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Critique of The Philosophy of Science on The Effectiveness of Digital Transactions

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Abstract

Digital transactions utilize a digitized system, providing easy access for economic actors and making them an effective transactional method. This study aims to analyze the effectiveness of digital transactions through the lens of the philosophy of science. Digital transactions, as an innovation of conventional transactions, have provided accessibility and efficiency in economic activities. However, alongside their benefits, digital transactions also face challenges such as cybercrime, low digital literacy, and weak legal protection. The research employs a qualitative method with a literature review approach, collecting and analyzing data from various literature sources. The findings indicate that digital transactions are not yet fully effective due to weaknesses in security systems, public literacy, and legal regulations. The philosophical analysis reveals that digital transactions need to be integrated with moral and ethical principles to achieve optimal effectiveness. This study provides recommendations for service providers, users, and the government to enhance security, education, and regulations in digital transactions.

Keywords*: Digital Transactions; Philosophy of Science; Cybercrime; Effectiveness*

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Introduction

A transaction is defined as an exchange of value that facilitates a need.[1] The historical evolution from barter to conventional transactions[2] based on a 'physical presence' ontology, allowing for physical inspection and minimal information asymmetry.[3] However, limited spatial access limits its effectiveness. Digitalization, on the other hand, offers an ontology of "representation",[4] which are inherently efficient in overcoming the constraints of space and time, resulting in a digital economy.[5] However, this ontological shift creates a new challenge, a trade-off between efficiency and digital risk, a comparison rarely explored in depth in literature that tends to focus on economic growth.

The growth of the digital economy during the COVID-19 pandemic was massive, driven by convenience Departemen and the adoption of innovations such as QRIS.[6] Bank Indonesia (BI) data shows a consistent upward trend, with a projected digital transaction value of IDR 85,044 trillion in 2025.[7] However, this increase in adoption brings consequences that can be analyzed using Risk Theory.[8] Risk Theory explains that ease of access and anonymity in digital transactions

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[1] Adiyanto Adiyanto and Rizki Febrianto, "Authentication of Transaction Process in E-Marketplace Based on Blockchain Technology," *Aptisi Transactions on Technopreneurship (ATT),* 2, No. 1 (2020): 68–74, https://doi.org/10.34306/att.v2i1.71.

[2] Serge Svizzero and Clement Allan Tisdell, "Barter and the Origin of Money and Some Insights from the Ancient Palatial Economies of Mesopotamia and Egypt," *Economic Theory, Applications and Issues*, No. July (2019): 1–35.

[3] AG Bizualem and MK Saron, "The Role of Ethiopian Commodity Exchange (ECX) in Crop Value Chain Development in Ethiopia.," *International Journal of Business and Economics Research,* 7, No. 6 (2018): 183–90, https://doi.org/10.11648/j.jiber.20180706.12.

[4] Dita Fitriani and Hwihanus Hwihanus, "Peranan Sistem Informasi Manajemen Terhadap Perkembangan E-Commerce dalam Pengambilan Keputusan Bagi Usaha Umkm," *Jurnal Kajian dan Penalaran Ilmu Manajemen,* 1, No. 1 (2023): 64–77, https://doi.org/10.59031/jkpim.v1i1.50.

[5] Chunshan Zhou, Dahao Zhang, and Yu Chen, "Theoretical Framework and Research Prospect of the Impact of China's Digital Economic Development on Population," *Frontiers in Earth Science* 10, No. September (2022): 1–11, https://doi.org/10.3389/feart.2022.988608.

[6] Marshall Saulthan, "Digital Banking Semakin Menggurita," *Kontan*, March 2021.

[7] Arlina Laras, "Transaksi Digital Ngebut, Perbankan Tanah Air Siapkan 'Senjata' Baru," Finansial Bisnis.com, 2023.

[8] Yok Fong Paat and Christine Markham, "Digital Crime, Trauma, and Abuse: Internet Safety and Cyber Risks for Adolescents and Emerging Adults in the 21st Century," *Social Work in Mental Health,* 19, No. 1 (2021): 18–40, https://doi.org/10.1080/15332985.2020.1845281.

proportionately increase exposure to threats.[9] BSSN data recorded 361 million digital attack incidents in Indonesia in 2023[10] It shows the phenomenon of digital moral hazards that undermine the overall effectiveness of the system, despite the great benefits.

A deeper analysis is needed using Trust Theory. An increase in digital crimes, such as online scams targeting vulnerable groups,[11] fundamentally undermines public trust. Case Study: Take the example of the case of 'Mama Minta Pulsa' which evolved into a Social Engineering scheme through digital wedding APK messages/invitations in Indonesia, which involved significant and widespread financial losses. [Image of a simple flow chart illustrating a common social engineering scam (e.g., APK/digital invitation fraud) in Indonesia] This scheme proves that digital literacy alone is not enough; Trust is exploited through psychological manipulation. Therefore, general recommendations such as improving literacy fail to address the root cause of distorted trust and extreme information asymmetry between the perpetrator and the victim, which is a major concern in Trust Theory.[12]

The philosophy of science provides a foundation for profound criticism of technological advances,[13,14] especially about the relationship between innovation and moral principles.[15] The central contribution of this study is to offer the Digital Effectiveness Ontological and Axiological Critique Framework (KKOAED), an innovative model that goes beyond regulatory recommendations and general

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[9] D. Mulligan and M. Levi, "Prevalence of Cyber Crime and Its Effect on Economy," *International Digital Organization for Scientific Research,* 5, No. 1 (2020): 64–69.

[10] Tira Santia, "OJK: Dunia Rugi USD 8 Triliun Akibat Kejahatan Siber," Liputan6, 2023.

[11] Vimala Balakrishnan, Umayma Ahhmed, and Faris Basheer, "Personal, Environmental and Behavioral Predictors Associated with Online Fraud Victimization Among Adults," *PLoS ONE* 20, No. 1 (2025): 1–17, https://doi.org/10.1371/journal.pone.0317232.

[12] indonesia.go.id, "Upaya Bersama Berantas Kejahatan Digital," Kementerian Komunikasi dan Digital Republik Indonesia, 2023.

[13] Milasari Milasari et al., "Filsafat Ilmu dan Pengembangan Metode Ilmiah," *Jurnal Filsafat Indonesia,* 4, No. 3 (2021): 217–28, https://doi.org/10.23887/jfi.v4i3.35499.

[14] I Kadek Sugianta, "Pengaruh Teknologi Zaman Modern Atas Pembentukan Konkret Kehidupan Manusia dalam Prespektif Filsafat Ilmu," *Genta Hredaya: Media Informasi Filsafat Hindu,* 5, No. 2 (2021): 101–11.

[15] Jujun S. Suriasumantri, *Fisafat Ilmu: Sebuah Pengantar Populer* (Jakarta: Pustaka Sinar Harapan, 1995).

literacy. This research not only criticizes what is wrong (the problem of crime) but also criticizes how effectiveness is defined (ontological and axiological problems), using the lens of the philosophy of science to develop a model of solutions based on system resilience rather than just individual resistance. The main objective is to examine in depth how the philosophy of science can offer a KKOAED model for critiquing the effectiveness of digital transactions and proposing sustainable, innovative solutions.

Method

This study employs a qualitative method that produces descriptive data in the form of written words based on events, perceptions, and thoughts of individuals or groups. The research design follows a literature review approach, which examines theories, findings, and other research materials obtained from various sources as the foundation for conducting the research activities.

