CRIME ASPECT OF TELEMEDICINE ON HEALTH TECHNOLOGY

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ABSTRACT

Entering the 21st century, the world is faced with the emergence of new technologies in the field of medicine that allow doctors to practice in virtual space. The revolution of innovative technology is known as Telemedicine, so in this paper telemedicine is a medical service provided via telecommunications, audio, visual and data that can connect healthcare facilities even though geographically separated. So the difference in time, place and distance is no longer an obstacle in the therapeutic relationship of doctors and patients. In the coming millennium, health care like this is expected to develop rapidly as well as in Indonesia so that in several countries, the development of telemedicine has also been followed by regulatory readiness. Unlike Malaysia, India or the United States. Indonesia does not yet have laws that specifically regulate the use of telemedicine, Indonesia is only limited to regulating telematics in general. Also, the regulation on e-health is not as we expected, even though electronic-based health services (e-Health) have been advocated by the World Health Organization (WHO) since 2005. Besides the benefits gained from the use of telemedicine, we also need to realize that the use of telemedicine also has the potential to cause a variety of legal problems, both at national and international levels, such as licensing or licensing problems for doctors or medical personnel who practice telemedicine to patients in Indonesia and abroad, accreditation of medical services facilities and equipment, informed consent, security and confidentiality of medical records, operational procedures and insurance issues. Moreover, accountability when a doctor's malpractice occurs. The reality conditions and the implications of legal issues regarding telemedicine above are ideally regulated in national law, to provide legal certainty in responding to the demands of the development of telemedicine medical technology.

Key words: Telemedicine, health services, legal implications, and legal certainty.

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1. INTRODUCTION

Indonesia, with the sixth largest population in the world reaching 203,456,005 people, with its poor population of 13.3% (in 2010) and caused health problems to become one of the main issues in Indonesia [1]. According to the Report in Asia & The Pacific Progress published by UNESCAP, Indonesia is still experiencing delays in the process of realizing the achievement of the Millennium Development Goals (MDGs) [2]. This case can see from the still high maternal mortality rate, the still low quality of sanitation and clean water, the rate of HIV / Aids transmission that is increasingly difficult to control, and the increasing foreign debt burden that is increasingly accumulating. These sectors influence the quality of Indonesian human life which is manifest in Indonesia's declining position on the Human Development Growth Index per 2010. In 2006 Indonesia touched the 107th place in the world, 2008 at 109, until 2009 to 2010 still in position 111[3]. 9th place difference with Palestine (West Bank & Gaza Strip) which is in position 101 [4].

Another problem faced by Indonesia is Indonesia's geographical condition in the form of islands (17,000 islands). So to put expert doctors across the island has its constraints. Most expert doctors prefer to be in large urban centers, especially the provincial capital. Communities in regencies, sub-districts, or villages especially in border areas must not be satisfied enough to be served by doctors who are not specialists or even paramedics and nurses [5].

The existence of a health service gap, the uneven distribution of doctors in Indonesia, especially specialist doctors, is a difficult obstacle to overcome [6]. Apart from all the problems above, the public interest in Indonesia to seek treatment abroad is also quite high. The Chairman of the IDI said that in a year almost 1 million people seek treatment abroad with the money spent abroad for medical purposes reaching Rp. 20 trillion [7].

Such conditions, aware or not, greatly complicate the government's efforts to improve health development in Indonesia. Whereas health development has a crucial goal in national development efforts, such as to increase live healthy for everyone in order to realize the highest level of public health, and as an investment for the development of socially and economically productive human resources [8].

Besides the benefits gained from the use of telemedicine, it is also necessary to realize that the use of telemedicine also has the potential to cause various legal problems. Some of the legal issues include, among others: licensing, accreditation, privacy and confidentiality of patients' electronic medical records, accountability in case of malpractice, clinical guidelines, and insurance [9].

