



RESEARCH ARTICLE

Gravitating towards Information Society for Information Security in Information Systems: A Systematic PRISMA Based Review

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ARTICLE INFO	ABSTRACT
Received: Apr 24, 2024	<p>This paper aims to explore how the invention of the internet has significantly altered consumption, work and social interaction patterns and the resulting effects on ensuring the confidentiality, integrity and availability of information. The objectives of research examine opinions and expectations regarding the assurance of secure information systems, analyzing how technological advancements can enhance information security in an increasingly information-dependent society. This mixed-method research project utilizes international databases and follows the PRISMA 2020 guidelines for conducting meta-analyses and systematic reviews. The study includes 165 papers and 40 reports using a robust and widely accepted empirical methodology within the relevant domain. It systematically employs specific keywords such as Information Systems, Information Society and Information Security which are interrelated. It was found that three-field plot analysis helps to understand the research field specialization in IS, InfoSec, and Information Soc. In the context of the USA, not only is it the most significant contributor, but China also plays a significant role in this research area and has extended its research collaborations with other countries. The effectiveness of existing informational and telecommunication laws is positively correlated with performance, and it serves as a mediator for enhancing cybersecurity in Bangladesh. This study focuses on safeguarding personal, financial, and sensitive information stored in both digital and physical formats. While the research is extensive, it has some limitations that must be addressed, such as effectively differentiating between several themes. It is imperative for governments and legislators to recognize the critical need for a clear vision for the future of information security initiatives.</p>
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INTRODUCTION

The advent of the Internet as a modern communication medium has brought about significant changes in the patterns of consumption, work, and social interaction (Amin et al., 2024), leading to the emergence of what is widely referred to as the "Information Society". According to Milon (2024), the term "Information security" has not yet been defined satisfactorily, nor are its implications fully

clear. Furthermore, it is worth noting that Information security, commonly referred to as InfoSec, plays a crucial role in safeguarding both digital and analogue information for organizations (Sabuj et al., 2019). The field of Information Security, commonly referred to as InfoSec, encompasses various domains such as cryptography, mobile computing, social media, and infrastructure and networks that house sensitive private, financial, and corporate information (Akter et al., 2023). Both government organisations and private organisations implement information security measures for various reasons within the context of the information society (Bhuiyan et al., 2024). Typically, the primary goals of InfoSec revolve around the assurance of confidentiality, integrity, and availability of organisational information. Given the broad scope of InfoSec, it frequently encompasses the deployment of diverse security measures across multiple domains (Bhuiyan et al., 2023). These measures include but are not limited to application security, infrastructure security, cryptography, incident response, vulnerability management, and disaster recovery (Bhuiyan et al., 2023).

In recent years, there has been significant discourse surrounding the potential benefits of information and communication technologies (ICTs) (Bhuiyan & Akter, 2024). These discussions have focused on various aspects, such as the potential for increased democratic participation and global civic engagement, the development of new policies for growth, and the potential for more efficient education and health networks (Hambling, 2021). Conversely, instances of exclusion are undeniably prevalent, typically categorized as part of the digital divide (Seeletso, 2022). This divide is observed between developing and developed nations, as well as within developed nations, where rural or economically disadvantaged regions significantly trail behind in terms of technological advancement (Saha et al., 2024). The identification of various threats to human rights, including but not limited to surveillance, censorship, and the ongoing legal proceedings surrounding the limitation of fair use rights for products safeguarded by intellectual property rights, has been brought to attention (Liu, 2021). Moreover, the escalating concern surrounding cyber-terrorism and the threat of digital attacks continues to contribute to the perceived necessity of implementing restrictive measures within the realm of cyberspace (Wade, 2021).

Research gaps

This study offers significant insights, albeit it does have several limitations. Many current studies focus solely on the technical components of Information Security (InfoSec) and do not thoroughly investigate how these measures impact the wider socio-technical environment of an Information Society (De Paoli & Johnstone, 2023). Furthermore, although the objectives of InfoSec, such as preserving confidentiality, integrity, and availability, are well-documented, there is a dearth of systematic assessments that thoroughly analyze the efficacy and incorporation of InfoSec practices specifically within the Information Society paradigm (Zanke et al., 2024). This study seeks to address this deficiency by conducting a comprehensive analysis of the available literature on Information Security within the framework of the Information Society (Tejay & Mohammed, 2023). The PRISMA methodology will be employed to guarantee a comprehensive and impartial synthesis of the present understanding (Mancin et al., 2024).