Digital Transaction

A digital transaction refers to the process of exchange between individuals or groups that utilizes computer networks or internet connections as the medium linking the transacting parties. This digital approach serves as a solution to the geographical limitations inherent in offline transactions by employing internet access that enables global reach and operates without time constraints. All transaction-related information remains accessible anytime and anywhere when the transacting parties wish to conduct their exchange.[16]

From an Islamic perspective, digital transactions are virtual exchanges conducted through applications or websites on digital devices, governed by what is known as 'akad' or contractual agreements in Islamic commercial law. The execution of digital transactions under Islamic principles must adhere to the essential pillars and requirements stipulated by Islamic jurisprudence to ensure the transaction's validity and effectiveness according to Islamic teachings.[17] The integration of digital platforms with Islamic financial principles represents a

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[16] Simeon Kolyandov, "The Rising Popularity of Digital Transaction Platforms," *Trakia Journal of Sciences* 19, No. Suppl.1 (2021): 122–29, https://doi.org/10.15547/tjs.2021.s.01.018.

[17] Siti Saroh et al., "Analisis Transaksi Digital Non Fungible Token (NFT), Sebagai Instrumen Investasi Menurut Perspektif Ekonomi Islam," *Jurnal Ilmiah Ekonomi Islam,* 9, No. 1 (2023): 378–86, https://doi.org/10.29040/jiei.v9i1.7948.

contemporary adaptation of traditional commerce to modern technological capabilities while maintaining religious compliance.

Philosophy of Science

The term "philosophy" (from Greek philosophia: philein, love, sophia, wisdom) is fundamentally defined as the love of wisdom.[18] Moving beyond its etymology, Philosophy of Science (FS), also known as metascience or theory of science, is a method of deep investigation to discover fundamental truths in the development of scientific knowledge.[19] The main focus of FS is not simply to gather truth, but to test the assumptions, methods, and implications of scientific truth itself.

Formally, FS analyzes science through three main foundations Surajiyo, which must be treated interdependent and critically: (a) Ontology, which tests the reality of scientific objects (e.g., is a 'digital transaction' a physical entity or just a representation of data?); (b) Epistemology, which tests the validity and methods of achieving scientific truth (e.g., what is the most valid method for measuring the 'effectiveness' of digital transactions?); and (c) Axiology, which tests the value, ethics, and purpose of the use of scientific knowledge (e.g., should the effectiveness of technology always be sacrificed for the sake of social justice?).

Criticism arises when these three foundations are not aligned. For example, while Logical Positivism (as a school of epistemology) tends to measure effectiveness quantitatively and empirically, it is vulnerable to axiological criticism for failing to question the ethical value of the data collected. In contrast, the School of Social Constructivism (by contrast) offers a more comprehensive point of view Hasan Stating that effectiveness is a context-dependent social construct, it is vulnerable to epistemological criticism because it is difficult to be universally verified.

Therefore, the role of FS in this research is to provide a fundamental and speculative critique tool, as suggested by Hasan, to go beyond normative descriptions (e.g., growth data) and explore how the scientific truth of technology

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[18] Suaedi, *Filsafat, Ilmu dan Filsafat Ilmu* (Jakarta: Rineka Cipta, 2016).

[19] Endang Komara, *Filsafat Ilmu dan Metodologi Penelitian, Cetakan Kesatu* (Bogor: Ghalia Indonesia, 2011).

can be morally implemented. This research uses a qualitative approach based on library research, where literature, reports, and previous research results Hasan, are critically analyzed to develop a philosophical framework.

Trust Theory

Trust is the critical foundation of any economic exchange, defined as a party's willingness to be vulnerable to the actions of the other party based on expectations of goodwill and competence, despite uncertainties.[20] In the context of conventional transactions, trust is primarily interpersonal, supported by physical presence and direct inspection. However, in the digital ecosystem, trust transforms into systemic trust, which involves belief in the integrity of infrastructure, technological security, and the regulation of platforms that mediate the exchange of value. It is this systemic belief that allows the claims of digital transaction effectiveness, that the process is fast, easy, and secure.

Trust Theory provides a critical lens for analyzing the failure of these effectiveness claims. Digital crimes, such as social engineering-based fraud (for example, the APK messaging scheme that is rampant in Indonesia), fundamentally exploit misplaced trust and information asymmetry between perpetrators and victims. Criminals not only target the vulnerability of individuals (low literacy), but also undermine trust in the system itself, for example, by falsifying notifications from trusted institutions.[21] This erosion of trust has serious axiological implications: effectiveness measured from the speed or volume of transactions (the Positivist metric) becomes fragile if it is not supported by sustained public trust.

Therefore, this article argues that the true effectiveness of digital transactions should be measured by their ability to maintain and build Resilient Systemic Trust. Conventional solutions that focus on improving individual literacy alone (such as the Kominfo program) are not enough, because they ignore the axiological challenges at the system level. Trust Theory thus becomes an axiological foundation that demands the development of an innovative framework to address this systematic failure, which will be outlined through the Ontological and

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[20] Roger C. Mayer, James H. Davis, and F. David Schoorman, "An Integrative Model of Organizational Trust," *Academy of Management Review,* 20, No. 3 (1995): 709–34, https://doi.org/10.5465/amr.1995.9508080335.

[21] Mulligan and Levi, "Prevalence of Cyber Crime and Its Effect on Economy."

Axiological Critique Framework of Digital Effectiveness (KKOAED) in the next chapter.

Results and Discussion

Ontology of Digital Transactions

The essence of digital transactions lies in their innovation over conventional transactional processes by integrating technology and economic activities, aiming to overcome accessibility limitations for transacting parties.[22] The most critical instruments in digital transactions involve technological tools for economic activities, such as sales, purchases, auctions, payments, and bookings, utilizing infrastructure like banking apps, e-commerce websites, or other payment technologies. These represent advancements from semi-digital instruments, such as ATM cards, debit cards, and credit cards.[23,24,25] At the ontological level, the inherent nature of fast-paced and virtual digital transactions creates a transaction reality that is independent of the physical constraints of space and time, a shift from the ontology of 'presence' in conventional transactions to the ontology of digital 'representation'. This is the crux of the ontological debate that needs to be raised. The unparalleled effectiveness in terms of convenience and ease of use is considered to be the nature of this transaction.

However, these effects, especially those that are intrinsically claimed, need to be critically analyzed through the lens of the philosophy of science, in particular Positivism and Social Constructivism. In a Positivist perspective, the effectiveness of digital transactions can be empirically validated through quantitative metrics such as processing speed, transaction volume, and adoption rate as shown in

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[22] Harri Hokkanen et al., "From Customer to Actor Value Propositions: An Analysis of Digital Transaction Platforms," *International Review of Retail, Distribution and Consumer Research,* 31, No. 3 (2021): 257–79, https://doi.org/10.1080/09593969.2021.1880463.

[23] Muhammad Danuri, "Development and Transformation of Digital Technology," *Infokam,* 15, No. 2 (2019): 116–23.

[24] Fitriani Latief and Dirwan, "Pengaruh Kemudahan, Promosi dan Kemanfaatan Terhadap Keputusan Penggunaan Uang Digital," *Jurnal Ilmiah Akuntansi Manajemen,* 3, No. 1 (2020): 16–30, https://doi.org/10.35326/jiam.v3i1.

