DIGITAL TRAIL AWARENESS IN ISLAMIC PERSPECTIVE

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Received : September 18, 2021 Accepted : December 30, 2021 Published : January 16, 2022

Abstract: The growing popularity of the internet has a significant impact on people's attitudes**.** The Covid-19 pandemic has accelerated a cultural, ethical, and normative change in people's behavior. The potential for social change resulting from the emergence or advancement of information and technology is significant. The rise of social media, which has now become a common form of communication, is unavoidable. Digital communication through a variety of websites to obtain information will leave digital traces. The concept of a digital trail certainly reaffirms what has previously been written in Al-Qur'an, Surah Yasin: 65. This verse is relevant to digital multi-hop tracks that outline human actions and behavior to the swipe of their fingers. The verse is translated through the use of a digital trail that is connected to internet access. This library research study uses the source triangulation method to analyse exploratory qualitative content. The study's findings indicate a correlation between the digital trail and Surah Yasin 65, demonstrating that current digital technology proves that the Qur'an's nash or verses are consistent with the unquestionable assumption of human rationality. It also emphasizes the importance of being cautious and responsible when using digital platforms.
Keywords: digital; trace; trail; multi-hop; awareness

Abstrak: Tren peningkatan penggunaan internet memberikan pengaruh besar terhadap perilaku masyarakat. Pandemi Covid-19 mengakselerasi pergeseran pola perilaku masyarakat baik dari segi budaya etika maupun norma yang ada. Potensi terjadinya perubahan sosial sebagai konsekuensi lahir atau berkembangnya teknologi informasi sangat besar. Kemunculan media sosial yang kini sudah menjadi hal yang umum dalam berkomunikasi memang tak dapat dihindarkan lagi. Jalur komunikasi di era digital yang melalui berbagai proses untuk mendapatkan informasi akan meninggalkan jejak-jejak digital atau digital footprint. Potret jejak digital ini tentunya menegaskan kembali apa yang telah dituliskan dalam Al Quran pada surah Yasin ayat 65. Ayat ini memiliki relevansi dengan jejak hop digital menguraikan perbuatan dan perilaku manusia dari sentuhan jari. Ayat tersebut diterjemahkan dengan footprint digital yang terhubung dalam sebuah jaringan internet. Studi ini merupakan library research dengan pendekatan kualitatif explanatif dalam bentuk konten analisis dengan metode tringalasi sumber. Hasil studi menunjukkan bahwa terdapat korelasi digital footprint dengan Surah Yasin 65 di mana teknologi digital saat ini menjadi bukti bahwa nash yang termuat dalam Alquran sesuai dengan asumsi rasionalitas manusia yang tidak memiliki

keraguan di dalamnya. Penekanan berikutnya adalah setiap individu harus cermat dan bertanggungjawab dalam mengakses platform digital.
Kata kunci: digital; footprint; multi-hop; awareness

Recommended APA Citation :
Adnan, G., Fadhli, M., & Ashal, F. F. (2021). Digital Trail Awareness in Islamic Perspective. *Elkawnie*, *7*(2), 382-394. https://doi.org/10.22373/ekw.v7i2.11706

Introduction

The advanced development of the internet has made it feasible for people in many countries, including Indonesia, to easily access a limitless amount of information. According to the Kompas daily news section (2021), Indonesia's current internet user population has reached 15.5%, increasing approximately 27 million people compared to the previous data in 2020. As reported by Hootsuite, with a 274.9 million population, Indonesia's internet network penetration has reached 73.7 % in early 2021. This massive increase was triggered by the pandemic that occurred in early 2020. Internet access is used to conduct almost all human activity, from office work, education, business to trading.