Research objectives

ROI 1: Examine how the information society influences information security standards.

ROI 2: Evaluate the information security frameworks' effectiveness in the context of the information society.

ROI 3: Analyze the geographical spread of information security research contributions for the information society over the world.

LITERATURE REVIEW

The various circumstances outlined above have presented policy makers with numerous challenges as they endeavour to develop effective strategies to capitalise on opportunities and mitigate threats (Saha et al., 2024). Additionally, they must navigate the delicate task of reconciling the conflicting interests of various stakeholders. Furthermore, it is worth noting that the regulation of a pervasive medium such as the Internet is often complicated by the inadequacy of national laws to address the various challenges it presents (Bhuiyan & Akter, 2024; Jam et al., 2017).

With the advent of the internet, our world has become increasingly interconnected, allowing individuals to transcend geographical boundaries and become virtual global citizens (Bhuiyan, 2017). The issue of cyber threats has evolved from being solely a national concern to now encompassing a broader scope of global security (Jawaid, 2022). The phenomenon of cyber threats is typically manifested as instances of cybercrime, which have the potential to inflict harm upon individuals, targeted groups or organisations, and even state actors (Milon, 2024). It has been observed that cyber criminals exhibit a tendency to actively seek out opportunities to launch attacks on various networks, systems, data, and operators with the primary objective of achieving financial gains (Bhuiyan et al., 2024).

It is imperative for Bangladesh to have access to dependable physical and information communication technologies (ICTs) (Helen, 2023). Infrastructure plays a crucial role in supporting various essential services across multiple sectors, including communications, emergency services, energy, finance, food, government, health, transport, and water (Hossain et al., 2024). These two types of infrastructure work together to ensure the smooth functioning of these vital services (Saha et al., 2024). Thus, in order to effectively attain our economic security and democratic goals, it is imperative that we possess dependable physical and digital infrastructure (Marchenko & Vlasov, 2019). The reliable functioning of the digital infrastructure or critical information infrastructure (CII) is becoming increasingly crucial for the operation and delivery of services by physical assets, as well as for conducting business activities (Bhuiyan et al., 2023; Rashid et al., 2023). Therefore, it is important to note that any major disruption to Critical Information Infrastructure (CII) can have severe and immediate consequences that extend well beyond the Information and Communication Technology (ICT) sector (Lawal et al., 2021). Such disruptions can significantly impair a nation's ability to carry out essential operations across various sectors. Thus, it can be argued that the responsibility for safeguarding critical information infrastructure protection (CIIP) lies with all members of society, as it is crucial for establishing a standard information society (Arif & Sabuj, 2018).

The role of information and communication technologies (ICT) is of great importance in various domains of contemporary society (Bhuiyan et al., 2024). The advent of ICT has revolutionised various aspects of human life, including communication, information retrieval, work practices, business operations, interactions with government entities, and social dynamics (Islam et al., 2024). ICT, or Information and Communication Technology, has a significant influence on various aspects of everyday life (Bhuiyan, 2023). Moreover, it plays a crucial role in driving macroeconomic growth. This, in turn, has a profound impact on society by facilitating the development of infrastructure and enhancing the overall standard of living (Bhuiyan, 2017; Kanval et al., 2024). The term 'socioeconomic development' is commonly used in both research and practical applications, however, its precise definition may not always be readily apparent (Lu & Li, 2019). The term 'development' connotes a sense of progress or advancement, and can be characterised as the collective endeavour within a society, whether consciously or subconsciously, with the objective of bringing about enhancements in various aspects of that society (Bhuiyan et al., 2023). The term 'socioeconomic', which is a compound word, pertains to various social factors such as education and profession, as well as economic factors like income and resources (Uçar & Sünbül, 2024).

Accordingly, socioeconomic development can be conceptualised as a dynamic progression characterised by alterations or enhancements in the social and economic circumstances pertaining to an individual, an organisation, or the broader societal framework (Rahman et al., 2024).