[25] Nugroho Sumarjiyanto Benedictus Maria and Tri Widayati, "Perkembangan Ekonomi Digital Terhadap Perilaku Pengguna Media Sosial dalam Melakukan Transaksi Ekonomi," *PESHUM: Jurnal Pendidikan, Sosial dan Humaniora,* 3, No. 4 (2024): 589–93, https://doi.org/10.56799/peshum.v3i4.4184.

limited comparative studies such as research Allan About digital payments, which showed a reduction in transaction time of up to 66.7% (from 1.5 minutes to 30 seconds), an increase in transaction frequency of 150%, and a reduction in errors of 80%.[26] Other studies Eka Sinaga Comparing the use of digital payments such as OVO, GoPay, and ShopeePay to online consumer behavior found a significant positive influence on adoption rates and transaction decisions.[27] These findings support the empirical validation of positivism, although it is limited to specific contexts such as Indonesian MSMEs.

However, this view fails to take into account the underlying structural and infrastructure biases. In contrast, Social Constructivism argues that the 'effectiveness' of digital transactions is a social construct legitimized by the dominant narrative of markets and technology. This critical analysis highlights that the claimed effectiveness can be an illusion for segments of society that lack digital access or literacy, thus challenging the claim of universality of its benefits. This discussion is limited to studies because the focus often shifts directly to economic impacts without exploring the underlying ontological assumptions.

According to Susilo Digital transactions generally fall into four categories:[28] Business-to-Customer (B2C), Business-to-Business (B2B), Consumer-to-Consumer

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[26] Allan A Calderon, "Digital Payments and Their Role in Enhancing Financial Transactions Efficiency," *International Journal of Economics and Financial Issues,* 15, No. 1 (2025): 182–89, https://doi.org/10.32479/ijefi.17555.

[27] Eka Sinaga, "Studi Komparatif Penggunaan Digital Payment Terhadap Perilaku Online Impulse Buying (Studi Kasus: Pengguna OVO, Gopay dan Shopeepay)," *Jurnal Ilmiah Edunomika,* 6, No. 2 (2022): 1–7, https://doi.org/10.29040/jie.v7i1.6917.

[28] Muhammad Susilo, "Rancang Bangun Website Toko Online Menggunakan Metode Waterfall," *InfoTekJar (Jurnal Nasional Informatika dan Teknologi Jaringan),* 2, No. 2 (2018): 98–105, https://doi.org/10.30743/infotekjar.v2i2.171.

(C2C), and Mobile Commerce (M-Commerce).[29,30,31,32] Apart from this operational categorization, from an Islamic perspective, digital transactions qualify as permissible muamalah (transactions) by fulfilling core Shariah principles of bai' (trade): the presence of parties (buyer/seller), sighat (offer/acceptance), and a valid transaction object.[33] This aligns with Islamic commercial law, where e-commerce transactions are valid if these elements are met, even in the absence of physical interaction. Specific Islamic trade types resemble digital transactions: (1) bai' as-salam (advance payment with delayed delivery),[34] (2) bai' al-istisna (similar to salam but with payment upon product readiness),[35] and (3) bai' muajjal (deferred payment by agreement).[36] Digital transactions most closely mirror bai' as-salam, requiring immediate post-agreement payment.[37] Interestingly, despite meeting the principles of sharia, the Islamic framework can be the subject of the same

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[29] Manon Reiber-Kuijpers, Marijke Kral, and Paulien Meijer, "Digital Reading in a Second or Foreign Language: A Systematic Literature Review," *Computers and Education,* 163, No. 1 (2021): 1–16, https://doi.org/10.1016/j.compedu.2020.104115.

[30] David Gligor et al., "Does Supply Chain Agility Create Customer Value and Satisfaction for Loyal B2B Business and B2C End-Customers?," *International Journal of Physical Distribution and Logistics Management,* 50, No. 7–8 (2020): 721–43, https://doi.org/10.1108/IJPDLM-01-2020-0004.

[31] Arto Lindblom, Taru Lindblom, and Heidi Wechtler, "Collaborative Consumption as C2C Trading: Analyzing the Effects of Materialism and Price Consciousness," *Journal of Retailing and Consumer Services,* 44, No. Sept (2018): 244–52, https://doi.org/10.1016/j.jretconser.2018.07.016.

[32] Hayford Amegbe, Charles Hanu, and Afra Nuwasiima, "Small-Scale Individual Entrepreneurs (SIEs) and the Usage of Mobile Money (M-Money) and Mobile Commerce (M-Commerce) in Facilitating Business Growth in Ghana," *Management Science Letters,* 7, No. 8 (2017): 373–84, https://doi.org/10.5267/j.msl.2017.5.004.

[33] Niniek Mumpuni Sri Rejeki, "Overview of the Concept of Khiyar Al Aib in E-Commerce Practice," *Jhss (Journal of Humanities and Social Studies),* 6, No. 2 (2022): 218–25, https://doi.org/10.33751/jhss.v6i2.5670.

[34] Mentari Aprillia Nurfatah and Nana Diana, "Penerapan Ba'I As-Salam dalam Transaksi Jual Online dalam Perspektif Ekonomi Islam," *Competitive: Jurnal Akuntansi dan Keuangan,* 6, No. 1 (2022): 32, https://doi.org/10.31000/competitive.v6i1.4354.

[35] Remali Yusoff and Nor' Azurah Md Kamdari, "The Contract of Bay-Al-Salam and Bay-Al-Istisna in Islamic Commercial Law: A Comparative Analysis," *Prosiding Persidangan Kebangsaan Ekonomi Malaysia Ke-11,* 1, No. October (2016): 13–14.

[36] Kartika Dwi Sara and Fitryani Fitryani, "Peran Kewirausahaan dan E-Commerce Terhadap Perkembangan Usaha Mikro, Kecil dan Menengah (UMKM) dalam Perspektif Islam," *Jurnal EMA,* 5, No. 2 (2020): 66–77, https://doi.org/10.47335/ema.v5i2.53.

[37] Ikram Pratama et al., "Analisis Kegiatan Ekspor Kopi Antara Kualitas dengan Harga dalam Perspektif Akad Bai' As-Salam," *Al Qalam: Jurnal Ilmiah Keagamaan dan Kemasyarakatan,* 16, No. 2 (2022): 569, https://doi.org/10.35931/aq.v16i2.907.

philosophical criticism of science: whether the 'validity' of sharia automatically correlates with the social and economic 'effectiveness' of being fair in practice.

Epistemology of Digital Transactions

From an epistemological point of view, digital transactions apply systematic ideas to streamline processes through structured stages:[38] transparent information sharing,[39] online ordering,[40] digital transactions with electronic signatures,[41] and e-payments involving various financial mechanisms.[42,43,44] Critically, this stage reflects an epistemological effort to create the 'truth' of transactions through the process of digital formalization.

However, Trust Theory highlights the epistemological gap between the formal processes claimed by the system and the perceived security reality of users. Although transactions rely on specific media such as WebRTC platforms or web-based self-contracting systems,[45,46] and are protected by security protocols (SSL,

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[38] Desy Maritha, "Inklusivitas Ekonomi Digital," *Jurnal Transformasi Administrasi,* 13, No. 1 (2023), https://doi.org/10.56196/jta.v13i01.249.

[39] Libin Guo and Yuxiao Shang, "Decision-Making of Cross-Border E-Commerce Platform Supply Chains Considering Information Sharing and Free Shipping," *Sustainability (Switzerland),* 15, No. 4 (2023), https://doi.org/10.3390/su15043350.

[40] Iman Dayarian and Martin Savelsbergh, "Crowdshipping and Same-Day Delivery: Employing In-Store Customers to Deliver Online Orders," *Production and Operations Management* 29, No. 9 (2020): 2153–74, https://doi.org/10.1111/poms.13219.