This rising trend of internet use has a significant impact on people's behavior. The Indonesian Ministry of Communication and Information (Kominfo.go.id, 2017) shows that there are approximately 800,000 sites in Indonesia that are suspected of spreading hoaxes (fake information). Moreover, cyberbullying is on the rise among teenagers. At least 60% of teenagers say they have been bullied, and another 87% have been subjected to online bullying (Pratama, 2021). Cyberbullying is a term used to describe content/uploads that contain elements of bullying, negative comments, and the dissemination of someone's posts or profiles to demean or mock them. According to research conducted by Karabatak and Kasetianingsih (2020; 2017), the social impact of the internet on adolescent morals includes inappropriate speech, a lack of respect for parents, the uploading of indecent photos and watching non-educational shows. The data is sufficient to demonstrate that accessing the internet through numerous available platforms provides users with an abundance of space to browse flexibly according to their desires. Even many people are trapped in illegal use; access to porn websites, online scams, criminal activity, and illegal trafficking

Islamic teachings have provided ways for a proper and good life order far beyond this era. They maintained humans safety from harm and danger, avoided slander, and prohibited all deviant behaviours. Islam provides general guidelines but is always adaptable to changing circumstances. The slogan of *amar ma'ruf nahi munkar* (encourage good behavior and avert bad behavior) cannot be ignored. Unconsciously, every interaction on a digital internet medium is automatically recorded on several other devices.

It should be noted that the process of swiping a finger to access media on the internet is not as simple as imagined. In fact, the touch and swipe of a single

finger are essentially recorded through multi-hops until the desired webpage opens. For instance, if computer A accesses Google's servers, the request must be routed through several additional computers. It is supposed there are ten computers to pass then record the activity. Thus, any activity carried out by data from computer A will leave traces on those ten computers, as well as on Google.

An internet network comprises thousands of computers that provide a variety of either positive or negative content that anyone can access. Internet users, known as netizens, will leave digital traces which are retained for an extended period of time on the various computers through which they passed (Bodhani, 2012; Karabatak & Karabatak, 2020).

A digital footprint is a snapshot of data generated by netizens' activities while accessing content on the internet; this is how a person's digital history is being recorded. Everything will be archived appropriately, from accessing social media to uploading content to social media, using applications, recording emails, watching videos, and accessing porn sites to using enrichment applications.

Similarly, Lambiotte and Kosinski (2014) agree that netizens' digital traces in the numeric form will be saved in the database or router logs to the server. This form of digital trail certainly confirms what is written in Al-Qur'an, Surah Yasin verse 65: *"That Day, We will seal over their mouths, and their hands will speak to Us, and their feet will testify about what they used to earn".*

The verse of Al-Qur'an above is pertinent to the digital hop tracks that detail human actions and behavior at the swipe of their fingers. The clause "*their hands will speak*" could be interpreted as a digital trail or footprint connected to internet access. The digital trail will reveal an individual's behavior without speaking with the perpetrator. This study will investigate more profound the Islamic perspective on digital trail awareness. At the same time, Karabatak (2020) investigates the phenomenon of adolescent internet users' behavior, but not from an Islamic perspective.

Methodology

This study is library research that obtained data from texts and books as primary sources to construct the study's object (Hadi, 2002). Still, it employed a qualitative descriptive approach with content analysis. The content analysis highlights the characteristics of a message's content and tries to visualise it. Additionally, content analysis can deduce the origins of a message. The content analysis does not focus on the message's description, but it tries to determine why the "message's content" appears in a particular form.

Establishing valid data requires an examination technique based on specific criteria. It consists of several components that must be applied, including credibility, transferability, dependability, and confirmability (Moleong, 2007). According to Denzin, as cited in Moleong (2007, p. 330), there are four types of

triangulation as an examination technique that employs sources, methods, investigators, and theories.

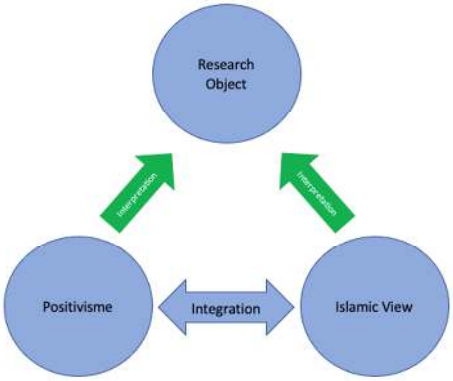

Figure 1. Research diagram

The methodology of this study is triangulation with sources. It requires comparing and evaluating the trustworthiness of data obtained at different times and using various tools in qualitative research. The source of data is derived from several *tafsir* that rely primarily on the language and *fiqh* aspects, namely *tafsir Sha'rawi* and *tafsir al-Jami' fi ahkamil Quran*.