METHODOLOGY

The search was performed by utilising well-established international databases such as Science Direct, Scopus, Web of Sciences, PubMed, and DOAJ. The selection of these databases was based on the guidelines provided in the PRISMA statement of 2020 (Bhuiyan & Akter, 2024). The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework is a widely acknowledged and extensively utilised tool in the field of research (Manjre & Goyal, 2022). It offers a standardised and comprehensive set of essential components that are crucial for accurately documenting and reporting the outcomes of meta-analyses and systematic reviews. The approach described in the study conducted by Molla et al. (2023) is grounded in robust empirical data and has been widely applied in the relevant domain. The PRISMA guidelines have a primary objective of enhancing the precision and reliability of reporting systematic reviews and meta-analyses that assess the effectiveness of randomised controlled trials (RCTs) (Arya et al., 2021). The framework described in this study can serve as a foundational structure for the documentation of systematic reviews across different research domains, with a specific focus on evaluating therapeutic interventions (Bhuiyan et al., 2024). The significance of offering a thorough and elaborate account of the methodologies and findings of systematic reviews cannot be overstated, as it allows consumers to evaluate the reliability and relevance of the conclusions derived from the review (Poli et al., 2024).

The research methodology utilised a systematic approach by employing specific keywords such as Information Systems, ICT laws, Information Society, Information Security, and priorities (Molla et al., 2023).

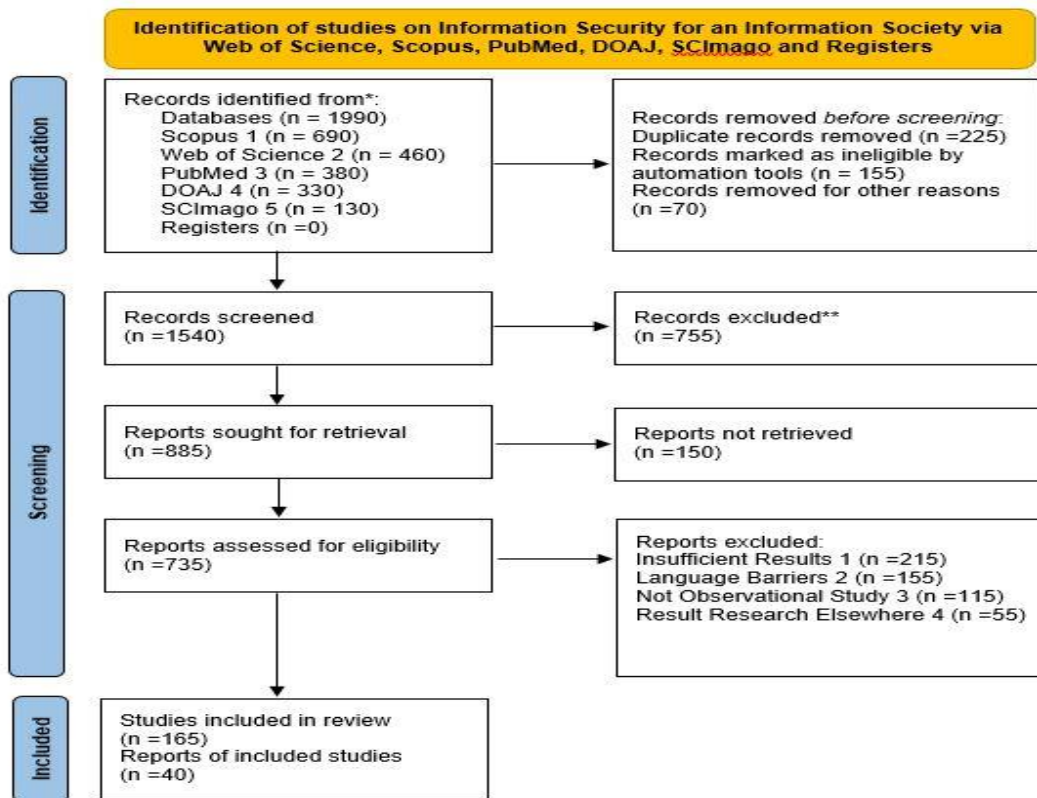


Figure 1: PRISMA Methodolog. Source: Author’s Work

The application of exclusion criteria serves the purpose of removing any records that do not correspond to the chosen keywords or study subjects, as elucidated by Molla et al. (2023). When considering the determination of publication and report rejections, it is crucial to consider a multitude of supplementary factors (Mia et al., 2024). Several factors contribute to the complexity of this research (Bhuiyan, 2019). One such factor is the limited availability of data, which hinders comprehensive analysis. Additionally, the presence of papers written in multiple languages poses a challenge in synthesising findings (Gruson & Ahadzie, 2024). Moreover, the existence of varied outcomes further complicates the task of drawing definitive conclusions (Bhuiyan et al., 2023). Lastly, the disconnected nature of impacts and findings adds another layer of complexity to this research endeavour. As part of the examination process, the researchers made an interesting discovery (Goldstein, 2022). They found an additional 165 papers and 40 reports, as illustrated in Figure 1.

