information System	218-222
Data Mining for Predicting Customer Satisfaction using Clustering Techniques	223-227
Foods Diary Mobile Application for Diabetics	228-232
The Impact of Consumer perceptions to Technology-based facilities at Bobobox Capsule Hotel, Jakarta	233-237
Developing e-loyalty toward online retailer from e-WOM, reputation, information quality and e-trust	238-243
A Blockchain Technology-Based for University Teaching and Learning Processes	244-247
Integrating Factor Analysis and Multi Dimensional Scaling for Brand Positioning of E-commerce Platforms	248-253
The Analysis of Behavioral Usage Factor of Social Media on University Student Learning	254-259
Multi Criteria Decision Making in Supplier Selection Process - A Case Study in a Palm Oil Processor	260-265
Improving Conversion Rates for Fashion e-Commerce with A/B Testing	266-270
Implementation of Computer Vision in Detecting Human Poses	271-276
Analysis of Application of Zachman Framework for Knowledge Management Systems Success Optimization	277-282
List of Most Usability Evaluation in Mobile Application: A Systematic Literature Review	283-287
SMS Notification On-Off Room Lights with Body Detection using Microcontrollers	288-293
Factors Influence the Success of E-Learning Systems for Distance Learning at the University	294-299
Knowledge Management Systems in Construction Consulting Company	300-305
Database Management System Design with Time Series Modification for Child Growth and Malnutrition Monitoring in the Regency of Serdang Bedagai	306-311
Simulation of Availability and Loss of Nutrient Elements in Land with Android-Based Fertilizing Applications	312-317
Factors Affecting Cryptocurrency Prices: Evidence from Ethereum	318-323

2020 International Conference on Information Management and Technology (ICIMTech)

ISBN: 978-1-7281-7071-8 IEEE Catalog Number: CFP20H83-ART

Table of Contents

Title	Page Range
Mobile Applications for Health Management in Indonesia	324-329
An Analysis of the Impact of XBRL Filings Towards Information Asymmetry in Indonesia	330-335
Social Media Content Strategy for Higher Education, Indonesia	336-341
The Use of E-Wallet System	342-347
The Effect and Technique in Search Engine Optimization	348-353
Inventory Placement Mapping using Bluetooth Low Energy Beacon Technology for Warehouses	354-359
Can the Damage be Undone? Analyzing Misinformation during COVID-19 Outbreak in Indonesia	360-364
Virtual Reality as an Alternative Therapy for Acrophobics	365-369
Comparative Forest Preservation Campaign Government and NGO on Indonesia Instagram	370-375
Examining the Impact of Knowledge Management Capability on Organizational Performance: A Study Case at one of the International School in South Tangerang, Indonesia	376-381
Website Design for Non-cash Customer Transaction Data Visualization in XYZ Bank	382-386
Conceptual Model of E-Voting in Indonesia	387-392
Implementation of Marketing Intelligence Systems for Operational Activities using Business Intelligence in PT. XYZ	393-397
Design and implementation of GIS-based Business Intelligence in Pekalongan City	398-402
Knowledge Management using Gamification in Consulting Firms	403-408
Provoking Tweets by Indonesia Media Twitter in the Initial Month of Coronavirus Disease Hit	409-414
Role Of Information Technology for Successful Responses to Covid-19 Pandemic	415-420
Automated Mobile Trip Plan using Simulated Annealing in Microservices Architecture	421-426
Instagram as Information in Developing Purchase Intentions: The Role of Social E-WOM and Brand Attitude	427-431
Modelling the Use of FinTech in Indonesia	432-437
Vision Application of LabVIEW: IGUI for Face and Pattern Detection in Real Time	438-442
Survey on Quality Assurance Testing on Service Oriented Architecture	443-447
The Friendship Game of Pancasila: Design, Implementation, and Evaluation	448-452
Evaluation of IT Governance Implementation Using COBIT 5 Framework and ISO 38500 at Telecommunication Industries	453-457
A Study of Digital Market Status Using The Bibliometric Approach during Four Decades	458-463
Does the Existence of Connected Transport Mobile Application Affect Transjakarta Passengers?	464-469
Evaluation Model of Success Change Management in Banking Institution Based on ITIL V3 (Case Study)	470-475
Mobile Application Design for Embedded Weighbridge System for Palm Oil Industry	476-481
Do Electronic Personal Health Records (E-PHR) Influence People Behavior to Manage Their Health?	482-487
The Influence of UTAUT Model Factors on the Intension of Millenials Generation in Using Mobile Wallets in Jakarta	488-492