Resource person involved in content analysis has backgrounds in Egyptian *Darul Ifta*, Arabic Literature, and expert in Qur'an Tafsir. The integration analysis process in this study corresponds Al-Qur'an verses with the opinions of credible Islamic scholars with the systematic decomposition of the digital trail according to positivist principles. Both perspectives are interpreted qualitatively in order to emphasize the importance of comprehending the digital trails' awareness.

Discussion

Computer Network

The computer network concept was invented in 1945s in America. The prototype is called the MODEL I computer under the development project at Bell Laboratories and a Harvard University research. This project was led by Professor Howard Hathaway Aiken. Initially, the project was only intended to use computer devices that must be used simultaneously. In order to accelerate the execution of multiple processes, thus batch processing was developed to run numerous programs concurrently on a computer using queue rules. The computer network is a medium to facilitate data distribution from the source to the destination. Typically, the data or information sent over a computer network will pass through several additional computers before reaching its destination via predetermined routes.

In the 1950s, when computer technology continued to evolve, it eventually gave birth to a next-level computer, known as a supercomputer. A supercomputer

was able to serve multiple terminals. Therefore, the concept of time-based process distribution, known as TSS (Time-Sharing System), was discovered. Then, for the first time, a computer network was used. Several terminals are connected to a host computer in the TSS system. Initially developed independently, computer and telecommunications technology appear to have been combined in the TSS process. According to another definition, a computer network is a set of "interconnected systems" between two or more computers in a network, either wired or wireless (wireless), that share information (Tarigan, 2009).

Additional interconnection equipment, such as Hubs, Bridges, Switches, Routers, and Gateways, is required to create a computer network with a more extensive range. In order to facilitate the communication process between computers easier, a standard that regulates the data exchange process was introduced, namely TCP/IP. TCP/IP (Transmission Control Protocol/Internet Protocol) is a data communication standard that the internet community uses to exchange data from one computer to another on the internet network (Salomatin et al., 2021; Syafrizal, 2005).

Data communication occurs when netizens access information stored on a computer owned by an information provider, known as a server. The process of requesting data from netizens will then traverse several other computers, a process known as routing until it reaches its destination and receives the requested information. The data that continues to circulate will open information in each routing process to reach its destination, which is where each piece of information will be stored and tracked.

Routing

Routing is the process of transferring data packets from one source to another in order to reach the intended target. The routing process occurs at the network layer on the Transmission Control Protocol network (TCP/IP). This layer has a role as a place to determine the route, which will then be forwarded to the destination address (Sukiswo, 2008). There are two types of routing; Distance Vector (DV) and Link state (LS). The DV method is used to determine the best route, which is decided by calculating the distance (hops), i.e., the route with the fewest hops is the best and selected route.

Each router on the network is aware of the shortest route to the next segment. The routes will then communicate with one another, and finally, the shortest path to the destination host will be chosen more frequently (Rifiani et al., 2011). On the other hand, the LS routing method collects interface information, such as available bandwidth, and then shares it between routers. The path with the highest bandwidth number will be chosen as the best. If two or more computers are on the same network, they can be connected directly. If this is not the case, communication must occur via a router. The router is a device that allows packets to be forwarded from one network to another (Wagito, 2005).

Routing is the process of determining the route taken across a communication network from one point to another. There are numerous methods for transferring data or information from one destination to another. Still, not all of them effectively deliver the data or information to the target destination. Therefore, the routing process will benefit networks with many different routes for getting data or information (Wagito, 2005). Routing protocols are essentially methods by which routers communicate with one another. Thus, a router can connect to other routers on one network. The benefits of using a routing protocol (Tittel, 2002) are: Simplifies network management by providing instant access to reachable addresses. And then, Defines routes in the network that are "loop-free". Determine the ideal route from a variety of available options. Next, ascertain that all routers on the network accept the optimized routes that have been established.

Numerous routing protocols are available, each with its advantages and disadvantages. However, all of these protocols provide a mechanism for routers to communicate with one another on the network, allowing for the collection of complete Network Layer Reachability Information (NLRI). Then it will be processed and used to determine the optimal routing information and resolve various looping issues.