Empires reality and the implications of legal issues regarding telemedicine in Indonesia require the national law. Allowing change and development without the adjustment of the rule of law is the same as letting these changes and developments in situations of uncertainty and disorder. For this reason, it is time for Indonesia to have national provisions regarding telemedicine to provide legal certainty for health practitioners and patients using telemedicine health services. Problems that will be reviewed and at the same time become legal issues four are:

- The characteristics of telemedicine in medical practice.
- The legal principle of using telemedicine in medical practice.

2. LITERATURE REVIEW

2.1. Cyber Technology

The development of human reason that is so fast that influences and are influenced by information technology as if it can no longer be stopped, especially in the era of progress as it is today when humans create at the same time need computer network technology [6], [10]–[17]. The internet is a commercial community activity to be the largest, and fastest growing, the part that has transcended national boundaries. With the internet network, what is happening now in other parts of the world. With the internet world or also called cyberspace, almost everything can be done. This positive aspect of cyberspace indeed forms the world technological development trend with all forms of human creativity. However, even the negative impacts cannot be avoided, for example in the form of pornography that is rife on the Internet media [18], [19].

The development of Internet technology has led to crimes called cybercrime or crime through the Internet network. The emergence of several cyber crime cases in Indonesia, is a phenomenon, such as credit card theft, hacking against various sites, tapping other people's data transmission, (for example e-mail), and data manipulation by preparing unwanted commands into computer programmers. The above acts can be subject to criminal acts, both formal and material offenses. Formal offense because it involves the act of someone accessing someone else's computer data without permission, while the real offense is that the act has caused a loss to others [20].

Cybercrime is often equated with computer crime. According to The U.S., The Department of Justice is as "... any illegal act requiring knowledge of computer technology for its perpetration, investigation, or prosecution". The same thing was conveyed by the Organization of European Community Development, which defines computer crime as: "Any illegal, unauthorized behavior relating to the automatic processing or the transmission of data." This crime has different characteristics with blue-collar crime and white-collar crime. Blue collar crime is a type of crime, or criminal act committed conventionally such as robbery, theft, murder, and others. The opponent is the white-collar crime. This type of crime is divided into four criminal groups, such as corporate crime, bureaucratic crime, malpractice, and individual crime [21]. Cybercrime itself as a crime that arises as a result of the existence of cyberspace on the internet, has its characteristics that are different from the two models above [22]–[24] This type of cybercrime, based on the type of activity it does, can be classified into several types as described below:

- Unauthorized access such as; crimes that occur when someone enters or infiltrates a computer network system illegally, for example: probing and port.
- Illegal contents; such as entering data or information to the internet about something that is not true, unethical, and can be considered violating the law or disturbing public order, such as the spread of pornography.
- Deliberate virus spread; generally done by using email.
- Data forgery; this is done with the aim of falsifying data on important documents on the internet. These documents are usually owned by institutions or institutions that have a web-based database site.
- Cyber espionage, sabotage, and extortion; cyber espionage is a crime that utilizes the internet network to conduct espionage activities against other parties, by entering the target party's computer network system. Sabotage and extortion is a type of crime that is done by making a disturbance, destruction or destruction of a data, computer program or computer network system connected to the internet.

- Cyberstalking; this is to disturb or harass someone by using a computer, for example using e-mail and repetitive. The crime resembles terror directed at someone using internet media. It can happen because of the ease in making an e-mail with a specific address without having to include an actual identity.
- Carding; This is a crime committed to stealing other people's credit card numbers and is used in trading transactions on the internet.
- Hacking and crackers; A hacker is someone who has a great interest in learning computer systems in detail and how to improve their capabilities. Those who often do acts of destruction on the internet are called crackers. Cracking activities on the internet start from hijacking accounts belonging to others, website piracy, probing, spreading viruses, to paralysis of target targets. The last action is called a DoS (Denial Of Service). Dos attack is an attack that aims to disable the target (hang, crash) so that it cannot provide services.
- Cybersquatting and typosquatting; Cybersquatting is a crime committed by registering the domain name of another person's company and then trying to sell it to the company at a higher price. The typosquatting is a crime by creating a playlist domain that is a domain that is similar to someone else's domain name. The name is a rival domain name of the company.
- Hijacking; is the crime of hijacking the work of other people such as piracy software (software piracy).
- Cyberterrorism; An act that threatens the government or citizens, including cracking into government or military sites.