Analysis

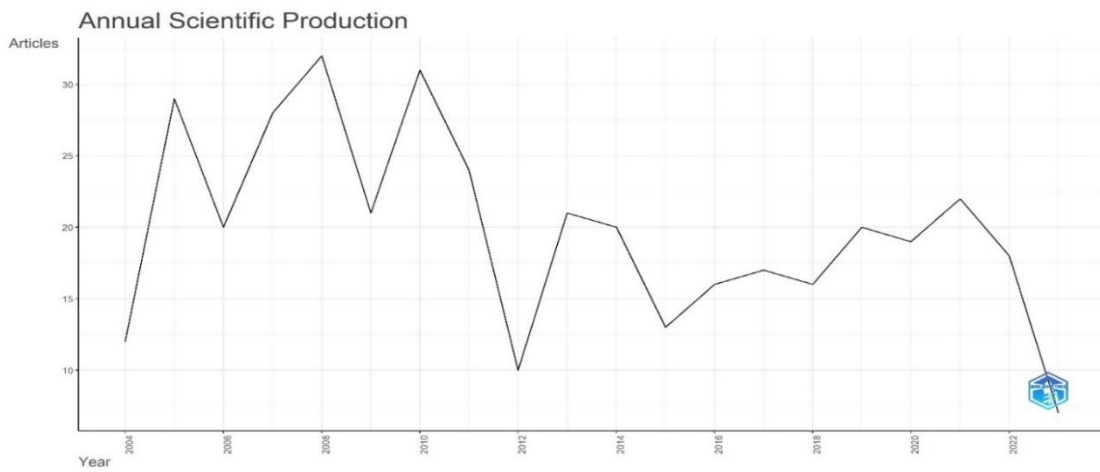


Figure 2: Annual Scientific Production of Information Society

Fig. 2 shows that the number of documents published before 2012 was significant. The years 2008 and 2010 experienced rapid publication growth, and suddenly, the number of publications reached its recorded low in 2012. In the last five years, from 2018 to 2022, the number of publications has not increased much.

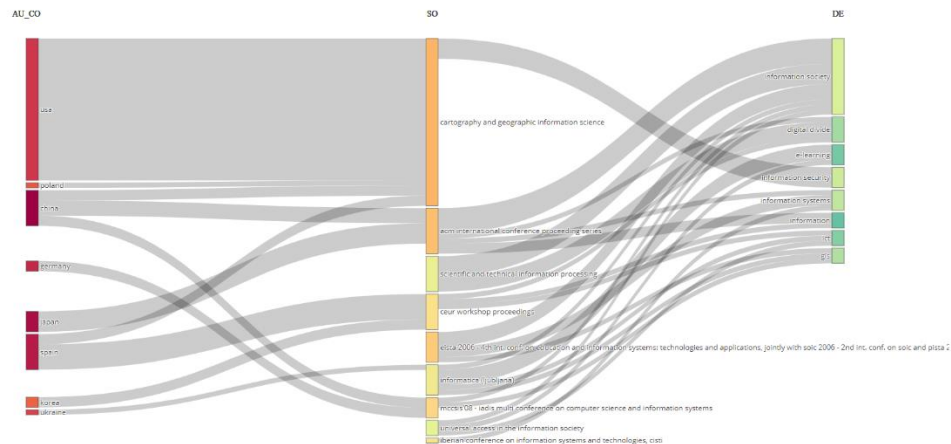


Figure 3: Information Society link between countries, keywords and sources

A three- field plot analysis helps to understand the research filed specialization in information security, information society and information systems. bond research in clean energy. Figure discovers the link between the countries, keywords, and sources. The keywords are presented on the right side, document sources in the middle, and country's name on the left side.

We noticed that USA is the most significant contributor in this research area, whose publications are linked to one specific journal "Cartography and geographic information science" The position of other countries is significantly far away from that of USA. China, Japan and Spain are found to be next forefront in terms of their contribution to this field. Meanwhile, the concentration of China and Japan can be traced to "ACM Internation conference proceeding series" and Spain publishes most of the articles in cur workshop preceding. Again, Information security is significantly tied with USA, Information society tied with China. Information systems and secure are significant keywords for Japanese authors and Spain concentrated more on ICT and GIS.