2020 International Conference on Information Management and Technology (ICIMTech)

ISBN: 978-1-7281-7071-8 IEEE Catalog Number: CFP20H83-ART

Table of Contents

Title	Page Range
Analysis of End-user Satisfaction Level of "MyTelkomsel" Services in Indonesia using End-user Computing Satisfaction Approach	493-497
The Effect of Family Ownership Concentration Internet Financial Reporting and Company Sizes on Information Asymmetry	498-503
The COVID-19 Pandemic's Impact on Indonesia's Electronic Retail Payment Transactions	504-509
How Pharmaceutical Consumers in Jakarta Adopt New Marketing Technology: Digital Pharmacy Mobile Application	510-515
XSS Attack Detection with Machine Learning and n-Gram Methods	516-520
Technopreneur Publication: A Bibliometric Analysis (2000-2019)	521-526
Knowledge Management in Indonesia: Research Positioning with Bibliometric Perspective	527-532
Empirical Studies on Knowledge Creation and Performance: a Literature Review	533-537
Analyze Cloud Accounting Software Implementation And Security System For Accounting in MSMEs and Cloud Accounting Software Developer	538-543
A Decision-making Method for the Distribution of Emergency Relief Medicine during the Earthquake Response with Demand Uncertainty	544-548
A Study of Radicalism Content Detection in Twitter: Insights from Support Vector Machine Technique	549-554
An Early Warning Detection System of Terrorism in Indonesia from Twitter Contents using Naïve Bayes Algorithm	555-559
Identification and Analysis of Factors Affecting E-survey Response Rate at Central Bureau of Statistics	560-565
Computational Adoption in Cultural Heritage: A Systematic Literature Review	566-570
Terrorism, Social Media, and Text Mining Technique: Review of Six Years Past Studies	571-576
Review of The Risk Analysis Using MEHARI Model: The Guideline To Analyze Risk For Startup Educational Platform	577-582
Instagram Literature: Insights from Scientometric Application	583-587
Digital Business: A Scientific Publication Positioning using Scientometric Analysis	588-593
Communication on Mobile Phone for the Deaf using Image Recognition	594-598
Sport Science Model to support the Professional Sports Organization Decision Making	599-604
Development of Gamification Mobile Application for Students	605-608
Analysis of Capability Level in Dealing with IT Business Transformation Competition using Cobit Framework 5 (Case Study at Airasia Indonesia)	609-614
The Effect of Digital Capability on Competitiveness Through Digital Innovation of E-Travel Business in Indonesia	615-620
The General Factors Mapping Between Digital Economy and Sharing Economy	621-625
Netnography Analysis of Consumer Sentiment Towards Panic Buying In The Early Period of the COVID-19 Virus Spread	626-631
Selection of Open Source Database Management for System Development Using Analytic Hierarchy Process Method in PT. XYZ	632-636
The Use of WhatsApp for Effective Delivery of Zero Waste Literacy	637-642
Unified Theory of Acceptance and Use of Technology (UTAUT) Model Perspective to Enhance User Acceptance of Fintech Application	643-648
Readiness Model of e-Learning Implementation from Teacher and Student Side at School in The Pramuka Island of Seribu Islands - DKI Jakarta	649-653

