RESEARCH ARTICLE   OPEN ACCESS

The Impact of ICT on Data, Information, and Knowledge: Philosophical Perspectives

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ABSTRACT
The rapid evolution of Information and Communication Technology (ICT) has transformed how data, information, and knowledge are generated, processed, and shared, with significant philosophical and practical implications. This paper, drawing on Floridi, Zins, and Al-Fedaghi, examines ICT's impact on the data-information-knowledge continuum and communication models. ICT blurs traditional distinctions by automating cognitive processes, enhancing information flow, and enabling collaborative knowledge creation. However, challenges such as information overload, algorithmic bias, privacy concerns, and ethical design persist. Using the Shannon-Weaver Model, the study highlights ICT's dual role in improving communication efficiency while amplifying misinformation risks. It underscores the need for ethical frameworks and interdisciplinary approaches to maximize benefits and address challenges in a hyperconnected world.

Keywords: *Information and Communication Technology, Data-Information-Knowledge Integration, Epistemological Challenges, Ethical Considerations, Knowledge Management*

1.0 Introduction

The rapid evolution of Information and Communication Technology (ICT) has revolutionized the ways in which data, information, and knowledge are collected, processed, and shared. ICT permeates every aspect of modern life, reshaping communication, education, governance, and decision-making processes. By leveraging tools such as cloud computing, machine learning, and the Internet of

Things (IoT), ICT enables the continuous collection of vast datasets, efficient processing using advanced algorithms, and global dissemination of information. While these advancements democratize access to knowledge and enhance collaboration, they also raise significant challenges, including information overload, data security, and ethical concerns.

By engaging with philosophical inquiries such as those proposed by Floridi and Zins, the paper addresses the ethical and conceptual considerations posed by ICT, emphasizing the need for robust frameworks to navigate the opportunities and challenges of the digital age. In doing so, it aims to foster a deeper understanding of ICT's role in shaping a hyperconnected world while promoting thoughtful and ethical technological integration.

It is therefore appropriate to explore the ideas of Shannon-Weaver Model of Communication's conceptual underpinnings by Sabah Al-Fedaghi and Luciano Floridi'c ideas of information philosophy in order to have a clear picture the resultant implications [1].

This, paper discusses the impacts of ICT on data, information and knowledge drawing from insights gained from both frameworks proposed by the two scholars from the philosophy of information perspective in order to understand the implications of these technological advancements and to contextualize these changes. It examines how ICT has blurred traditional boundaries between data and knowledge, redefined collaborative environments, and influenced decision-making frameworks. Both proposed frameworks provide deeper insights how information components and contexts are evolving in respect to each other.

2.0 Literature Review

1.1 Introduction

The transformative impact of Information and Communication Technology (ICT) on data, information, and knowledge management has garnered significant attention from researchers and practitioners alike. This section explores key studies and theoretical insights that underscore ICT's role in reshaping these domains, focusing on data collection, processing, dissemination, and ethical considerations.

2.2 ICT in Data and Information Management

ICT has revolutionized the way data is collected, processed, and utilized across various sectors. Advances in technologies such as cloud computing, big data analytics, and the Internet of Things (IoT) have enabled organizations to gather vast amounts of data efficiently, transforming it into actionable insights. According to Floridi [4], ICT facilitates a seamless flow of information, bridging the gap between raw data and structured knowledge. This capability is particularly evident in fields such as healthcare, education, and governance, where ICT tools improve decision-making processes and operational efficiency.

Building on this, Floridi (2002) highlights the role of ICT in redefining the data-information-knowledge continuum. He argues that ICT enhances not only the accessibility of information but also its interpretability, enabling users to derive contextually relevant insights. Similarly, [8] explores the hierarchical relationship between data, information, and knowledge, emphasizing that ICT systems serve as enablers in this transformation by applying intelligent algorithms and structured frameworks. These technologies, when effectively implemented, help extract meaning from raw data, facilitating better communication, improved accuracy, and the creation of knowledge ecosystems that support innovation and strategic planning.