[41] Vidya Vinayan and Aleena Benny, "Online Transaction Fraud," *International Journal of Creative Research Thoughts (IJCTS),* 10, No. 5 (2022): 591–95.

[42] Ashvini S. Gorte et al., "Credit Card Fraud Detection Using Various Machine Learning and Deep Learning Approaches," *Lecture Notes in Networks and Systems,* 492, No. 3 (2023): 621–28, https://doi.org/10.1007/978-981-19-3679-1_52.

[43] Dow Scott, "The Causal Relationship Between Trust And The Assessed Value of Management by Objectives," *Journal of Management,* 6, No. 2 (1980): 157–75, https://doi.org/10.1177/014920638000600205.

[44] Lynn Batten and Xun Yi, "Off-Line Digital Cash Schemes Providing Untraceability, Anonymity and Change," *Electronic Commerce Research,* 19, No. 1 (2019): 81–110, https://doi.org/10.1007/s10660-018-9289-8.

[45] Samarth K Patil et al., "Integrating Artificial Intelligence and Encryption in Web Real-Time Communication: A Smart Video Conferencing Platform With Real-Time Transcription and Translation," *Cureus Journal of Computer Science*, April 2025, https://doi.org/10.7759/s44389-024-02669-z.

[46] Gama Pratama, "Analisis Transaksi Jual Beli Online Melalui Website Marketplace Shopee Menurut Konsep Bisnis di Masa Pandemic Covid 19," *Ecopreneur: Jurnal Program Studi Ekonomi Syariah,* 1, No. 2 (2020): 21, https://doi.org/10.47453/ecopreneur.v1i2.130.

SET, SEP) to ensure confidentiality, integrity, and non-repudiation,[47,48] the Philosophy of Science questions the epistemological validity of these claims of safety and effectiveness.

Critical research on trust theory in digital transactions often highlights epistemological vulnerabilities due to human factors, such as social engineering, in addition to technical protocol failures. Nina Klimburg-Witjes and Alexander Wentland, through an analysis of cybersecurity discourse, uncover the construction of "deficient users" that shift security responsibilities from institutions to individuals, thereby weakening systemic trust. Their approach integrates science-technology studies and critical safety studies to critique the narrative that training alone is enough to overcome human manipulation.[49]

Social engineering exploits cognitive and emotional biases, such as natural trust in authority, that make digital verification vulnerable even though protocols like SSL seem perfect. Klimburg-Witjes cs. It identifies three main narratives: careless employees, dual expertise (technical-social), and "human disability fixing" via training, all of which ignore corporate responsibility. This creates a flawed digital epistemology because it assumes users can be "fixed" without collectively changing the system.

The shift of trust from direct to systemic verification fails if human factors are ignored, as in phishing that manipulates preexisting trust relationships.[50] Descriptive research on protocols tends to overlook this, while critical studies emphasize collective resilience rather than the individualization of risk. As a result,

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[47] Chandra, "Keamanan Data dengan Metode Kriptografi Kunci Publik," *Jurnal TIMES,* 5, No. 2 (2016): 11–15, https://doi.org/10.51351/jtm.5.2.2016548.

[48] Novi and Zaini, "Secure Socket Layer untuk Keamanan Data Rekam Medis Tumor Otak pada Health Information System," *Jurnal Nasional Teknik Elektro,* 6, No. 3 (2017): 137, https://doi.org/10.25077/jnte.v6n3.405.2017.

[49] Nina Klimburg-witjes and Alexander Wentland, "Hacking Humans? Social Engineering and the Construction of the ' Deficient User ' in Cybersecurity Discourses," *Science, Technology, & Human Values,* 46, No. 6 (2021): 1316–39, https://doi.org/10.1177/0162243921992844.

[50] Morice Daudi, "Exploiting Human Trust in Cybersecurity: Which Trust Development Process Is Predominant in Phishing," *ACIG,* 3, No. 2 (2024): 233–49, https://doi.org/10.60097/ACIG/199452.

the correctness of e-payment transactions depends on a shared security culture, not on the assumption of impenetrable protocols.

An Islamic perspective that prohibits gharar (excessive uncertainty), maysir (gambling), and riba' (usury) in transactions[51] It is an example of early axiological criticism. The principles of trust (trust) and al-Ishitrak (transparency) implicitly demand a strict epistemological fulfillment of the digital system. This means that digital systems must not only be efficient, but must also provide irrefutable evidence (epistemology) so as not to create uncertainty (gharar) and meet ethical values (axiology). Therefore, FI demands that this research go further: if Shariah has underlined the need for transparency and trust, how can the framework of the Philosophy of Science systematically identify the failures of current technologies and systems in meeting these axiological-epistemological demands?

Axiology of Digital Transactions

Descriptively, digital transactions provide substantial economic benefits, such as payment efficiency, time savings, and support for economic growth through reduced cash circulation.[52] These claims of effectiveness, especially in the dimensions of speed, convenience, and low cost, are based on the axiological assumption that technological advances inherently improve well-being. However, the Philosophy of Science demands an axiological critique of this claim of universality of benefits, especially in light of a series of serious challenges: the risk of cybercrime, data privacy concerns, and the low digital literacy in the broad population.

Cyber and privacy risks undermine Trust Theory by eroding systemic trust in digital institutions, where effectiveness depends on a holistic perception of security, not just the prevention of attacks. Critical studies show that this structural breakdown not only inflicts individual harm but also weakens institutional credibility broadly, forcing a shift from adversarial models to trust-driven

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[51] Nurul Asikin Abdul Razak, Shofian Ahmad, and Zamzuri Zakaria, "Protecting Islamic Users In E-Payment Transaction: The Islamic Perspective," *Samarah: Jurnal Hukum Keluarga dan Hukum Islam,* 9, No. 1 (2025), https://doi.org/10.22373/sjhk.v9i1.26391.

[52] Jefry Tarantang et al., "Perkembangan Sistem Pembayaran Digital pada Era Revolusi Industri 4.0 di Indonesia," *Jurnal Al-Qardh,* 4, No. 1 (2019): 60–75, https://doi.org/10.23971/jaq.v4i1.1442.

frameworks.[53] Studies that focus on economic benefits, such as increased GDP, ignore axiological costs, including unequal access and the high costs of cybercrime that burden vulnerable groups. An analysis of Brandl, Hengsbach, and Mereno 2024 Research reveals that the cashless revolution exacerbates social injustice through disproportionately high transaction costs for low-income individuals and reliance on risky credit.[54] It fails to achieve the axiological goal of technology for equitable welfare, as weak political regulation and public infrastructure reinforce private dominance.

Limited access and the cost of crime risk make the effectiveness of e-payments unfair, with high-income groups benefiting from low friction, while others are stuck on expensive services.[55] The research emphasizes that data privacy and security must be integrated to restore trust, as the erosion of consumer trust reaches 9 percentage points due to data concerns. As a result, digital adoption is hampered by an uneven perception of risk, demanding an inclusive regulatory approach.[56]

The principles of Islamic trade reinforce this axiological claim. In digital muamalah, requirements such as post-payment buyer[57] and sighat (virtual agreement) validity[58] are manifestations of the axiological and epistemological

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[53] Sule Magaji et al., "The Future of Cybersecurity in Payment Systems: From Preventing Attacks to Building Trust in The Global Digital World," *International Journal of Latest Technology in Engineering, Management & Applied Science (IJL TEMAS),* 14, No. 7 (2025): 630–37, https://doi.org/10.51583/IJLTEMAS.