2020 International Conference on Information Management and Technology (ICIMTech)

ISBN: 978-1-7281-7071-8 IEEE Catalog Number: CFP20H83-ART

Table of Contents

Title	Page Range
Implementing of Customer-driven Approach to Develop a Web-based e-CRM in Rural Tourism	654-659
Application Engineer Selection using Simple Additive Weighting Method Approach	660-663
Improving SMEs Knowledge and Performance with Cloud Computing CSF Approach: Systematic Literature Review	664-668
Investigation of Shopper Segmentation based on the Influence of Popularity Claim towards Impulsive Buying Decision in Online Media Context	669-674
Retailers' Intention in Using Mobile Payment in Indonesia	675-680
Mobile Commerce Service Quality Comparison Between Physical and Digital Product	681-686
Development of E-Commerce Approach to Service Oriented Architecture Using SOMA Methodology	687-692
Marketing of Identity Politics in Digital World (Netnography Study on Indonesian Presidential Election 2019)	693-698
Modeling Prim's Algorithm for Tour Agencies' Minimum Travelling Paths to Increase Profitability	699-703
Indonesian Millennial Segmentation to Increase Behavioral Intention to Use Language Learning Apps	704-708
The Impact of Trust to Online Purchase Intention of Business Investors	709-714
The Effect of Tax Rate, E-Billing Payment System, and E-Filing System on Micro, Small and Medium Enterprises (MSMEs) Taxpayer Compliance in Jakarta	715-719
Mobile Augmented Reality to Enhance Customer Experience while Purchasing Furniture	720-725
Migrating Application from Monolith to Microservices	726-731
New Media Business: Converging ICT and Terrestrial Free to Air Television Business	732-737
Factors That Affecting Purchase Decision On Automotive Workshop Official Store In E-commerce	738-743
The Influence of Knowledge Management Process on Job Satisfaction: A Case Study of detikNetwork Product Management Division	744-749
Social Network as a Mediator of Co-creation's Effect to the Creative Ventures Performance	750-755
Twitter's Projection on Identities and Realities of University Graduates	756-760
An Evaluation of the Employee Self-Service Feature of SAP System with Technology Acceptance Model (TAM): A Case Study	761-766
Technology Acceptance Model (TAM) for the Implementation of Knowledge Acquired Model for SME	767-770
Computer-Assisted Audit Techniques (CAATs) for Financial Fraud Detection: A Qualitative Approach	771-776
Risk of Invalidation of Data in Hospital Information Systems in Indonesia	777-782
Community Participation in Development of Spatial and Tabular Villages Database in Indonesia (Case Study: Poncol Pekalongan, Central Java)	783-787
The Design of Information System and Technoogy Strategy for Improving Performance of Healthcare Service with EA3 Framework (Case Study: Summit)	788-793
The Impact of marketing Influencer and Information Quality to Purchase Intention of Instagram users	794-799
The Impact of Motivation to Watch YouTube, Subjective Norms, Behavior Control, Information Success Model to watching YouTube Engagement	800-805
"Smart Heathcare" a Medical Record System for Effective Health Services	806-811
Gamification Effect between Generation X and Millennials: Study on E-commerce Site	812-817