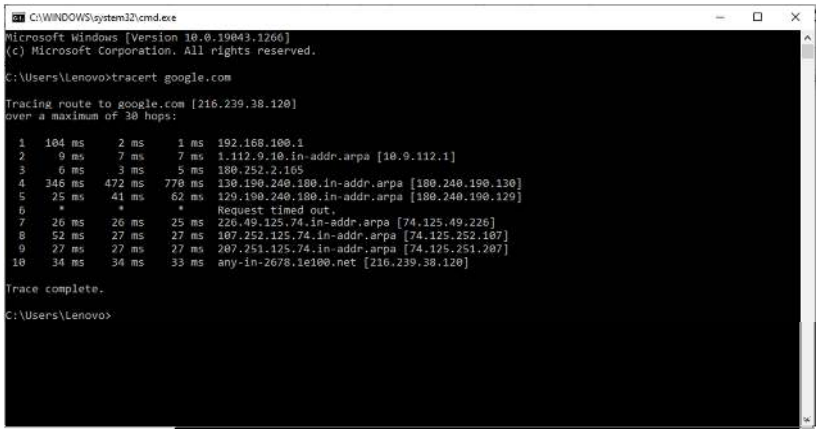

Figure 2. Routing Process to Google

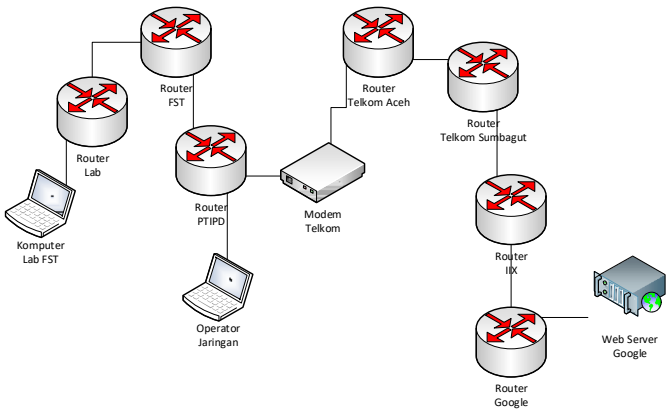

Figure 3. An Overview of Google's Access Topology

Modern computer networks generally employ dynamic routing algorithms rather than static routing algorithms, as static algorithms impose no load on the network during the transmission of a data package. Two types of popular dynamic algorithms are named as Link-State and Distance Vector (Altman & Jiménez, 2012). The routing steps illustrated in figures 2 and 3 are carried out on the Ar-Raniry State Islamic University campus.

Indonesia has enormous potential for social change due to its high level of diversity, large population, and diverse cultures. Faster and easier access to technology and information development shrinks and narrows the world. Without regard for time or place constraints, information can now infiltrate anywhere. Nowadays, people are able to know one another's activities using social media, even if they have never met or met face to face. There seem to be no boundaries in the world, and there is no such thing as privacy and confidentiality.

In The New Yorker newspaper in 1993, a phenomenal cartoonist, Peter Steiner, created a cartoon about two dogs playing on the internet via a computer. Steiner captioned the cartoon, "On the internet, nobody knows you're a dog." This is the inverse of the previous sentence, which describes everything as limitless. Indeed, approximately 25 years later, Steiner's writing, which was considered commonplace at the time, is now regarded as inappropriate. This is a result of the growth of information technology. Internet companies can use Google Analytics tracking codes to identify users who access their services by recording data and creating a digital trail (Pranajaya, 2020).

Social media was established due to the advancement of information technology and is not a new phenomenon in society. Ironically, it is safe to say that people nowadays are very dependent and addicted to this mode of communication. This is supported by data showing that 90% of internet users use social media platforms (Taprial & Kanwar, 2012). According to Hootsuite's Wearesocial research, social media users in Indonesia reached 150 million, or 56% of the total population, in January 2019. It increases 20% from the previous survey.