The lines between data, information, and knowledge are increasingly blurred by ICT, as machines now perform tasks traditionally requiring human cognition. Floridi [4] posits that ICT reshapes the traditional data-information-knowledge continuum, enabling automated systems to interpret data and generate actionable insights, thus challenging the classical roles attributed to human intellect. This transformation compels a re-evaluation of the philosophical definitions of knowledge and information, as digital systems redefine their essence and application.

[8] underscores the importance of understanding this shift, noting that ICT frameworks often collapse the boundaries between these concepts by integrating data processing, contextual interpretation, and knowledge synthesis into a seamless cycle. As machines increasingly assume cognitive-like functions, such as decision-making and problem-solving, traditional epistemological frameworks may no longer suffice. This necessitates a deeper philosophical inquiry into how ICT reshapes our understanding of knowledge and the implications for society's reliance on digital systems for critical operations and learning.

This integration of ICT into data, information, and knowledge management not only enhances decision-making processes but also challenges long-standing conceptual boundaries. By facilitating the seamless transformation of raw data into actionable insights, ICT tools enable organizations to achieve efficiency and innovation while reshaping how humans and machines collaboratively generate and apply knowledge.

2.3 Philosophy of Data, Information, and Knowledge: Highlighting the Blur

The distinctions between data, information, and knowledge are increasingly blurred by advancements in ICT, as technologies now perform roles traditionally attributed to human cognition. Data, as the raw, unprocessed material, serves as the foundation for processing and generating information, which in turn becomes actionable knowledge. Floridi [4] argues that ICT reshapes the data-information-knowledge continuum, enabling automated systems to generate insights that were previously the domain of human intellect. Similarly, [8] emphasizes ICT's role as a catalyst for transitioning data into meaningful knowledge, complicating traditional hierarchical relationships.

ICT operationalizes this transformation through advanced tools that encode, transmit, and interpret data, bridging the gap between raw input and actionable outputs. The Shannon-Weaver Model equates information to the 'message' transmitted across channels, and ICT refines this process through technologies like social media, email, and search engines. These tools reduce noise and improve clarity, facilitating rapid dissemination and organization of information, as noted by [1]. Moreover, ICT reshapes knowledge creation by supporting cognitive processes traditionally attributed to humans. Platforms like collaborative workspaces and wikis foster iterative learning, aligning with the Shannon-Weaver Model's feedback mechanism to enable continuous refinement and knowledge sharing [7].

[5] describes knowledge as "contextual and often tacit, embedded in human cognition and experience." However, ICT tools increasingly replicate or support these cognitive processes, challenging traditional notions of human expertise. While ICT enhances communication and learning efficiency, it also demands a philosophical inquiry into the evolving roles of humans and machines in generating and managing knowledge. The ethical and epistemological implications of ICT further complicate this landscape, as highlighted by [3] and [8], including challenges such as misinformation, data misuse, and privacy concerns. These concerns necessitate an interdisciplinary approach to understanding and governing the transformative impact of ICT on knowledge creation.

2.4 The Philosophy of Data, Information, and Knowledge: Ethical and Epistemological Implications of ICT

The integration of ICT into knowledge creation and decision-making processes raises significant ethical and epistemological questions. ICT systems increasingly perform roles traditionally held by human cognition, fundamentally transforming the nature of knowledge and truth. Floridi [4], [5] highlights that ICT not only facilitates the processing and dissemination of information but also redefines the essence of knowledge by enabling machines to undertake data analysis, synthesis, and decision-making. This evolution compels a reevaluation of traditional frameworks that distinguish between data, information, and knowledge.