2020 International Conference on Information Management and Technology (ICIMTech)

ISBN: 978-1-7281-7071-8 IEEE Catalog Number: CFP20H83-ART

Table of Contents

Title	Page Range
Exploration WordPress as E-Commerce RAD-CMS for SMEs in Indonesia	818-823
Social Computing to Support Knowledge Management (Case Study: One of Private University in Jakarta, Indonesia)	824-828
The Analysis of Value Shop as a Basic Design of Mobile Applications in Cirebon and Surrounding Areas	829-834
Factors Influencing the Uses of Social Media within the Government: A Systematic Literature Review	835-840
Data Mining Techniques of Complaint Reports for E-Government: A Systematic Literature Review	841-846
The Impacts of E-Payment System and Impulsive Buying to Purchase Intention in E-commerce	847-852
Threshold-Based Low Power Consumption Human Fall Detection for Health Care and Monitoring System	853-857
Feasibility Study and Prototype Design of Freelancer Online Marketplace	858-863
Development Model of Warteg Online Applications based on Web and Mobile	864-869
The Impact of Visual Merchandising and Transaction Attitude to E-commerce Purchase Intention	870-875
IT Governance Training for Small Medium Enterprises	876-880
YouTubers Creativity in Creating Public Awareness of COVID-19 in Indonesia: A YouTube Content Analysis	881-886
Instagram Engagement for University	887-892
Data Science Publication: Thirty-Six Years Lesson of Scientometric Review	893-898
Information Systems, Social Media Influencers and Subjective Norms Impact to Purchase Intentions in E-commerce	899-904
Financial Literacy and Mobile Payment Usage as Financial Inclusion Determinants	905-910
A Study of Digital Entrepreneurship through Bibliometric Visualizing from 1993 to 2019	911-915
The Influence Of Social Media Marketing, Website Quality, E-Wom, And Perceived Value On The Purchase Intention (Case Study: PT. Vita Nova Atletik's Local Brand Sports Shoes)	916-921
The Influence of Online Shopping Applications, Strategic Promotions, and Hedonist Habits on e-Shopaholic Behavior	922-927
Automatic Circuit Breaker Design Based On Fire Identification (Smoke And Fire)	928-933
Assessing Qualification of Crypto Currency as A Financial Assets: A Case Study on Bitcoin	934-939
SHARC as Home Electricity Controlling Applications Based on Android and Arduino: A Case Study	940-945
The Potential of an App-Based Motorbike Taxi Drivers to be a Role Model in Promoting Safe Driving	946-950
Mobile Application Development: A Preliminary Study	951-956
The Model of Web-based Crowdfunding Platform	957-961
Exploring Fintech for Sustainable Finance and Sustainable Development in Indonesia	962-965
Performance Evaluation of Queue Algorithms for Video-on-Demand Application	966-971
Unlocking Student's Preference on Two Binus Mobile Learning Management System	972-976
Big Data Security and Privacy: Current Challenges and Future Research Perspective in Cloud Environment	977-982
Pervasive Health Monitoring System for Activity Detection	983-987

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Table of Contents

Title	Page Range
Web Design for Distance Learning Indonesian Language BIPA	988-991

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Digital Business: A Scientific Publication Positioning using Scientometric Analysis

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Abstract—The digital economy creates a digital business based on technopreneurship for the needs of digital citizens. It has been research yet the notion about digital business review which showed the big picture using data from all countries. This study aims to map the position of international business digital scientific publications indexed by Scopus using scientometric analysis. The study has carried out scientometric methods and analyzed research data using the analysis search results service from Scopus and the VOSviewer application. The research data of 933 scientific documents published from 1978 to 2019 were obtained from the Scopus database. The results showed an increasing trend in the number of digital business publications at the international level each year. Most countries, affiliation, author, subject areas, and type documents in digital business publications were Germany, Curtin University, Chang, E., computer science; and conference paper. There was one pattern of collaborative researchers in digital business publications. This research proposes a convergence axis classification consisting of digital business publication to characterize the body of knowledge generated from four decades of publication: Information technology, Management, Business ecosystem, Industry, Benchmarking, E-commerce, Digitalization, Strategy, abbreviated as IMBIBEDS themes.

Keywords—business, digital business, digital economy, scientometric, technopreneurship

I. INTRODUCTION

The digital economy in the digital age creates digital business for the needs of digital citizens. The digital age creates new opportunities and provides the ability to effectively utilize information and communication technology essential for the survival and prosperity of a company [1]. Digital technology has provided ways to deal with uncertainty in the processes and outcomes in business and entrepreneurship [2]. The progress of digitalization and development of information and communication technologies has created many new business opportunities for entrepreneurial activities in developing countries [3], [4], as well as improving business models in information systems management [5]. Digital business is a business creation by utilizing the acceleration of information and

communication technology [7]–[10]. The transition of traditional business towards digital business has broadly begun to affect various industries, especially in the automotive, banking, health, telecommunications, and manufacturing sectors for digital citizens [6].