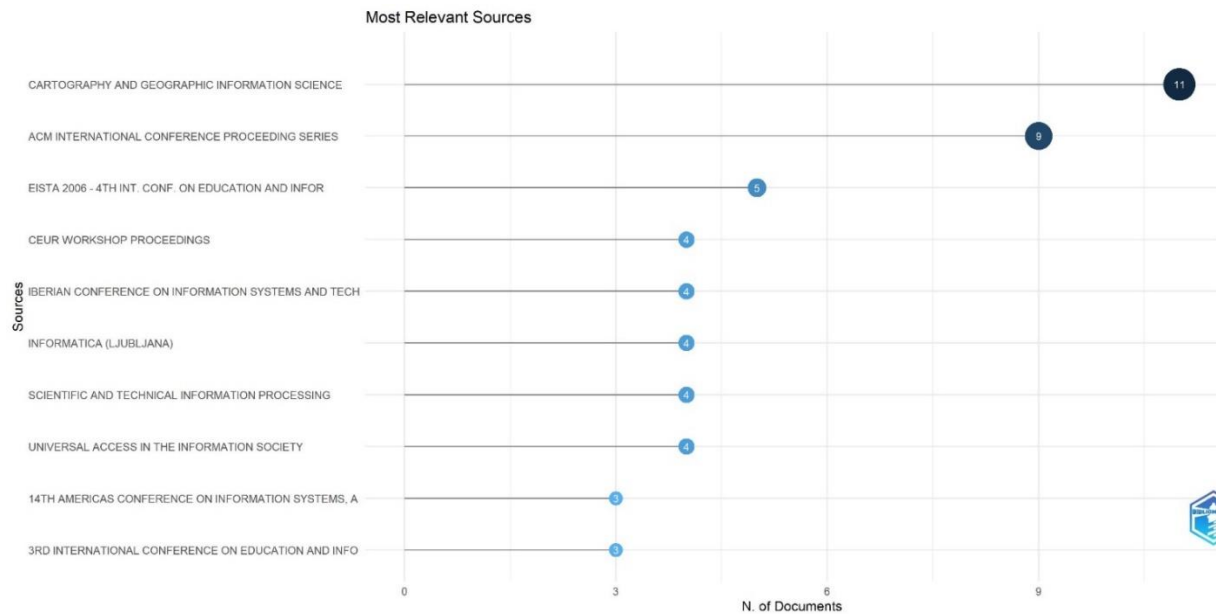


Figure 4: Most relevant source of Information Society.

Fig.4 presents the top sources for the articles. Cartography and geographic information Science published the highest 11 journals. ACM international conference proceeding series published 9 papers, making it the second most popular journal. EISTA 2006- \$th Int. Conference on education and Informac is in the third position, having published 5 papers.

shows collaboration among countries based on single-country publications (SCP) and multiple-country publications (MCP). China plays a significant role both in SCP, and MCP, article collaboration and lead the most number of publication with 30 articles. It shows that China has emphasized research collaboration on information security, information society and information systems of in its own country and extended its research collaborations with other countries (Bhuiyan et al., 2024). Spain holds the second highesy number with 20 articles where 19 are SCP Nevertheless, Spain, Germany, Japan, USA , Poland and UK played a role in articles publication.

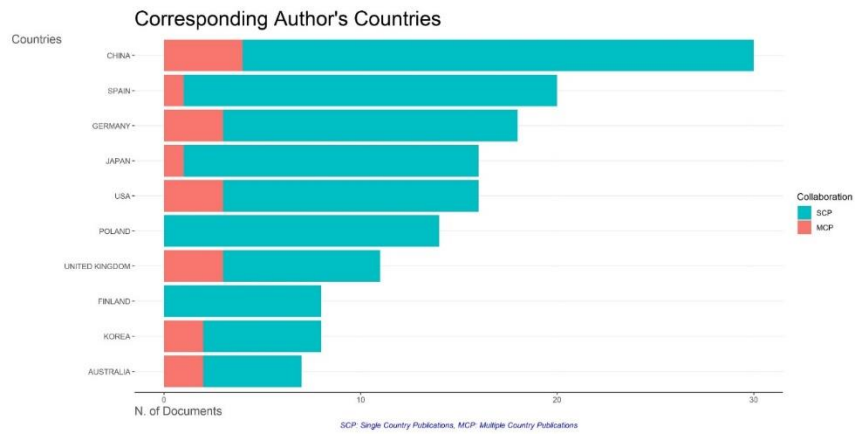


Figure 5: Information Society for Corresponding Author’s different countries.