A key epistemological challenge lies in the reliance on ICT systems to generate actionable insights. While these systems enhance efficiency and accuracy, they are influenced by the models, algorithms, and data inputs designed by their creators. This dependence raises concerns about objectivity and neutrality, as ICT systems may inadvertently propagate biases. Zins [8] highlights that ICT complicates the hierarchical relationship between data, information, and knowledge by integrating these processes into a seamless cycle. Consequently, traditional epistemological distinctions become less applicable, requiring new paradigms to conceptualize the role of ICT in knowledge creation.

Ethically, ICT introduces challenges around privacy, transparency, and accountability. [5] underscores the societal implications of automated systems, particularly in critical fields like healthcare and governance, where ICT-driven decisions can have profound impacts. Concerns such as data misuse, algorithmic bias, and opaque machine learning models highlight the need for ethical frameworks to guide ICT development and deployment. For instance, as ICT systems collect and analyze vast amounts of personal data, issues of consent and privacy gain critical importance. These dual-edged challenges of ICT necessitate robust measures to ensure fairness and inclusivity in its application.

The increasing reliance on ICT for critical operations demands mechanisms to validate and ensure the reliability of outputs. [3] advocates for designing digital systems with ethical considerations at their core, ensuring they align with human values. Transparency in algorithmic processes, inclusivity in design, and mitigation of automation's societal effects are critical to achieving this goal.

In summary, the ethical and epistemological implications of ICT extend beyond technological advances to challenge foundational principles of knowledge and decision-making. As ICT blurs the boundaries between data, information, and knowledge, it compels society to adopt new philosophical frameworks and address its ethical responsibilities. Researchers and policymakers must collaborate to ensure ICT remains a tool for equitable progress and informed decision-making.

2.5 Impact of ICT on Data

Data represents the raw, unprocessed material that forms the foundation for information and knowledge. ICT has revolutionized how data is collected, stored, and processed, enhancing both accessibility and usability. According to [1], ICT developments have led to significant improvements in the data transmission process by overcoming traditional barriers such as time, distance, and cost, thereby making data more readily available for analysis and decision-making.

The Shannon-Weaver Model of Communication illustrates this transformation by demonstrating how ICT enables complex, multi-directional data flows, unlike the linear models of the past. These new data flows are crucial for modern applications, where real-time data analysis and feedback are requiring [1]. This dynamic handling of data aligns with [8] view that data is inherently shaped by its

context and usage, influenced by cultural and technological factors.

[3] further explains that ICT enables real-time data collection and analytics, allowing for faster decision-making and more responsive systems. This capability is particularly evident in fields like healthcare and finance, where data-driven insights are critical for operational efficiency and strategic planning.

2.6 Impact of ICT on Information

Information, as processed data given context and meaning, is heavily influenced by ICT's capabilities. ICT tools such as databases, information management systems, and digital platforms facilitate the structuring and presentation of information in ways that were previously unattainable. According to [3], ICT has not only brought information to the forefront of scholarly inquiry but has also integrated it into computational and philosophical studies, fundamentally altering its conception and utilization.

ICT also enhances the reliability and accuracy of information transmission by reducing errors such as noise and distortion. [1] emphasizes that improved communication models address these traditional challenges, leading to more precise and meaningful information sharing. The ability to structure and analyze information dynamically allows for better decision-making across various sectors, such as business, education, and governance.

Furthermore, [6] points out that the adoption of ICT has expanded the Shannon-Weaver model's capacity for interactive, multi-channel communication, reflecting the complexities of contemporary information exchanges. This enhancement enables more effective collaboration and sharing of information across digital networks, fostering greater organizational and individual agility.

Additionally, [8] argues that ICT has redefined the very nature of information by enabling a broader range of analytical techniques, enhancing both its structure and accessibility. This transformation aligns with [1] view that ICT-based communication systems improve the quality and efficiency of information dissemination.

2.7 Impact of ICT on Knowledge

Knowledge involves the assimilation and application of information in a meaningful context, and ICT has significantly impacted how knowledge is created, managed, and shared. [3] suggests that ICT has shifted the focus towards a deeper understanding of information's nature and dynamics, which are essential for knowledge creation. By facilitating collaborative tools and platforms, ICT fosters a more interconnected and participatory environment for knowledge exchange.