Digital business models play a role in integrating environmental benefits and safety. Digital business in new ways is considered capable of having a significant impact throughout the world in the last few decades [11]. Business in digital form is often considered to play a role as an environmental savior. Because digital business can reduce the use of paper to send bills, pay bills, and orders [12]. The business has been considered as one of the causes of environmental damage [13]. Thus, digital business has a beneficial role for both parties, both for business owners and the environment. Digitalization in business and management is often considered an integral concept of modern management and is the center of attention and a top priority topic for information technology-management and business process management [15]–[17]. Previous publications such as Remane, Hanelt, Nickerson, and Kolbe provide training instructions for systematically analyzing and finding digital business models for companies and business people. Understanding of business actors to find new business model combinations important to their enterprises and the demands of the current digital era [14]. Digital business needs to be developed with the spirit and principles of technology-based entrepreneurship or technopreneurship.

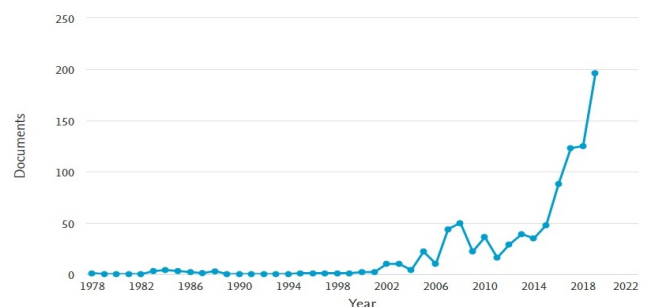


Fig. 1. Number of Documents Per Year from Digital Business Publications

The implications of business strategies in the form of using computing technology to social impacts have not yet been fully explained in terms of shared uses and creations [8]. The problem is that there has not been any research map on global business digital publications from year to year. Also, there is no scientific publication that specifically addresses the relationship between authors, affiliations, and the impact of digital business publications. This study aims to map the position of international business digital scientific publications indexed by Scopus using scientometric analysis. Researchers have observed a growing number of scientific publications related to digital business topics that have been published internationally and indexed by Scopus from 1978 to 2019 shown in Figure 1.

II. RESEARCH METHODS

This research has mapped the position of digital business scientific publications globally and has been indexed by Scopus. Research data was obtained from the Scopus database using document search services in March 2020. [18]. This study has carried out scientometric methods and analyzed research data using the analyze search results service from Scopus and the VOSviewer application [19], [20]. VOSViewer tools were used to build and visualize scientometric networks, namely the number of studies, researchers, academic affiliations, countries, fields, keywords, and author collaboration [21]. This survey has been carried out by identifying keywords related to digital business to find and identify related articles from publications with the Scopus database for 933 academic documents published from 1978 to 2019 at the global level. The study limited data collection to 2019 without looking at 2020 (exclude 2020) so that the annual data obtained illustrates the condition of the study in one whole year from January to December. The query command that is applied when mining data on Scopus was TITLE-ABS-KEY ("digital business") AND PUBYEAR <2020.

The study analyzed co-authorship with units of analysis of authors and full counting methods using VOSViewer to get the author's collaboration network. The study carried out an analysis of co-occurrence with analysis of keywords and a full calculation method using VOSViewer to obtain a network of keywords.

III. RESULT AND DISCUSSION

Digital business publications tend to increase every year. The highest publication peak in 2019, 214 documents. Digital business publications at the international level have been started since 1978.

A. Most Frequent Country Affiliation of Digital Business Publications

The top research country in digital business publications was Germany with 138 documents. Then followed by the United States with 109 documents, the United Kingdom with 92 documents, Australia with 51 documents, Italy with

50 documents, Spain with 40 documents, France with 35 documents, Switzerland with 31 documents, China with 30 documents, Finland with 30 documents, Russian Federation with 29 documents, India with 27 documents, and Portugal with 27 documents as shown in Fig 2. Country Number of Digital Business in Year.