Meanwhile, mobile social media users (gadgets) have surpassed 130 million, or approximately 48% of the population (Katadata.co.id, 2019). Additionally, according to a survey conducted by the Association of Internet Service Providers (APJII), high-intensity internet users have a high level of education, with a higher level of education indicating a greater frequency of internet access. The university student is one of the populations that meet these criteria (APJII, 2020).

According to Kandell as cited in Soliha (2015), university students appear to be more susceptible to internet addiction than other populations. Since university students are in the phase of emerging adulthood, i.e., the period between late adolescence and early adulthood, experiencing psychological dynamics. However, whether consciously or not, social media leaves a digital trail

that cannot be removed. Thus, it is necessary to emphasize that the internet's existence can be risky or that it can also be an implacable enemy if people do not use it properly and with complete awareness.

Digital Trail

Although the digital trail has existed since the invention of computers, the term has grown in popularity due to the activities of numerous cybercriminals. Even if a computer is not connected to the internet, every activity performed on a computer leaves a trail. Regardless of whether the computer is connected to the internet or not, all activities will leave a properly stored log. This log will be helpful in determining whether the machine has been damaged or has any issues. In recent years, the public has become more aware of the phenomenon of cybercrime. As a result, a digital trail is also required.

The term "digital trail" refers to a variety of cellular signal activities on cellphones, social media account login history, social media comments, and traces of sending SMS or phone calls. Moreover, even if a website or Internet-based application is hacked, a digital trail is left behind and tracked. These activities generate digital traces, and all of a person's activities on the internet (netizens) will be preserved for an extended period of time (Bodhani, 2012).

Digital trail records in the form of metadata that pass through various routers, servers, and internet service providers will be stored appropriately, allowing them to determine what someone is accessing even when they use browser engines' incognito features. Digital trails are classified into passive and active trails (Kaspersky.com, n.d.). Passive digital traces are digital recordings that enable interaction between netizens' devices and infrastructure, such as locations via satellite or logs connected to BTS. Another example is the internet protocol address recorded by the owner of the accessed website. Meanwhile, an active digital footprint is a record created by citizens when they interact with the internet, such as sending messages or uploading images.

Certain third-party companies may use this information for a variety of purposes. Some will be beneficial to internet users, while others may be exploited by criminals, such as fraudsters or crackers, for their own or others' profit. For instance, if an influential person has a competitor who intends to bring him down through cybercrime. The perpetrator's digital footprints will be tracked, and information about him will be published, making him more easily arrested by police. Similarly, digital traces will assist the police in resolving a criminal case that has occurred.

Relevancies of Digital Trails with *Nash* Al Quran

Humans have the freedom and rights to choose what is best for themselves. The existence of obligations that must be fulfilled is the essence of individual freedom. When humans cannot act freely, they will not be subjected to judgment or punishment for their actions. They will also receive no reward for their efforts,

either in heaven or hell. Humans are creatures possessed with intelligence, which enables them to know their *Rabb*, His *manhaj*, and distinguish between His pleasure and wrath.

Allah, of course, endowed human endeavor with that blessing. Imam Qurtubi, in his book, mentions that the meaning of *"wa tukallimuna aydihim wa tasyhadu arjuluhum"* is a person's actions originate in the hands. The feet witness the deed. Thus, what comes from the hands can be interpreted as a statement, while what comes from the feet can be interpreted as a confession (Qurtubi, 1935).

The human mind can determine everything that will occur as a consequence of an act. When an urge arises in the heart, the mind will process it regardless of whether action is required. The mind's command will be communicated through the human senses, including speech, hands, and feet. Due to humans' heavy dependency on computers and mobile phones nowadays, almost all work and life can be traced back to digital language. It is worth noting that all of these platforms begin with hand language, beginning with a human finger. Essentially, the presence of a digital platform enables humans to perform any task. However, there are a lot of adverse reactions in the form of digital access being abused for profit, pleasure, or self-satisfaction.