[54] Barbara Brandl, David Hengsbach, and Guadalupe Moreno, "Small Money, Large Profits: How the Cashless Revolution Aggravates Social Inequality," *Socio-Economic Review,* 23, No. 2 (2025): 735–57, https://doi.org/10.1093/ser/mwad071.

[55] Aya Aljaradat, Gargi Sarkar, and Sandeep K Shukla, "Modelling Cybersecurity Impacts on Digital Payment Adoption: A Game Theoretic Approach," *Journal of Economic Criminology,* 5, No. August (2024), https://doi.org/https://doi.org/10.1016/j.jeconc.2024.100089.

[56] Jana Arbanas et al., "Consumer Data Privacy and Security," Deloitte Insights, 2023.

[57] Ambar Wati, Arman Paramansyah, and Dessy Damayanthi, "Penerapan Etika Bisnis Islam Dalam Transaksi Jual Beli:," *El-Mal: Jurnal Kajian Ekonomi & Bisnis Islam,* 2, No. 2 (2021): 184–200, https://doi.org/10.47467/elmal.v2i2.344.

[58] Siti Dwi Pujiyanti and Anis Wahdi, "Transaksi Bisnis Online dalam Perspektif Islam," *SERAMBI: Jurnal Ekonomi Manajemen dan Bisnis Islam,* 2, No. 2 (2020): 91–102, https://doi.org/10.36407/serambi.v2i2.173.

need for certainty and justice. The requirement to avoid usury[59] and ensure that transaction objects can be validly delivered requires digital systems to be not only efficient but also ethical and fairly measurable. Therefore, the study concludes that axiological criticism should be at the core of effectiveness evaluation: the effectiveness of a technology should not be measured by financial output alone, but by its ability to build systems that are axiologically fair and systemically reliable.

Critique of Digital Transaction Effectiveness

Ontologically, digital transactions address economic accessibility issues, evidenced by a surge in adoption during COVID-19 (see Figure 1). Their five-year growth reflects their role in solving societal economic constraints.

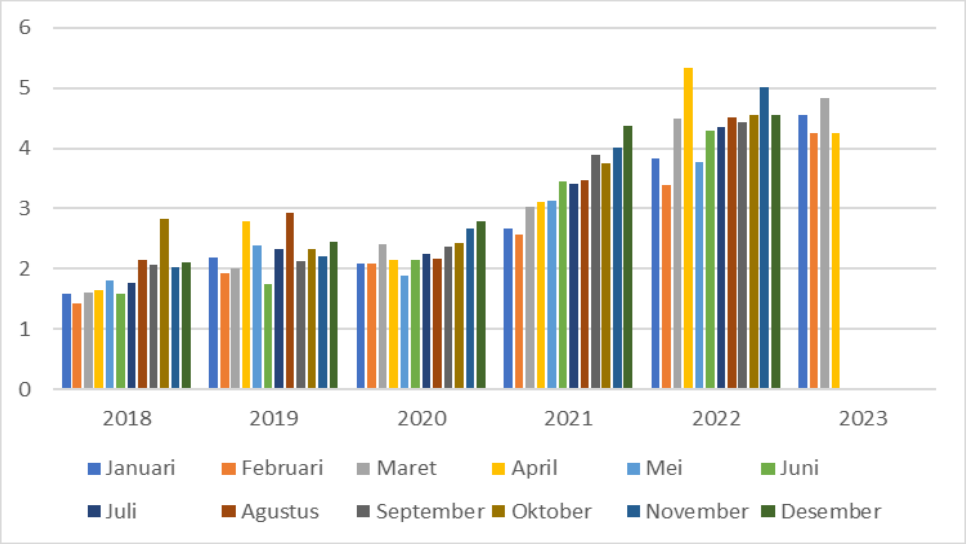

Figure 1. Monthly Digital Banking Transaction Value in Indonesia
Source: Financial Services Authority (OJK) in Ahdiat (2023)

The figure above illustrates that the value of digital transaction usage has experienced fluctuating growth. Overall, the value of digital transactions has increased by 158% from 2018 to April 2023. The significant surge in digital transaction values began in mid-2020, driven by the COVID-19 pandemic, which led to restrictions on public activities, including traditional market transactions.

[59] Juhrotul Khulwah, "Jual Beli Dropship dalam Prespektif Hukum Islam," *Al-Mashlahah Jurnal Hukum Islam dan Pranata Sosial,* 7, No. 1 (2019): 101, https://doi.org/10.30868/am.v7i01.548.

While Berry[60] and Razak, et all[61] seeing this phenomenon as a rational transition towards Society 5.0, the philosophy of science provides an ontological critique of whether the growth rate of IDR 453.75 trillion[62] reflects substantial effectiveness, or is it simply a "dependency switch" that creates new vulnerabilities? Ontologically, digital transactions have transformed the essence of the market from verifiable physical interactions into abstract virtual objects, where effectiveness is often unilaterally claimed by platform providers without considering the existential risks for users.

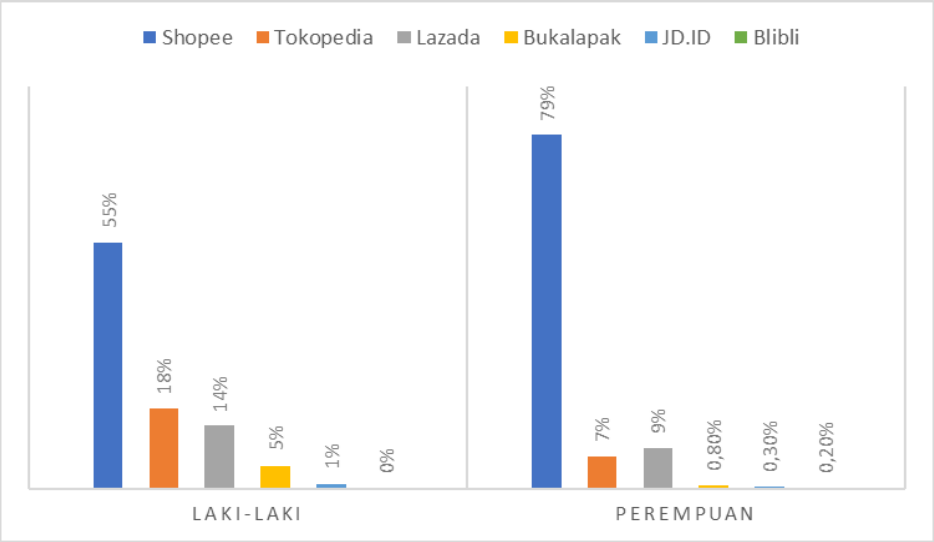

Figure 2. The Most Preferred Digital Transaction Applications in Indonesia
Source: info. populix.co (2023)

Epistemologically, the success of apps like Shopee (Figure 2) that dominate user preferences (79% women, 55% men) is often attributed to the ease of procedures and integrative features.[63] However, philosophy of science criticizes this epistemological framework as a form of "superficial formalism". The

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[60] Leonard Berry, "Relationship Marketing of Services-Growing Interest, Emerging Perspectives," *Journal of the Academy of Marketing Science,* 23, No. 4 (1995): 236–45.

[61] Razak, Ahmad, and Zakaria, "Protecting Islamic Users In E-Payment Transaction: The Islamic Perspective."