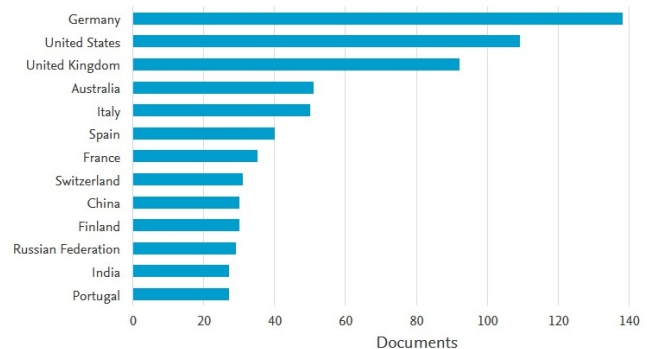


Fig. 2. Country Number of Digital Business in Year

B. Most Common Institutional Affiliations of Digital Business Publications

The top research institutions in digital business publications were the Curtin University with 13 documents, Universität St. Gallen with 12 documents, Fujitsu Ltd. with 10 documents, Universität Göttingen with 10 documents, London School of Economics and Political Science with 9 documents, the University of the Aegean with 9 documents, University Politehnica of Bucharest with 8 documents, and Aalto University with 8 documents as shown in Fig 3. Affiliation Number of Digital Business in Year.

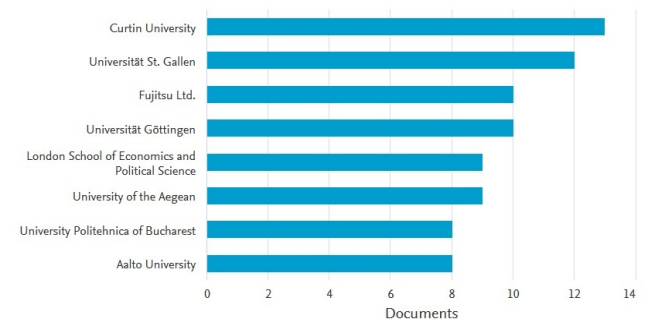


Fig. 3. Affiliation Number of Digital Business in Year

C. Most Individual Authors in Digital Business Publications

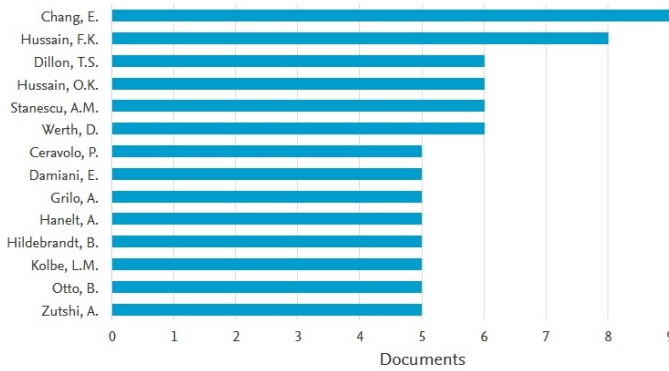


Fig. 4. Most Individual Authors of Digital Business Publications

The author with the most publications in the digital business was Chang, E. with 9 documents. Followed by Hussain, F.K. with 8 documents, Dillon, T.S. with 6 documents, Hussain, O.K. with 6 documents, Stanescu, A.M. with 6 documents, Werth, D. with 6 documents, Ceravolo, P. with 5 documents, Damiani, E. with 5 documents, Grilo, A. with 5 documents, and Hanelt, A. with 5 documents.

D. Most Frequency of Digital Business Publications by Subject Area

The most subject area in digital business publications was Computer Science with 560 documents (30.9%). Followed by Business, Management, and Accounting, with 339 documents (18.7%), Engineering with 266 documents (14.7%), Decision Sciences with 161 documents (8.9%), Mathematics with 146 documents (8.0%), Social Sciences with 110 documents (6.1%), Economics, Econometrics and Finance with 102 documents (5.6%), Environmental Science with 25 documents (1.4%), Materials Science with 22 documents (1.2%), and Chemical Engineering with 17 documents (0.9%).