2.2. Impact of World Economic Losses

The cost of losses due to cybercrime worldwide is reported to have reached US \$ 600 billion last year or around 0.8% of global GDP [25]–[30]. Even more worrying than this figure is likely to be the magnitude of growth compared to the global cost of losses in 2014, which was recorded at only US \$ 445 billion [31]–[36]. The rapid growth was mainly due to low entry costs and technological advances such as machine learning and artificial intelligence. In the Asia Pacific region alone, cybercrime has caused a loss of US \$ 171 billion. To CNBC, Yip explained how criminal acts in cyberspace had become easier to do. The analysis emerged at McAfee and US think tanks. The Center for Strategic and International Studies released a study entitled 'The Economic Impact of Cybercrime - No Slowing Down,' which assesses the gravity of what Yip calls a 'pandemic' of cybercrime. The cost of cybercrime related to the internet economy around the world, worth the US \$ 4.2 trillion in 2016, cybercrime can be seen as a 14% levy on growth, "McAfee explained about the research. Certain countries have been considered safe places for cybercriminals. Countries such as North Korea, Iran and Russia tend to target financial services. The report appeared along with the highlighting of acts of cryptocurrency hacking. The latest example is the hacking of the Tokyo-based cryptocurrency exchange, Coincheck, where nearly 58 billion yen of NEM coins were stolen. Even though it was not the first to happen, it was one of the most significant theft cases. Cryptocurrency users and investors have voiced concerns about the need for higher standards and a broad regulatory system to protect their interests [37].

2.3. Regulation

The regulation of the number of allowed places for the medical practice is vital to control profession. In Indonesia, the practice license refers to the real written evidence which is given by the government to those who are qualified to do the professional duty (Medical Practice Act No. 29 of 2004 article 37) [38]. The findings of this research indicated a significant difference between the mean value for the three different places about the practice license between Indonesia and Malaysia. The mean value reported for the Indonesian sample was

3.88% which is higher than the Malaysian example (3.34%) indicating that the Indonesian practice license should be improved rather than the Malaysia practice license [8].

According to Zulfendri, doctors (from the three different places) were only granted one license to practice their profession. However, based on the Regulation of the Indonesian Ministry of Health No 19 of 2004 Article 37 (2) (3), the specialist doctors have the opportunity to have more than one license to practice their professions at more than one places, and the Ministry of Health of Medan issues the practice license. The letter of the assignment is valid for only three months, and it can be renewed [39].

The situation is different in Malaysia. The doctors who work for the Malaysian government will not be allowed to work for the private sector, and the kingdom civil who work in the hospital will have office hour from 8 am to 5 pm.

The medical record of patients affects the profession. The study shows that Indonesia and Malaysia have a significant difference in mean value in the medical record issues. The mean value recorded for Indonesia was 3.78% which was lower than the mean value for Malaysia (4.28%). This result indicated that the Malaysian respondents were more demanding in the issue. The regulation of the Ministry of Health of the Republic of Indonesia No. 269/ Minister of Health / Reg / III / 2008 stated that the medical records are files containing patient's history and the document including examination, the treatment which given to the patient [40][41].

According to [5], the medical record is a collection of information about the identity, examination result, and memorandum and any aspects which are related to the healthcare activities from time to time. This memorandum can be in the forms of note-writing, picture, and recently it may also be an electronic record such as; computer, film micro and voice record. Unfortunately, the medical record system still has some weaknesses because of the direct data exchanging from one hospital to another hospital is not allowed. Each hospital could not have the patient's previous personal medical record. Therefore, it is desirable to access the medical records via networks [9]. Health institutions concern to keep and save all the medical records in Electronic Medical Record (EMR), in which it is a matter that relates to the patients' confidentiality. For those purposes, technological experts are needed to work well and reliable because confidentiality protection is associated with the secure system [42].