[62] wantiknas.go.id, "Digital Banking Tumbuh 13,48 % Dengan Nilai Transaksi Rp. 58.478 Triliun Di 2023," WANTIKNAS: Dewan Teknologi Informasi dan Komunikasi Nasional, 2024.

[63] Nunuk Latifah, Anna Widayani, and Rani Arifah Normawati, "Pengaruh Perceived Usefulness Dan Trust Terhadap Kepuasan Konsumen Pada E- Commerce Shopee," *BISMA: Jurnal Bisnis dan Manajemen,* 14, No. 1 (2020): 82, https://doi.org/10.19184/bisma.v14i1.13550.

epistemology of digital transactions focuses only on procedures (search, ordering, payment), but ignores the deeper Trust Theory.

Research by Latifah et all praises feature integration as the key to satisfaction.[64] On the other hand, when viewed from the perspective of Trust Theory, features such as "star seller" or "payment confirmation" are just artificial trust instruments. The philosophy of science asks: Does this digital procedure really provide valid knowledge (episteme) about the integrity of the seller, or is it just a manipulation of perception through algorithms? The effectiveness lauded in the mainstream literature often ignores that these systems create a "blind trust" in the platform, which is epistemologically very fragile to systemic disruption.

The peak of scientific maturity lies in the axiological dimension-the relationship between knowledge and moral values. This is where the effectiveness of digital transactions gets the sharpest criticism.[65] data regarding skimming, phishing, and carding is not just a "technical problem", but an axiological failure. Subaidah, et all and Desi Redita, et all tend to see solutions in strengthening the security system and legal regulation (literacy).[66,67] Critics while the philosophy of science sees that this evil is a logical consequence of a system that prioritizes efficiency (speed) over safety (morality). Axiologically, digital transactions are said to be economically "effective", but ethically "flawed" because they create a criminogenic ecosystem that is detrimental to homo oeconomicus.

The application of Trust Theory reveals that global losses due to digital crime show that the effectiveness that has been glorified is only partial effectiveness. Without moral integrity (Axiology) embedded in the architecture of the system (Epistemology), the growth of digital transactions is just an expansion of space for human exploitation. The scientific contribution of this article is to affirm

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[64] Latifah, Widayani, and Normawati.

[65] Kamsidah, "Tiga Kejahatan Digital yang Paling Sering Terjadi dan Harus Kamu Waspadai," Kementerian Keuangan Republik Indonesia, 2023.

[66] Subaidah Ratna Juita, Dhian Indah Astanti, and Dian Septiandani, "Perlindungan Hukum Terhadap Nasabah Bank Korban Kejahatan Skimming," *Jurnal Usm Law Review*, 6, No. 1 (2023): 407–19, https://doi.org/10.26623/julr.v6i1.6353.

[67] Desi Redita Sari, Rini Apriyani, and Amsari Damanik, "Penegakan Hukum Pidana Terhadap Tindak Pidana Skimming (Studi di Polres Kutai Kartanegara)," *Journal of Law and Nation,* 3, No. 1 (2024): 89–97, https://joln.my.id/index.php/joln/article/view/92.

that effectiveness should not be defined only by transaction volume, but by the resilience of the system to moral degradation and trust.

Conclusion

Digital transactions utilize a digitized system, providing easy access for economic actors and making them an effective transactional method. However, the effectiveness of digital transactions must be examined more deeply through the lens of the philosophy of science. This qualitative study employs a literature review (Library Research) method, gathering data from various books, journals, and writings, both foreign and local. The findings suggest that digital transactions cannot yet be considered fully effective due to prevalent crimes stemming from weak transaction systems, inadequate security measures, low public literacy, and insufficient legal protections in digital transactions.

Based on the research findings, the following recommendations are proposed for digital transaction users: First, product or service providers (merchants) should enhance collaboration with digital service partners to improve the security of websites or apps used for transactions. Second, buyers or service users should increase their knowledge and literacy regarding digital transaction processes to avoid online fraud. Third, the government should improve public education to enhance digital transaction literacy and strengthen legal frameworks for digital transactions and online crime enforcement. This study has limitations in terms of literature availability and analytical depth. Therefore, further research is needed to conduct a more in-depth analysis of the philosophical critique of the effectiveness of digital transactions.

BIBLIOGRAPHY

Adiyanto, Adiyanto, and Rizki Febrianto. "Authentication of Transaction Process in E-Marketplace Based on Blockchain Technology." *Aptisi Transactions on Technopreneurship (ATT),* 2, No. 1 (2020): 68–74. https://doi.org/10.34306/att.v2i1.71.

Aljaradat, Aya, Gargi Sarkar, and Sandeep K Shukla. "Modelling Cybersecurity Impacts on Digital Payment Adoption: A Game Theoretic Approach." *Journal of Economic Criminology,* 5, No. August (2024). https://doi.org/https://doi.org/10.1016/j.jeconc.2024.100089.

Amegbe, Hayford, Charles Hanu, and Afra Nuwasiima. "Small-Scale Individual Entrepreneurs (SIEs) and the Usage of Mobile Money (M-Money) and Mobile Commerce (M-Commerce) in Facilitating Business Growth in Ghana." *Management Science Letters,* 7, No. 8 (2017): 373–84. https://doi.org/10.5267/j.msl.2017.5.004.

Arbanas, Jana, Paul Silverflate, Susanne Hupfer, Jeff Loucks, Prashant Raman, and Michael Steinhart. "Consumer Data Privacy and Security." Deloitte Insights, 2023.

Balakrishnan, Vimala, Umayma Ahhmed, and Faris Basheer. "Personal, Environmental and Behavioral Predictors Associated with Online Fraud Victimization Among Adults." *PLoS ONE,* 20, No. 1 (2025): 1–17. https://doi.org/10.1371/journal.pone.0317232.

Batten, Lynn, and Xun Yi. "Off-Line Digital Cash Schemes Providing Untraceability, Anonymity and Change." *Electronic Commerce Research,* 19, No. 1 (2019): 81–110. https://doi.org/10.1007/s10660-018-9289-8.

Berry, Leonard. "Relationship Marketing of Services-Growing Interest, Emerging Perspectives." *Journal of the Academy of Marketing Science,* 23, No. 4 (1995): 236–45.

Bizualem, AG, and MK Saron. "The Role of Ethiopian Commodity Exchange (ECX) in Crop Value Chain Development in Ethiopia." *International Journal of Business and Economics Research,* 7, No. 6 (2018): 183–90. https://doi.org/10.11648/j.jiber.20180706.12.

Brandl, Barbara, David Hengsbach, and Guadalupe Moreno. "Small Money, Large Profits: How the Cashless Revolution Aggravates Social Inequality." *Socio-*

Economic Review, 23, No. 2 (2025): 735–57. https://doi.org/10.1093/ser/mwad071.

Calderon, Allan A. "Digital Payments and Their Role in Enhancing Financial Transactions Efficiency." *International Journal of Economics and Financial Issues,* 15, No. 1 (2025): 182–89. https://doi.org/10.32479/ijefi.17555.

Chandra. "Keamanan Data dengan Metode Kriptografi Kunci Publik." *Jurnal TIMES,* 5, No. 2 (2016): 11–15. https://doi.org/10.51351/jtm.5.2.2016548.

Daudi, Morice. "Exploiting Human Trust in Cybersecurity: Which Trust Development Process is Predominant in Phishing." *ACIG* 3, No. 2 (2024): 233–49. https://doi.org/10.60097/ACIG/199452.