Figure:5 presents the top countries that got information security, information society and information systems research attention in terms of the number of and citations. USA owns the maximum number of 533 citations. UK, Korea, Spain and Poland are in the top 5 in citations.

Country Collaboration Map

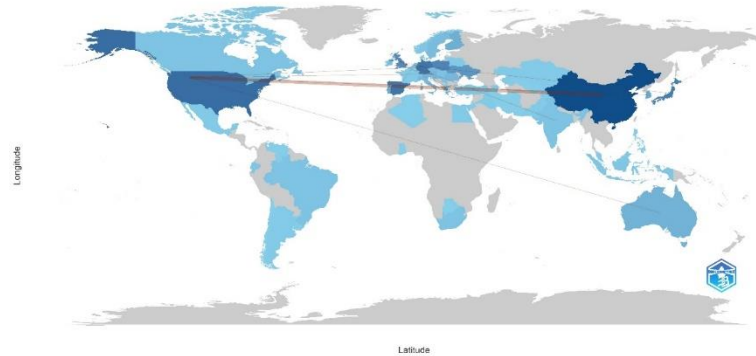


Figure 6: Country collaboration Map of Information Society

Fig. 6 presents the country collaboration map, which shows the authors' affiliation between the countries. The thickness of lines means frequency of collaboration and The intensity of the color represents the number of publications in a country, researchers noticed strongest collaborations between countries: China and USA- 4 articles. Next, Germany – Australia, Greece Italy, Germany Greece, Germany- UK all grace collaborated in 2 articles countries.

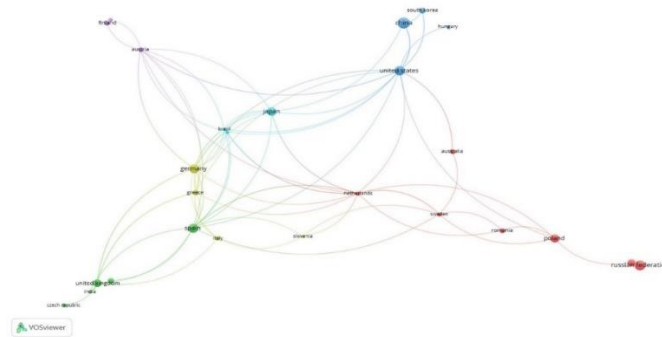


Figure 8: Connection of Information Society by different countries

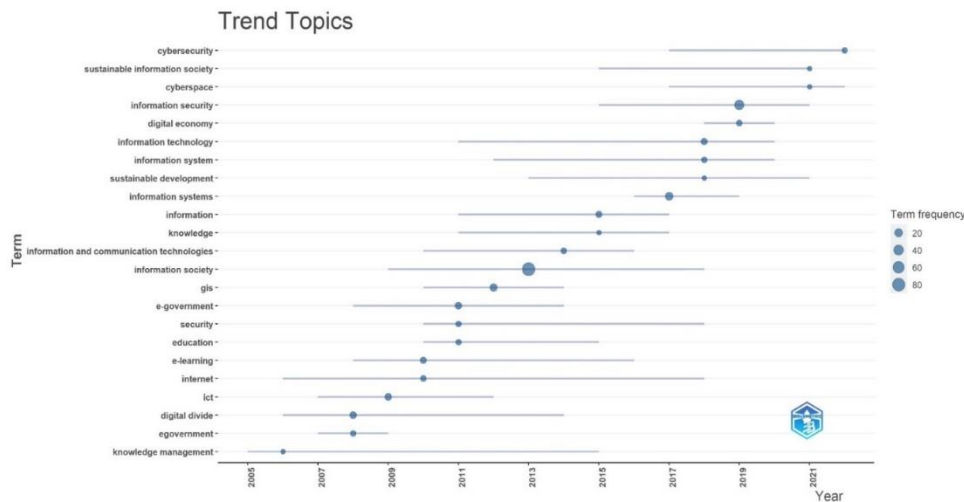


Figure 9: Trends Topic of Information Society

DISCUSSION

The papers included in this special edition collectively examine the impact of information and communication technologies (ICT) on different facets of society and socioeconomic progress (Adamska, 2021). Specifically, they explore the influence of ICT in domains such as education and training, administration, organizational relationships, project management, service delivery, and medical care (Tran, 2023). Within this editorial, we endeavor to establish a framework for understanding the significance of Information and Communication Technology (ICT) in the context of socioeconomic development (Khanom et al., 2022). Additionally, researchers aim to elucidate the interconnections between different facets of society, technology, business, and governmental policy in relation to socioeconomic development (Liwång, 2022).