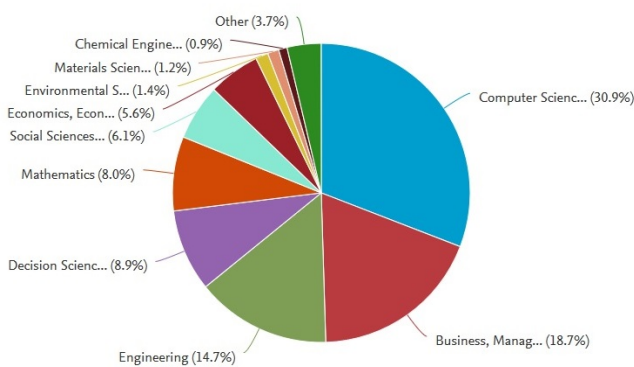


Fig. 5. Most Frequency of Digital Business Publications by Subject Area

E. Most Frequent Type Document of Digital Business Publication

The most frequent type document in digital business publication was Conference Paper (47.9%) with 447 documents, then Article (32.4%) with 302 documents, Book Chapter (6.4%) with 60 documents, Conference Review

(6.1%) with 57 documents, Book (2.7%) with 25 documents, Review (2.1%) with 20 documents, Editorial (1.1%) with 10 documents, Note (0.6%) with 6 documents, Short Survey (0.4%) with 4 documents, and Erratum (0.1%) with 1 documents.

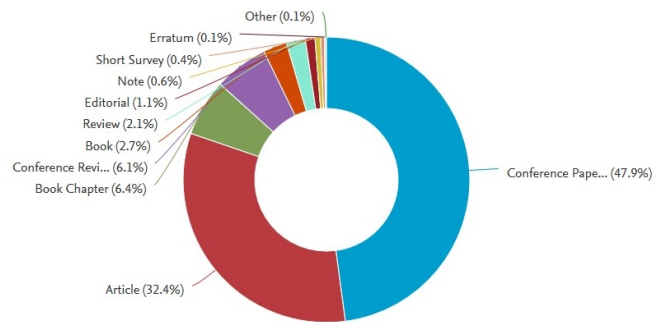


Fig. 6. Most Frequent Type Document of Digital Business Publication

F. Documents by Funding Sponsor of Digital Business Publications

Fig. 7 shows the top sponsoring Funding agencies that were most helpful in publishing digital business are the European Commission with 13 documents, the National Natural Science Foundation of China with 6 documents, the Academy of Finland with 3 documents, Bundesministerium für Bildung und Forschung with 3 documents, Universitas Indonesia with 3 documents, and Vedecká Grantová Agentúra MŠVVaŠ SR a SAV with 3 documents.

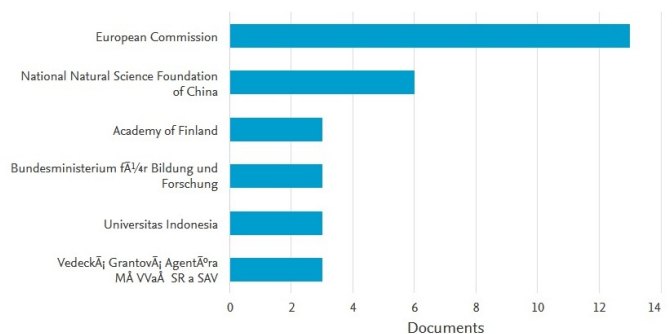


Fig. 7. Most Frequency of Digital Business Publications by Funding Sponsor

G. Year Documents Based on Sources of Digital Business Publications

The number of documents each year based on sources in international publications in the Digital Business is Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics with 54 documents. Followed by the Lecture Notes In Business Information Processing with 27 documents, IFIP Advances In Information And Communication Technology with 14 documents, and Communications In Computer And Information Science 13 documents.

digital business ecosystems, digital ecosystem, and ecosystem. Most of these keywords relate to digital business ecosystems themes.

4. Industry cluster (purple). In this cluster, we can find industry themes. This cluster was related to the keywords industry, finances, and surveys.
5. Benchmarking cluster (brown). In this cluster, we can find benchmark themes. This cluster was related by the keywords benchmarking
6. E-commerce cluster (yellow). This cluster dominated by the keywords e-commerce, electronic commerce, internet, marketing, and consumer behavior. Most of these keywords relate to e-commerce themes.