Dayarian, Iman, and Martin Savelsbergh. "Crowdshipping and Same-Day Delivery: Employing In-Store Customers to Deliver Online Orders." *Production and Operations Management,* 29, No. 9 (2020): 2153–74. https://doi.org/10.1111/poms.13219.

Dita Fitriani, and Hwihanus Hwihanus. "Peranan Sistem Informasi Manajemen Terhadap Perkembangan E-Commerce dalam Pengambilan Keputusan Bagi Usaha UMKM." *Jurnal Kajian Dan Penalaran Ilmu Manajemen,* 1, No. 1 (2023): 64–77. https://doi.org/10.59031/jkpim.v1i1.50.

Gligor, David, Siddik Bozkurt, Ismail Gölgeci, and Michael J. Maloni. "Does Supply Chain Agility Create Customer Value and Satisfaction for Loyal B2B Business and B2C End-Customers?" *International Journal of Physical Distribution and Logistics Management,* 50, No. 7–8 (2020): 721–43. https://doi.org/10.1108/IJPDLM-01-2020-0004.

Gorte, Ashvini S., S. W. Mohod, R. R. Keole, T. R. Mahore, and Sagar Pande. "Credit Card Fraud Detection Using Various Machine Learning and Deep Learning Approaches." *Lecture Notes in Networks and Systems* 492, No. 3 (2023): 621–28. https://doi.org/10.1007/978-981-19-3679-1_52.

Guo, Libin, and Yuxiao Shang. "Decision-Making of Cross-Border E-Commerce Platform Supply Chains Considering Information Sharing and Free Shipping." *Sustainability (Switzerland),* 15, No. 4 (2023). https://doi.org/10.3390/su15043350.

Hokkanen, Harri, Mikko Hänninen, Mika Yrjölä, and Hannu Saarijärvi. "From Customer to Actor Value Propositions: An Analysis of Digital Transaction

Platforms." *International Review of Retail, Distribution and Consumer Research,* 31, No. 3 (2021): 257–79. https://doi.org/10.1080/09593969.2021.1880463.

indonesia.go.id. "Upaya Bersama Berantas Kejahatan Digital." Kementerian Komunikasi dan Digital Republik Indonesia, 2023. https://www.komdigi.go.id/berita/artikel/detail/upaya-bersama-berantas-kejahatan-digital.

Juita, Subaidah Ratna, Dhian Indah Astanti, and Dian Septiandani. "Perlindungan Hukum Terhadap Nasabah Bank Korban Kejahatan Skimming." *Jurnal Usm Law Review,* 6, No. 1 (2023): 407–19. https://doi.org/10.26623/julr.v6i1.6353.

Jujun S. Suriasumantri. *Fisafat Ilmu: Sebuah Pengantar Populer*. Jakarta: Pustaka Sinar Harapan, 1995.

Kamsidah. "Tiga Kejahatan Digital yang Paling Sering Terjadi dan Harus Kamu Waspadai." Kementerian Keuangan Republik Indonesia, 2023.

Khulwah, Juhrotul. "Jual Beli Dropship dalam Prespektif Hukum Islam." *Al-Mashlahah Jurnal Hukum Islam dan Pranata Sosial,* 7, No. 1 (2019): 101. https://doi.org/10.30868/am.v7i01.548.

Klimburg-witjes, Nina, and Alexander Wentland. "Hacking Humans ? Social Engineering and the Construction of the ' Deficient User ' in Cybersecurity Discourses." *Science, Technology, & Human Values,* 46, No. 6 (2021): 1316–39. https://doi.org/10.1177/0162243921992844.

Kolyandov, Simeon. "The Rising Popularity of Digital Transaction Platforms." *Trakia Journal of Sciences,* 19, No. Suppl.1 (2021): 122–29. https://doi.org/10.15547/tjs.2021.s.01.018.

Komara, Endang. *Filsafat Ilmu dan Metodologi Penelitian, Cetakan Kesatu*. Bogor: Ghalia Indonesia, 2011.

Laras, Arlina. "Transaksi Digital Ngebut, Perbankan Tanah Air Siapkan 'Senjata' Baru." Finansial Bisnis.com, 2023.

Latief, Fitriani, and Dirwan. "Pengaruh Kemudahan, Promosi dan Kemanfaatan Terhadap Keputusan Penggunaan Uang Digital." *Jurnal Ilmiah Akuntansi Manajemen,* 3, No. 1 (2020): 16–30. https://doi.org/10.35326/jiam.v3i1.

Latifah, Nunuk, Anna Widayani, and Rani Arifah Normawati. "Pengaruh Perceived Usefulness dan Trust Terhadap Kepuasan Konsumen pada E-Commerce

Shopee." *BISMA: Jurnal Bisnis dan Manajemen,* 14, No. 1 (2020): 82. https://doi.org/10.19184/bisma.v14i1.13550.

Lindblom, Arto, Taru Lindblom, and Heidi Wechtler. "Collaborative Consumption as C2C Trading: Analyzing the Effects of Materialism and Price Consciousness." *Journal of Retailing and Consumer Services,* 44, No. Sept (2018): 244–52. https://doi.org/10.1016/j.jretconser.2018.07.016.

Magaji, Sule, Yahaya Ismail, Yakubu Jafaru, and Ibrahim Musa. "The Future of Cybersecurity in Payment Systems: From Preventing Attacks to Building Trust in The Global Digital World." *International Journal of Latest Technology in Engineering, Management & Applied Science (IJL TEMAS),* 14, No. 7 (2025): 630–37. https://doi.org/10.51583/IJLTEMAS.

Maria, Nugroho Sumarjiyanto Benedictus, and Tri Widayati. "Perkembangan Ekonomi Digital Terhadap Perilaku Pengguna Media Sosial dalam Melakukan Transaksi Ekonomi." *PESHUM: Jurnal Pendidikan, Sosial dan Humaniora,* 3, No. 4 (2024): 589–93. https://doi.org/10.56799/peshum.v3i4.4184.

Maritha, Desy. "Inklusivitas Ekonomi Digital." *Jurnal Transformasi Administrasi,* 13, No. 1 (2023). https://doi.org/10.56196/jta.v13i01.249.

Mayer, Roger C., James H. Davis, and F. David Schoorman. "An Integrative Model of Organizational Trust." *Academy of Management Review,* 20, No. 3 (1995): 709–34. https://doi.org/10.5465/amr.1995.9508080335.

Milasari, Milasari, Ahmad Syukri, Badarussyamsi Badarussyamsi, and Ahmad Fadhil Rizki. "Filsafat Ilmu dan Pengembangan Metode Ilmiah." *Jurnal Filsafat Indonesia,* 4, No. 3 (2021): 217–28. https://doi.org/10.23887/jfi.v4i3.35499.

Muhammad Danuri. "Development and Transformation of Digital Technology." *Infokam,* 15, No. 2 (2019): 116–23.

Mulligan, D., and M. Levi. "Prevalence of Cyber Crime and its Effect on Economy." *International Digital Organization for Scientific Research,* 5, No. 1 (2020): 64-69.

Novi, and Zaini. "Secure Socket Layer Untuk Keamanan Data Rekam Medis Tumor Otak pada Health Information System." *Jurnal Nasional Teknik Elektro,* 6, No. 3 (2017): 137. https://doi.org/10.25077/jnte.v6n3.405.2017.

Nurfatah, Mentari Aprillia, and Nana Diana. "Penerapan Ba'i As-Salam dalam

Transaksi Jual Online dalam Perspektif Ekonomi Islam." *Competitive: Jurnal Akuntansi dan Keuangan,* 6, No. 1 (2022): 32. https://doi.org/10.31000/competitive.v6i1.4354.