It is imperative for Bangladesh to establish a sense of trust and ensure the safety of information and communication technologies (ICTs) due to the increasing complexity, frequency, and severity of cyber threats (Helen, 2023). The concern surrounding cyber threats stems from the potential for severe economic, social, and national security impacts that could arise from the disruption or destruction of critical information infrastructure. The cyberspace that we inhabit is confronted with a multitude of threats (Khanom et al., 2022). Cyber threats encompass a wide spectrum of malicious activities, ranging from targeted espionage aimed at acquiring sensitive political intelligence, to deceptive phishing techniques employed to facilitate fraudulent credit card transactions (Bhuiyan et al., 2023). Furthermore, it is worth noting that contemporary espionage activities have expanded beyond the realm of government information and now encompass the theft of intellectual property belonging to commercial enterprises (Islam & Bhuiyan, 2022). This shift in focus has led to increased targeting of industries involved in communication technologies, optics, electronics, and genetics (Mani, 2019). The design of the Internet infrastructure is conducive to the occurrence of cyber threats, as it possesses characteristics such as border lessness, anonymity, and cross-border connectivity (Seabra et al., 2022). However, it is worth noting that despite its inherent vulnerabilities, the Internet plays a crucial role in supporting essential government and private sector services in Bangladesh (Akter et al., 2023).

An information society is a society in which the generation, dissemination, utilization, incorporation, and manipulation of information are significant economic, political, and cultural endeavors (Pričins, 2023). The Information Society for Information Security in Information Systems (IS4IS) specifically examines the significance of information security in the wider framework of information systems

and society (Artiushin & Voloschenko, 2022). It acknowledges the crucial significance of safeguarding information in a society that is becoming more and more dependent on digital technologies.

Table 1: The intellectual core of information systems security

Key concerns of consideration	Description	Reference
Confidentiality	Confidentiality pertains to the limitation of data access exclusively to persons who have been granted authorization. Nevertheless, as technology progresses to enhance the availability of data and organizational practices promote less hierarchical structures, informality, and empowerment, it becomes crucial to priorities the equilibrium between accessibility and security. In this growing setting, it becomes vital to attain a state of equilibrium between usability and security, as well as convenience and security.	(Di Nocera et al., 2023; McCoy et al., 2023)
Integrity	Ensuring the accuracy and consistency of data is extremely important, but it is equally crucial to assess how data analysis conforms to the standards and values of the organisation. Businesses demand people who have the capacity to precisely analyse processed and stored information while following business policies and legal obligations. Ensuring the preservation of "interpretation integrity." is crucial in order to prevent misapplications and errors.	(Chatterjee et al., 2021; Zhao, 2023)
Availability	Availability refers to the consistent and uninterrupted accessibility of systems as required. Although system failures sometimes raise security concerns, this principle often causes less controversy inside organizations as compared to confidentiality and integrity.	(Khatai & Singh, 2024)

However, it is essential to guarantee that confidentiality, integrity, and availability are implemented correctly (RITE) in order to effectively safeguard information assets in the future (Wang et al., 2023). Organizations should contemplate adopting supplementary guiding principles: responsibility, integrity, trust, and ethicality (RITE). Creating a subculture that acknowledges the essential nature of these concepts forms a strong basis for strong information security (Varzakas & Antoniadou, 2024).

Table 2: The intellectual core of information systems security

Keywords	Description	Reference
Responsibility and Knowledge of Roles	Understanding roles and duties is crucial in geographically distributed organizations. As vertical management structures decline, empowerment takes the stage, forcing individuals to organize their work habits around clear duties. Beyond past mistakes, responsibility includes proactive management of future events.	(Pan et al., 2023)
Integrity as a Requirement of Membership	The integrity of individuals within an organization is highly significant. Data has transformed into a crucial resource, leading organizations to meticulously assess the individuals they accept into their ranks. Once inside, it is crucial to protect and maintain integrity, as the majority of security breaches come from current	(King et al., 2023)

	personnel. Upholding high ethical standards is crucial to preventing fraud and promoting loyalty.	
Trust as Distinct from Control	The term "effective control" implies a deceptive situation where an individual has unrestricted authority over a trust's assets and is not bound by any fiduciary or other limitations. This allows them to treat the "trust property" as their own personal belongings.	(Nair, 2018)
Ethicality as a Guide, Not Just Rules	Organizations should foster an ethical atmosphere where individuals are required to conform their conduct to informal norms and behaviors. Although rules are designed to address structured processes and foreseeable scenarios, there may be instances where rules are not applicable. During such occurrences, ethical practices provide essential direction.	(Ali et al., 2022)