Although the human body and the digital platform are separate, the digital platform can record the results of the swipe of a finger by passing through ten computer hops. It means that the search done by the fingers leaves traces on several computers throughout the world until it arrives at the search destination on the website. This tracing will speak for itself and serve as a witness to the deeds of human actions from the digital platform used. Several verses in the Al-Qur'an that deal with the hand are highlighted as the subject of activity. This is depicted in the following figure:

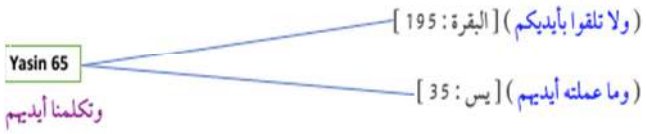

Figure 4. *Yad* Comparison

The word "*yad*" or "*aydiahum*" refers to human behavior or actions. The hand becomes the subject of people's actions, with the rest of the body serving as witnesses. Referring to the approach of *nas tafsir* in ushul fiqh on *Dalalatu Alfaz*, then, in accordance with the suitability of the *nas* of Al-Qur'an contained in the *Majaz*, the meaning of Surah Yasin: 65 is classified as *Majaz*. The identified **fi'il** (tenses) in that verse is *fi'l mudhari'* (present tense), indicating that the word *"tukallimuna"* is repeated, implying that the verse contains space for *ta'wil* (interpretation). Majaz refers to a word that has a second or other meaning (Zuhaili, 2006).

However, according to Sya'rawi's *tafsir*, the verse falls into the *haqiqah* category. He interprets this to mean that the hands will speak to describe human actions, followed by other body parts, specifically the feet, who will serve as witnesses to deeds. Additionally, Sya'rawi stated that the confessions made by the hands and from other body parts, such as the feet, were *tathawu'an* or obedience, not commands. He confirms this with an example about how hands can speak; therefore, even though the tongue can speak within the human body, the tongue is essentially the same as the other body in terms of they just flesh. Therefore, if Allah has declared that an object has the ability to speak, we have no reason to doubt the hand's ability to speak. The hand is also the primary instrument with which the human body performs all activities (Sya'rawi, 1991).

The relationship discovered in this study reaffirms an understanding of the systematic process by which internet access via digital platforms will be automatically stored and recorded in a global hop server sequence.

The method of recording bears a strong resemblance to the mystery behind the Al-Qur'an's use of words in the form of *"aydihim"* or hands. Digital trails are used to track someone's internet usage behavior. Additionally, Al-Qur'an employs highly specific words to encourage humans as the intellectual creature to consider the Quranic language when they select words in interaction.

This research confirms that each use of letters and language in Al-Qur'an conveys a powerful message and is consistent with the times. This result suffices to demonstrate to us that the Al-Qur'an is an infallible holy book (Albaqarah:2). This study also confirms the *kalam ilahi* (divine) as valid and reliable words over time. This test, of course, presupposes that regardless of how much technology advances in the future, technology will strengthen Al-Qur'an truthfulness.

Digital Awareness

A study conducted by Gallup (2019) found that netizens (internet citizens) who spend their time aimlessly surfing the internet may experience anxiety and increase the risk of depression. Due to the ambiguity of the content, it is easy to get caught up in reading a random selection of articles from the homepage and responding to every social media user's post. Additionally, the research reveals that netizens can be happier and more connected when they interact with people who share similar relationships among them. Ironically, accessing the internet and social media wastes a lot of valuable time, though it can be used for self-development instead. Netizens who are constantly exposed to the internet must be aware of the adverse effects that may endanger both physical and mental health.

In the article Development of Information and Communication Technology in Supporting the Use of Media in Society, Kristiyono (2015) stated that excessive use of internet media, whether social media or others, will have a number of consequences. The internet's impact will make the users addicted, emerging

behavioral issues and cybercrime. Additionally, cyberbullying is the most common type of cybercrime on social media.

Someone who regularly takes risks and breaks the rules often results from a lack of self-control in cyberbullying behavior. Social media users' behavior must be regulated in accordance with societal norms, a process known as self-control.

In general, two factors can influence social media use; internal factors (self-control, confidence, satisfaction, and attitudes toward the use of social media) and external factors (parental care in the form of controlling teenagers' behavior (Li et al., 2013; Pratiwi, 2016). Low self-control is the internal factor that has the greatest impact on social media addiction (Nurhanifa et al., 2020).