Paat, Yok Fong, and Christine Markham. "Digital Crime, Trauma, and Abuse: Internet Safety and Cyber Risks for Adolescents and Emerging Adults in the 21st Century." *Social Work in Mental Health,* 19, No. 1 (2021): 18–40. https://doi.org/10.1080/15332985.2020.1845281.

Patil, Samarth K, Vinayak Nigam, Shriyash Olambe, and Anita Shinde. "Integrating Artificial Intelligence and Encryption in Web Real-Time Communication: A Smart Video Conferencing Platform With Real-Time Transcription and Translation." *Cureus Journal of Computer Science*, April 2025. https://doi.org/10.7759/s44389-024-02669-z.

Pratama, Gama. "Analisis Transaksi Jual Beli Online Melalui Website Marketplace Shopee Menurut Konsep Bisnis di Masa Pandemic Covid 19." *Ecopreneur: Jurnal Program Studi Ekonomi Syariah,* 1, No. 2 (2020): 21. https://doi.org/10.47453/ecopreneur.v1i2.130.

Pratama, Ikram, Hardi Alunaza, Arifin Abdullah, and Muhammad Iqbal. "Analisis Kegiatan Ekspor Kopi Antara Kualitas dengan Harga dalam Perspektif Akad Bai' As-Salam." *Al Qalam: Jurnal Ilmiah Keagamaan dan Kemasyarakatan,* 16, No. 2 (2022): 569. https://doi.org/10.35931/aq.v16i2.907.

Pujiyanti, Siti Dwi, and Anis Wahdi. "Transaksi Bisnis Online dalam Perspektif Islam." *SERAMBI: Jurnal Ekonomi Manajemen dan Bisnis Islam,* 2, No. 2 (2020): 91–102. https://doi.org/10.36407/serambi.v2i2.173.

Razak, Nurul Asikin Abdul, Shofian Ahmad, and Zamzuri Zakaria. "Protecting Islamic Users in E-Payment Transaction: The Islamic Perspective." *Samarah: Jurnal Hukum Keluarga dan Hukum Islam,* 9, No. 1 (2025). https://doi.org/10.22373/sjhk.v9i1.26391.

Reiber-Kuijpers, Manon, Marijke Kral, and Paulien Meijer. "Digital Reading in a Second or Foreign Language: A Systematic Literature Review." *Computers and Education,* 163, No. 1 (2021): 1–16. https://doi.org/10.1016/j.compedu.2020.104115.

Santia, Tira. "OJK: Dunia Rugi USD 8 Triliun Akibat Kejahatan Siber." Liputan6, 2023.

Sara, Kartika Dwi, and Fitryani Fitryani. "Peran Kewirausahaan dan E-Commerce

Terhadap Perkembangan Usaha Mikro, Kecil dan Menengah (UMKM) dalam Perspektif Islam." *Jurnal EMA,* 5, No. 2 (2020): 66–77. https://doi.org/10.47335/ema.v5i2.53.

Sari, Desi Redita, Rini Apriyani, and Amsari Damanik. "Penegakan Hukum Pidana Terhadap Tindak Pidana Skimming (Studi di Polres Kutai Kartanegara)." *Journal of Law and Nation,* 3, No. 1 (2024): 89–97. https://joln.my.id/index.php/joln/article/view/92.

Saroh, Siti, Listian Indriyani Achmad, Muhammad Hamdan Ainulyaqin, and Sarwo Edy. "Analisis Transaksi Digital Non Fungible Token (NFT), Sebagai Instrumen Investasi Menurut Perspektif Ekonomi Islam." *Jurnal Ilmiah Ekonomi Islam,* 9, No. 1 (2023): 378–86. https://doi.org/10.29040/jiei.v9i1.7948.

Saulthan, Marshall. "Digital Banking Semakin Menggurita." *Kontan*, March 2021.

Scott, Dow. "The Causal Relationship Between Trust And The Assessed Value of Management by Objectives." *Journal of Management,* 6, No. 2 (1980): 157–75. https://doi.org/10.1177/014920638000600205.

Sinaga, Eka. "Studi Komparatif Penggunaan Digital Payment Terhadap Perilaku Online Impulse Buying (Studi Kasus: Pengguna OVO, Gopay dan Shopeepay)." *Jurnal Ilmiah Edunomika,* 6, No. 2 (2022): 1–7. https://doi.org/10.29040/jie.v7i1.6917.

Sri Rejeki, Niniek Mumpuni. "Overview of the Concept of Khiyar Al Aib in E-Commerce Practice." *Jhss (Journal of Humanities and Social Studies),* 6, No. 2 (2022): 218–25. https://doi.org/10.33751/jhss.v6i2.5670.

Suaedi. *Filsafat, Ilmu Dan Filsafat Ilmu*. Jakarta: Rineka Cipta, 2016.

Sugianta, I Kadek. "Pengaruh Teknologi Zaman Modern atas Pembentukan Konkret Kehidupan Manusia dalam Prespektif Filsafat Ilmu." *Genta Hredaya: Media Informasi Filsafat Hindu,* 5, No. 2 (2021): 101–11

Susilo, Muhammad. "Rancang Bangun Website Toko Online Menggunakan Metode Waterfall." *InfoTekJar: Jurnal Nasional Informatika dan Teknologi Jaringan,* 2, No. 2 (2018): 98–105. https://doi.org/10.30743/infotekjar.v2i2.171.

Svizzero, Serge, and Clement Allan Tisdell. "Barter and the Origin of Money and Some Insights from the Ancient Palatial Economies of Mesopotamia and Egypt." *Economic Theory, Applications and Issues*, No. July (2019): 1–35.

Tarantang, Jefry, Annisa Awwaliyah, Maulidia Astuti, and Meidinah Munawaroh. "Perkembangan Sistem Pembayaran Digital pada Era Revolusi Industri 4.0 di Indonesia." *Jurnal Al-Qardh,* 4, No. 1 (2019): 60–75. https://doi.org/10.23971/jaq.v4i1.1442.

Vinayan, Vidya, and Aleena Benny. "Online Transaction Fraud." *International Journal of Creative Research Thoughts (IJCTS),* 10, No. 5 (2022): 591–95.

wantiknas.go.id. "Digital Banking Tumbuh 13,48% dengan Nilai Transaksi Rp. 58.478 Triliun di 2023." WANTIKNAS: Dewan Teknologi Informasi dan Komunikasi Nasional, 2024.

Wati, Ambar, Arman Paramansyah, and Dessy Damayanthi. "Penerapan Etika Bisnis Islam dalam Transaksi Jual Beli:" *El-Mal: Jurnal Kajian Ekonomi & Bisnis Islam* 2, No. 2 (2021): 184–200. https://doi.org/10.47467/elmal.v2i2.344.

Yusoff, Remali, and Nor' Azurah Md Kamdari. "The Contract of Bay-Al-Salam and Bay-Al-Istisna in Islamic Commercial Law: A Comparative Analysis." *Prosiding Persidangan Kebangsaan Ekonomi Malaysia Ke-11,* 1, No. October (2016): 13–14.

Zhou, Chunshan, Dahao Zhang, and Yu Chen. "Theoretical Framework and Research Prospect of the Impact of China's Digital Economic Development on Population." *Frontiers in Earth Science,* 10, No. September (2022): 1–11. https://doi.org/10.3389/feart.2022.988608.