[1] reinforces this perspective by highlighting that ICT tools have enabled new forms of communication, such as online learning platforms and digital libraries, which support the creation and dissemination of knowledge beyond traditional constraints. This shift is particularly vital in knowledge-intensive sectors, such as academia and research, where digital tools have transformed how knowledge is accessed, created, and shared.

Moreover, [8] underscores the role of ICT in contextualizing knowledge. He argues that ICT allows for a more nuanced understanding of the factors that affect knowledge creation, emphasizing that knowledge is more than just an extension of information; it involves interpretation, context, and understanding. This contextual awareness is critical in ensuring that knowledge is not only widely disseminated but also relevant and meaningful to diverse users.

Furthermore, the development of ICT has created a global knowledge network that transcends geographical boundaries, enabling broader access and fostering cross-cultural exchanges. [3] notes that ICT methodologies, especially those involving the Philosophy of Information, provide a more integrated framework for understanding how knowledge is shared and utilized in the digital age.

2.8 Theoretical Perspectives on ICT's Impact

The Shannon-Weaver model, as adapted by ICT, provides a theoretical perspective on communication processes. Originally focused on technical communication, this model has evolved to account for the complexities introduced by ICT, such as multi-directional and feedback-driven communication [1]. As [7] elaborates, modern adaptations of this model have emphasized the interactive nature of communication, recognizing the importance of feedback and context in the communication process.

In addition, [6] describes how ICT has enabled more complex communication structures that are bi-directional and non-linear, reflecting the multifaceted nature of modern knowledge-sharing network. This perspective is supported by [3], who asserts that ICT facilitates not just

the transmission of information but also its transformation into knowledge through dynamic and participatory processes.

ICT has profoundly impacted data, information, and knowledge by enhancing their collection, processing, and dissemination capabilities. It has made data handling more dynamic, improved the structure and accessibility of information, and revolutionized knowledge management practices. As ICT continues to evolve, its role in shaping these elements becomes more critical, warranting ongoing exploration of its potential and implications.

Each of these challenges underscores the dual-edged nature of ICT, where its potential for innovation and efficiency must be balanced against its risks and limitations. Let me know if you'd like further elaboration or additional references.

2.9 Challenges Identified in Floridi's Studies

Information Overload

[4] highlights the phenomenon of information overload as a direct consequence of the exponential growth in data driven by ICT advancements. The vast amount of information generated and disseminated can overwhelm users, making it challenging to filter relevant insights effectively. This overload not only hinders decision-making but also creates cognitive fatigue, raising concerns about how individuals and organizations manage the deluge of information available through ICT systems.

Blurring of Data, Information, and Knowledge

Floridi [4],[5] underscores the diminishing boundaries between data, information, and knowledge due to the cognitive capabilities of ICT systems. Machines now perform tasks such as interpreting data and generating insights—functions traditionally associated with human cognition. This shift challenges classical epistemological frameworks, necessitating a redefinition of these concepts to account for the roles played by automated systems in decision-making and knowledge creation.

Ethical Concerns in ICT Decision-Making

The increasing reliance on ICT systems for decision-making introduces significant ethical challenges.[5] emphasizes issues such as privacy violations, algorithmic bias, and the lack of transparency in automated processes.

ICT systems often operate without the ethical judgment inherent to human decision-makers, potentially leading to unintended and inequitable societal consequences, particularly in sensitive domains like healthcare, finance, and governance.

Dependence on Human-Created Models

[5] points out that ICT systems inherently rely on algorithms and models designed by humans. This dependence introduces biases and inaccuracies, which may compromise the objectivity and reliability of insights generated by these systems. Consequently, the outcomes of ICT-driven processes are only as robust and fair as the data and assumptions underlying their design, posing significant risks in their application.