The topmost cited digital business publications were shown in Table 1. The most cited international publications in the “MIS Quarterly: Management Information Systems” was Bharadwaj, A., El Sawy, O.A., Pavlou, P.A., Venkatraman, N. in 2013 entitled “Digital Business Strategy: Toward A Next Generation of Insights” cited 632 documents.

J. Authorship Network

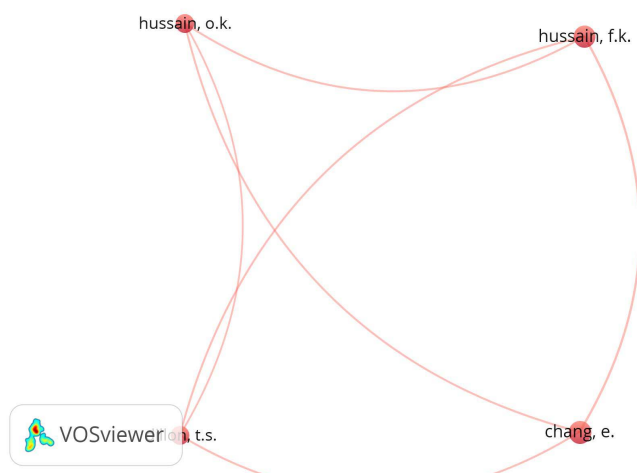


Fig. 10. Authorship Network

The criteria for the minimum number of documents per author were five documents. Thus, from 1,983 authors, 15 authors were found who met the thresholds. There was one group collaboration network between researchers in the digital business publications as seen in Fig. 10. The red cluster which contains Hussain, F.K., Dillon, T.S., Hussain, O.K., and Chang, E. They both from the Curtin University of Technology, Perth, Australia.

IV. CONCLUSION

The results of this study indicate that there were maps and visual trends in increasing the number of publications on digital business studies at the international level. The country that has the largest contribution in making publications in digital business studies was Germany with 138 documents. The most productive research institution in

7. Digitalization cluster (blue). In this cluster, we can find digitalization themes. This cluster was related by the keywords digitalization, digital business transforming, digital transformations, digital innovation, business strategy, and digital business.
8. Strategy cluster (orange). This cluster dominated by the keywords digital business strategy, digital strategy, strategic planning, it strategy, and competitiveness. Most of these keywords relate to strategy themes.

I. Document Cited of Digital Business Publications

the publication of the digital business studies was Curtin University with 13 documents. The individual author with the most publications in the digital business study was Chang, E. with 9 documents. The most widely studied areas published in the digital business studies were Computer Science with 560 documents (30.9%). The most document types published are Conference Paper with 447 documents (47.9%). Most documents per year by the source in international publications in the digital business studies were the “Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics” with 54 documents. The most sponsoring institution that helped in the study of the publication of digital business is the European Commission with 13 documents. The highest publication of international academic documents in digital business studies was in 2019 with 214 documents. Most publications with the most citations were the works of Bharadwaj, A et al in 2013 entitled “Digital Business Strategy: Toward A Next Generation of Insights” with 632 citations. There were one collaboration group on research related to the digital business publication.

In terms of contributing implications to knowledge, this research proposes a convergence axis classification consisting of digital business publication to characterize the body of knowledge generated from four decades of publication: Information technology, Management, Business ecosystem, Industry, Benchmarking, E-commerce, Digitalization, Strategy, abbreviated as IMBIBEDS themes. As implications for practical, identifying key themes in the digital business sector leads to understanding the development of studies to understand common topics and contexts, as well as the research gaps. With all of this, new studies can be led to address a lack of study and advance knowledge in the areas. The themes most researched also demonstrate the digital business contribution to business and digital economy.

Future research is to analyze contributions and explain the impact of digital business publication based on a combination of data obtained from Scopus dan Web of Science.

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