Self-control is a concept that is incorporated into numerous theories of motivation, desire, and action regulation. Self-control refers to actions taken in the face of conflicting impulses in order to obtain immediate gratification (Hagger et al., 2021). Averill (1973) illustrates that there are three aspects of self-control, namely cognitive control, decision control, and behavioral control.

Conclusion

The computer network and the transaction process, or the exchange of data between computers through a process known as routing, is one of Allah's revealed pearls of wisdom to humans. Allah has revealed numerous signs to demonstrate the Al-Qur'an's truth, but humans refuse to recognize it. For instance, a banking hacker will be identified throughout a stage known as digital forensics. Similarly, all of our practices in this world will be revealed during a stage known as *Yaumil hisab* (judgment day). Digital awareness is a type of education that everyone should possess, just as everyone should learn and practice *akhlakul karimah* (moral or noble character).

This study reveals Al-Qur'an's perfection in selecting words that can be interpreted in light of the times. Therefore, as technology advances rapidly, the contents of Al-Qur'an will be justified by technology. This fact should strengthen Muslims' faith and inspire people to consider every word, sentence, and piece of literature in the Al-Qur'an. The conclusion of this study emphasizes the importance of developing digital awareness when interacting with digital platforms in order to realize individuals with noble character or *akhlakul karimah.*

References

Altman, E., & Jiménez, T. (2012). NS simulator for beginners. *Synthesis Lectures on Communication Networks*, *10*, 1–186. https://doi.org/10.2200/S00397ED1V01Y201112CNT010

APJII. (2020). Laporan Survei Internet APJII 2019 – 2020 (Q2*)*. https://apjii.or.id/

Averill, J. R. (1973). Personal Control Over Aversive Stimuli and Its Relationship to stress. *Psychological Bulletin*, *80*(4), 286–303. https://doi.org/10.1037/h0034845

Bodhani, A. (2012). Shops Offer The e-Tail Experience. *Engineering & Technology*, *7*, 46–49. https://doi.org/10.1049/et.2012.0512

Gallup. (2019). Gallup 2019 Global Emotions Report. Retrieved online from https://www.gallup.com/analytics/248906/gallup-global-emotions-report-2019.aspx?thank-you-report-form=1

Hadi, S. (2002). Methodology Research. Andi Offset.

Hagger, M. S., Zhang, C.-Q., Kangro, E.-M., Ries, F., Wang, J. C. K., Heritage, B., & Chan, D. K. C. (2021). Trait Self-Control and Self-Discipline: Structure, validity, and invariance across national groups. *Current Psychology*, *40*(3), 1015–1030. https://doi.org/10.1007/s12144-018-0021-6

Karabatak, S., & Karabatak, M. (2020). Z Generation Students and Their Digital Footprints. *8th International Symposium on Digital Forensics and Security, ISDFS 2020*. https://doi.org/10.1109/ISDFS49300.2020.9116455

Kasetyaningsih, S. W., & Hartono. (2017). Dampak Sosial Media Terhadap Akhlaq Remaja. *IPTEK-KOM*, *13*(1), 9. Retrieved from https://jurnal.kominfo.go.id/index.php/iptekkom/article/view/3930/1547

Kaspersky.com. (n.d.). What is a Digital Footprint? Retrieved November 25, 2021, from https://www.kaspersky.com/resource-center/definitions/what-is-a-digital-footprint

Katadata.co.id. (2019). Berapa Pengguna Media Sosial Indonesia. Retrieved online from https://databoks.katadata.co.id/datapublish/2019/02/08/berapa-pengguna-media-sosial-indonesia

Kominfo.go.id. (2017). Ada 800000 Situs Penyebar Hoax di Indonesia. Retrieved online from https://kominfo.go.id/content/detail/12008/ada-800000-situs-penyebar-hoax-di-indonesia/0/sorotan_media

Kompas. (2021). Jumlah Pengguna Internet Indonesia 2021 Tembus 202 Juta. Retrieved online from https://tekno.kompas.com/read/2021/02/23/16100057/jumlah-pengguna-internet-indonesia-2021-tembus-202-juta