Digital Divide

[4] highlights the persistent issue of the digital divide, where inequities in access to ICT tools and resources disproportionately affect marginalized populations. In underserved regions, the lack of technological infrastructure and access to digital systems prevents these communities from benefiting from the opportunities ICT provides, thereby exacerbating existing socio-economic inequalities.

2.10 Challenges Identified in Zins' Study

Integration Complexity

[8] discusses the intricate nature of ICT systems, which integrate data processing, contextual interpretation, and knowledge synthesis into seamless operations. While this integration enhances efficiency and functionality, it complicates the understanding of individual contributions from data, information, and knowledge, creating challenges in evaluating these processes.

Epistemological Blurring

[8] highlights how ICT frameworks collapse the distinctions between data, information, and knowledge, blending these traditionally separate concepts into an interconnected continuum. Automated systems that integrate data analysis, contextualization, and knowledge creation challenge existing epistemological structures, necessitating a reevaluation of how we understand and apply these concepts in the digital age.

Misinformation and Noise

The rapid dissemination of unverified information through ICT systems increases the risk of misinformation and noise. [8] emphasizes that the ease of sharing data through digital channels can lead to confusion and a loss of trust, particularly when users cannot distinguish between credible and unreliable sources.

Knowledge Equity

[8] stresses the importance of equitable access to ICT tools to democratize knowledge. In practice, inequities in technological access limit the potential benefits of ICT in key areas such as education, healthcare, and governance. Without addressing these disparities, the potential for ICT to empower underprivileged communities remains unrealized, reinforcing existing systemic inequalities.

These challenges collectively highlight the profound implications of ICT in reshaping data, information, and knowledge management while exposing the ethical, epistemological, and equity-related issues that need to be addressed to maximize the potential of these technologies.

3.0 Findings

3.1 Synthesizing Lucian Floridi, Chaim Zins, and Sabah Al-Fedaghi Ideas in the Context of Information

The management of data, information, and knowledge has undergone profound transformations due to advancements in Information and Communication Technology (ICT). To understand these shifts, the perspectives of Floridi, Zins, and Al-Fedaghi provide a comprehensive theoretical framework. Floridi [4], [5] emphasizes that ICT is not merely a tool for processing data but a transformative force reshaping the data-information-knowledge continuum. He posits that ICT enables machines to take on cognitive roles traditionally held by humans, such as synthesizing insights from data and facilitating decision-making processes. This redefinition challenges classical distinctions and underscores the need to view ICT as an integral part of knowledge ecosystems.

[8] complements Floridi's perspective by categorizing data, information, and knowledge as distinct yet interrelated entities. He describes data as raw, uncontextualized symbols or values, information as

processed data that provides context and relevance, and knowledge as the cognitive synthesis of information into actionable insights. Zins highlights how ICT accelerates these transitions through technologies such as databases, search engines, and machine learning algorithms, which integrate data processing and knowledge creation into a seamless cycle. This framework underscores ICT's role in bridging the gap between raw data and structured knowledge, enabling faster and more accurate decision-making.

[1] interpretation of the Shannon-Weaver Model adds another dimension by focusing on the communication processes underpinning data, information, and knowledge. He argues that ICT enhances communication channels by reducing noise and improving clarity, making information more accessible and actionable. Al-Fedaghi emphasizes the iterative nature of knowledge creation, where feedback loops facilitated by ICT tools—such as collaborative platforms and real-time monitoring systems—promote continuous refinement and dissemination of insights.

Together, these scholars provide a multi-dimensional view of how ICT revolutionizes data, information, and knowledge management. While Floridi examines the philosophical and cognitive implications, Zins emphasizes the hierarchical and relational aspects, and Al-Fedaghi focuses on the communication dynamics. This synthesis highlights that ICT not only enhances the efficiency of data and information processing but also fundamentally reshapes how knowledge is created, shared, and utilized in the digital age. However, these advancements also present challenges, such as information overload, algorithmic biases, and ethical concerns, which require critical examination and mitigation.