Remarkably, cyber espionage and other cybercrimes exhibit a remarkably low cost structure. The Internet provides a wide range of attack tools and methodologies that can be easily accessed by individuals, including amateurs, for activities such as phishing or malware distribution (Dasgupta, 2019). In addition, it is worth noting that individuals who commit cybercrimes often encounter minimal chances of being convicted. This can be attributed to the presence of legal frameworks that are not harmonized or compatible across different jurisdictions (Ünal & Yavuz, 2020). Furthermore, the absence of well-established organizational structures hampers international cooperation, dialogue, and coordination in effectively addressing cyber threats (Marazis, 2021). The utilisation of silent surveillance techniques allows hostile nations to meticulously analyse the layout and defensive measures surrounding crucial government and private sector infrastructures (Long et al., 2022). This, in turn, grants them the ability to surreptitiously implant backdoors, as well as develop and evaluate potential attack strategies (Vrankar et al., 2023). It has been observed that both public and private organizations are currently offering digital facilities to users. However, it is concerning that these organizations are not adequately prioritizing security measures to protect the digital infrastructure (Bjola & Zaiotti, 2020). This lack of emphasis on security could potentially lead to vulnerabilities and expose sensitive information to unauthorized access or cyber-attacks (Rahman & Jahankhani, 2021). It is crucial for organizations to recognize the importance of implementing robust security protocols to safeguard the digital facilities they provide (Penchev, 2021). Furthermore, it can be observed that the efficacy of the Information and Telecommunication Act in ensuring the security of the cyberspace within the country is lacking (Alam et al., 2022). This study aims to examine the primary challenges faced by Bangladesh in implementing effective cyber security measures in the context of the globalized world. The present study investigates the effectiveness of existing informational and telecommunication laws in order to propose remedial measures for enhancing the cyber security of Bangladesh (Bhuiyan et al., 2023).

CONCLUSION

Bangladesh is currently making significant progress towards becoming an information society, driven by a strong and advantageous force (Islam & Bhuiyan, 2022). Governments and legislators must acknowledge the crucial need to establish a well-defined vision for the future of this undertaking (Faroque, 2024). Information security is the deployment of procedures to mitigate the risks involved with safeguarding information. Cybersecurity involves protecting information systems and the data they manage, store, and transmit to prevent unauthorized access, use, disclosure, disruption, alteration, or destruction (Isakov et al., 2024). This encompasses the protection of personal information, financial information, and sensitive or private information stored in both digital and physical forms (Lai, 2023). In order to attain efficient information security, a

comprehensive and multidisciplinary approach is required, spanning humans, procedures, and technology. Information Security encompasses a wide range of study fields, including Cryptography, Mobile Computing, Cyber Forensics, and Online social media (Mohanty et al., 2023).

Limitations of the Study

This research is thorough, although it does have certain shortcomings that need to be addressed. The PRISMA-based methodology, known for its robustness in topic modelling, may have limitations in effectively differentiating between several themes (Rashid et al., 2021). This is especially true in situations where the subjects are closely linked or coincide with one other. This is likely to lead to imprecision in identifying subjects (Alam et al., 2022). In our research, we only included publications authored in English that were included in the most prestigious datasets (Bhuiyan et al., 2023).

Future Directions

The field of information security is known for being constantly changing and having many different aspects (Fernando, 2022). In light of the fast rate of technological progress and the constantly changing nature of threats, it is crucial to actively pursue ongoing research efforts to develop robust and adaptable security measures (Bhuiyan, 2017). The current systematic review, carried out following the PRISMA framework, seeks to provide insight into important areas that require additional research (Masum et al., 2024). The primary goal is to guarantee the preservation of safe information systems in the context of a society that relies more and more on information.

Conflict of Interest

The authors of this research paper assert that there are no conflicts of interest inherent in the process of performing and publishing this study.

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