Kristiyono, J. (2015). Budaya Internet: Perkembangan Teknologi Informasi DAN Komunikasi Dalam Mendukung Penggunaan Media Di Masyarakat. *Scriptura*, *5*(1). https://doi.org/10.9744/scriptura.5.1.23-30

Lambiotte, R., & Kosinski, M. (2014). Tracking the Digital Footprints of Personality. *Proceedings of the IEEE*, *102*(12), 1934–1939. https://doi.org/10.1109/JPROC.2014.2359054

Li, X., Li, D., & Newman, J. (2013). Parental Behavioral and Psychological Control and Problematic Internet Use Among Chinese Adolescents: The Mediating Role of Self-Control. *Cyberpsychology, Behavior, and Social Networking*, *16*(6), 442–447. https://doi.org/10.1089/cyber.2012.0293

Moleong, L. J. (2007). Metode Penelitian Kualitatif. PT. Remaja Rosdakarya.

Nurhanifa, A., Widianti, E., & Yamin, A. (2020). Kontrol diri dalam penggunaan media sosial pada remaja. *Jurnal Ilmu Keperawatan Jiwa*, *3*(4), 527–540. https://journal.ppnijateng.org/index.php/jikj/article/download/727/374

Pranajaya, P. (2020). Pemahaman Jejak Digital Di Kalangan Mahasiswa Program Studi Ilmu Perpustakaan Universitas Yarsi. *Semnas Ristek (Seminar Nasional Riset Dan Inovasi Teknologi)*, *4*(1). http://proceeding.unindra.ac.id/index.php/semnasristek/article/view/2576

Pratama, K. R. (2021). Instagram, Media Sosial Pemicu "Cyberbullying" Tertinggi. Retrieved online from https://tekno.kompas.com/read/2021/03/29/07164137/instagram-media-sosial-pemicu-cyberbullying-tertinggi

Pratiwi, E. D. (2016). Faktor Yang Mempengaruhi Niat Menggunakan Instagram Dengan The Theory Of Reasoned Action Menggunakan AMOS 21. *Jurnal Teknik Komputer*, *2*(1), 68–77. https://doi.org/10.31294/JTK.V2I1.364

Qurtubi, A. A. M. bin A. A. (1935). Al-Jami' Li Ahkamil Quran. Mathba'ah Darul Kitab Mesir.

Rifiani, V., Zen, M., Hadi, S., & Darwito, H. A. (2011). Analisa Perbandingan Metode Routing Distance Vector Dan Link State Pada Jaringan Packet. http://repo.pens.ac.id/677/1/1066.pdf

Salomatin, A., Iskhakov, A., & Meshcheryakov, R. (2021). Formation of a Digital Footprint Based on the Characteristics of Computer Hardware to Identity APCS Users. *Proceedings - 2021 International Russian Automation Conference, RusAutoCon 2021*, 314–320. https://doi.org/10.1109/RUSAUTOCON52004.2021.9537361

Soliha, S. F. (2015). Ketergantungan Pengguna Media Sosial Dan Kecemasan Sosial. *Jurnal Interaksi*, *4*(1), 1–10. https://doi.org/10.14710/interaksi,4,1,1-10

Sukiswo, S. (2008). Evaluasi Unjuk Kerja Routing Link-State Pada Jaringan Packet Switched Menggunakan NS-2 (Network Simulator–2). *Transmisi: Jurnal Ilmiah Teknik Elektro*, *10*(3), 138–143. https://doi.org/10.12777/TRANSMISI.10.3.138-143

Sya'rawi, M. M. (1991). Tafsir As-Sya'rawi. Akhbar Al-Yaum.

Syafrizal, M. (2005). Pengantar jaringan komputer. Andi Offset.

Taprial, V., & Kanwar, P. (2012). Understanding Social Media. Ventus Publishing.

Tarigan, A. (2009). Bikin Gateway Murah, Mudah pakai mikrotik. Info Komputer.

Tittel, E. (2002). Schaum's Outline of Computer Networking. McGraw-Hill Education.

Wagito. (2005). Jaringan Komputer :teori dan implementasi berbasis linux. Gava Media.

Zuhaili, M. M. (2006). al-Wajiz fi Ushul Fiqh Islam. Darul Khaer.