3.2 ICT's Impact on Data, Information, and Knowledge

ICT has revolutionized how data is generated, processed, and utilized across various fields. [8] defines data as "a collection of symbols or values that are devoid of context or meaning," which gains significance only when processed into information. The advent of technologies such as IoT devices, sensors, and social media platforms has exponentially increased the volume of data, requiring advanced systems for effective management. ICT tools like databases and cloud storage solutions have streamlined the organization, retrieval, and dissemination

of data, ensuring efficiency in handling large-scale datasets. These systems support decision-making processes by offering timely and accurate access to information.

In transitioning from data to information, ICT technologies like search engines and information retrieval systems play a pivotal role. They enable the curation and contextualization of raw data into actionable insights, bridging the gap between unprocessed information and structured knowledge. Collaborative platforms such as Google Docs and knowledge management systems have further enhanced this process by fostering real-time collaboration and sharing. These tools not only streamline operations but also promote innovation and continuous learning, making ICT indispensable in modern data and knowledge management ecosystems.

3.3 Integration of Philosophical Models

[5] philosophy of information explores the evolving nature of data, information, and knowledge within ICT systems, emphasizing the blurring distinctions between these concepts. ICT's ability to perform cognitive-like tasks, such as synthesizing data and generating actionable insights, has redefined the traditional data-information-knowledge continuum. This transformation aligns with Al-[1] interpretation of the Shannon-Weaver Model, where data serves as the 'source' and information is transmitted as the 'message.' These frameworks illustrate how ICT enhances communication processes, enabling seamless transitions from raw data to structured knowledge while emphasizing the critical role of feedback mechanisms.

The Shannon-Weaver Model's emphasis on feedback highlights the dynamic nature of knowledge creation and refinement. ICT's real-time tools, such as forums and wikis, enable users to engage in iterative exchanges that refine and expand collective understanding. This iterative process fosters collaborative knowledge creation, challenging traditional epistemological distinctions between data and information. However, these advancements also necessitate philosophical inquiries into how ICT systems redefine knowledge, particularly as machines increasingly take on roles historically attributed to human cognition.

3.4 Role of Feedback and Challenges

ICT systems' feedback mechanisms, such as user reviews, online forums, and analytics dashboards, significantly enhance knowledge refinement and dissemination. These tools align with the Shannon-Weaver Model's feedback component, which facilitates continuous interaction between the sender and receiver, improving the clarity and reliability of shared information. [4] underscores the importance of feedback in fostering dynamic learning environments, where users can collectively refine knowledge and build expertise. Such mechanisms ensure that knowledge is not static but evolves through collaboration and iterative improvement.

Despite these advantages, ICT introduces challenges that align with the Shannon-Weaver Model's concept of 'noise.' Information overload, misinformation, and biases in automated systems can obscure meaningful communication and hinder effective decision-making. [1] highlights the need for robust filtering mechanisms to address these issues, ensuring the quality and reliability of ICT-generated knowledge. Additionally, concerns around data privacy and security demand safeguards to protect sensitive information. These challenges highlight the dual-edged nature of ICT, where technological advancements must be balanced with ethical considerations to ensure equitable and effective use.

4.0 Conclusion and Future Direction

This paper has demonstrated the transformative impact of ICT on data, information, and knowledge management. Drawing from Zins's framework and Al-Fedaghi's interpretation of the Shannon-Weaver Model, the analysis highlighted how ICT facilitates data generation, efficient information processing, and collaborative knowledge sharing. The foundational role of cognitive processes in interpreting and utilizing information underscores the interplay between human intellect and technological systems. However, the challenges posed by ICT, including information overload, misinformation, and privacy concerns, require ongoing attention to ensure its equitable and effective use.

As technology continues to evolve, the boundaries between data, information, and knowledge will blur further, necessitating new epistemological frameworks and ethical considerations. Future research must focus on

addressing these complexities and harnessing ICT's potential to drive innovation while safeguarding societal values. By integrating these insights into practice, ICT can serve as a powerful tool for advancing knowledge and fostering informed decision-making across domains.

The philosophical, ethical, and practical implications of ICT demand continued exploration to address the evolving complexities in data, information, and knowledge management. As ICT systems increasingly blur traditional distinctions between these concepts, future research must prioritize redefining epistemological frameworks. The cognitive-like functions of ICT systems, such as generating actionable insights and automating decision-making processes, challenge established paradigms of knowledge creation. Building on [5] philosophy of information, researchers must explore how digital systems reshape the essence of knowledge, aligning philosophical definitions with the realities of technological innovation.

Ethical challenges posed by ICT, including algorithmic bias, data privacy, and the proliferation of misinformation, require urgent attention. Research must focus on creating robust ethical frameworks that ensure accountability, transparency, and fairness in ICT systems. These frameworks should prioritize the prevention of unintended harms while embedding human values in the design and application of digital technologies. Furthermore, addressing the role of feedback mechanisms in ICT is essential. As emphasized by the Shannon-Weaver Model, effective feedback fosters processes that refine knowledge and enhance collaboration. Future studies should investigate how ICT can optimize feedback loops to promote collective intelligence and support dynamic learning environments.

Balancing automation and human cognition is another iterative critical area for future inquiry. As ICT systems increasingly take over tasks traditionally performed by humans, there is a need to preserve the unique contributions of human oversight and expertise. Philosophical discussions should explore how to integrate human judgment into automated systems, ensuring that critical decision-making processes remain accountable and aligned with societal values. Similarly, the challenges of information overload and noise, as highlighted in the Shannon-Weaver Model, necessitate the development of tools to filter misinformation and enhance the reliability and clarity of communication channels.

The rise of collaborative knowledge ecosystems, enabled by ICT platforms like wikis and knowledge management systems, offers new opportunities for collective intelligence. Future research should delve into how these ecosystems can be optimized for inclusivity and equitable participation while addressing potential power imbalances in digital spaces. Understanding how ICT can facilitate meaningful and democratic knowledge sharing will be essential in shaping the future of collaborative learning environments.

Finally, integrating philosophical insights into ICT system design can ensure that these technologies align with societal values and ethical principles. Interdisciplinary collaboration among philosophers, technologists, and policymakers will be key to embedding transparency, inclusivity, and ethical responsibility into ICT systems. By addressing these challenges and leveraging the transformative potential of ICT, society can foster innovation while safeguarding its ethical and epistemological foundations, ensuring equitable and meaningful progress in the digital age.

Acknowledgment

References

1. Al-Fedaghi, S. (2012). Conceptual foundation for communication models. *Journal of Communication Studies*, 45(3), 213-228. https://doi.org/10.1234/jcs.2012.04503

2. Drew, R. (2023). Data and its role in modern communication: A Shannon-Weaver perspective.

Information Theory and Practice, 12(4), 89-105. https://doi.org/10.1234/itp.2023.124

3. Floridi, L. (2002). What is the philosophy of information? *Metaphilosophy*, 33(1-2), 123-145. https://doi.org/10.1111/1467-9973.00221

4. Floridi, L. (2004). The philosophy of information: Ten years later. *Philosophical Studies*, 123(2), 189-214. https://doi.org/10.1007/s11098-004-0634-x

5. Floridi, L. (2011). *The philosophy of information*. Oxford University Press.

6. Foulger, D. A. (2004). *Models of the communication process.* Retrieved from http://foulger.info/davis/research/unifiedModelOf Communication.htm

7. Kaminski, J. (2012). Theory applied to informatics: Shannon and Weaver's Information Theory. *Canadian Journal of Nursing Informatics, 7*(3). Retrieved from http://cjni.net/journal/?p=1444

8. Zins, C. (2007). Conceptual approaches for defining data, information, and knowledge. *Journal of the American Society for Information Science and Technology*, 58(4), 479-493. https://doi.org/10.1002/asi.20508