In Indonesia, the article No. 46: Medical Practice Act No. 29 of 2004 (1) stated that every doctor is obliged to make a medical record after patients received treatments as well as the name, time, and signature of the person who takes action and provides the service. Article 46 (1) states that the medical record belongs to the doctor and the content of the medical history should be kept well by the doctor. In article 51(d), the doctor is responsible for maintaining the patient's confidentiality. Moreover, Articles 79 and 46(1) stated that if the doctor does not make the medical record, the doctor will be imprisoned for a maximum of one year or maximum excellent Rp. 50.000.000 (fifty million Rupiah). In addition, the regulation of the Ministry of Health of the Republic of Indonesia No. 269/Menkes/Per/2008 Article 17 (1) stated that in maintaining the medical records, the Minister, Chairman of State Health Department, could take the administrative actions in accordance with their obligation, (2) governmental action as referred to no (1) could be done through written and spoken, the last step is the withdrawal of practice permit.

While in Malaysia, the code of conduct 2001 Part II indicates the doctor's obligation, they are; (i) recording everything related to the patient (ii) saving and using the medical record (iii) medical record also belongs to patient (iv) doctor must give the report, relaying information for those are unethical (v) doctor is responsible for patient's confidentiality (vi) the medical record could be given to the third party if the patient's written consent is accepted. Doctors who violate this regulation will be sentenced in accordance with the Medical Law 1971 (Article 50) amendment 24/2012 Section 30 Article (1) related to these actions: (a)

denouncing medical practices (b) ordering applicant patient to subject to all requirements including; (i) patients gets the medical records (ii) all (iii) all physician are having course or formal education as defined by councils (iv) physicians report the patient's medical history (c) asking the previous medical history (d) making some orders (e) considering council's decision. (2) Boards may also impose a fine as well as additional punishment (3) doctor who deals with this case is not allowed to run their job (4) Everyone who does not comply with the article (1) shall be sanctioned, then (5) Councils may decide the reasonable payment.

Shortly, the above laws showed that Malaysian law is more beautiful than that of Indonesia. It may result to the legal certainty, while Indonesia central record system may lead to a bit doubtful confidence. The eager expectation is Indonesia will have a more sophisticated technology medical record system so the doctor can keep supervising the patient's medical records towards patients' treatment.

3. METHODOLOGY

Research conducted is legal research about academic activities. This research distinguishes from legal research about practical activities that are more directed to solving legal problems that are practical. Legal research that is academic is related to efforts to make valuable contributions to the development of legal science through the discovery of new legal theories, or find new arguments, or find new concepts about things that are considered established in law. The approach used in this study is the statute approach and the conceptual approach. The legal material needed in this study is primary and secondary legal materials. The research was conducted in 2 (two) stages, such as the collection of legal materials (legal materials) and assessment and/or analysis of legal materials. Collection of legal material is carried out through a positive legal inventory and library search (literature study) related to the problem under study. Against all legal materials that have been collected then organizing and classifying legal materials by the formulation of the problem, research objectives and systematic preparation of research results. After all legal materials are organized and classified then analysis and or interpretation is carried out, in this way it is expected that the problems in this study can be assessed and solved the answers.

4. RESULT AND DISCUSSION

The use of telemedicine is very dependent on the type of telemedicine practice. The type or form of Telemedicine practice can be in the form of teleconsultation, teleassistance, tele education, and telemonitoring and telesurgery. With the support of medical equipment that can transform video images into digital images, now, the use of telemedicine in medical practice has been widely used. Until now telemedicine has been applied in many countries in the world such as America, Greece, Israel, Japan, Italy, Denmark, the Netherlands, Norway, Jordan, India, and Malaysia. Store-and-forward (asynchronous telemedicine) telemedicine includes collecting medical data and sending this data to a doctor (specialist) at the right time for offline evaluation. This type of telemedicine does not require the presence of both parties at the same time. Dermatologists, radiologists, and pathologists are specialists who usually use asynchronous telemedicine. Medical records in the right structure should be a component in this transfer. Artificial intelligence, Artificial Intelligence (AI) is a technique and science to make a machine smart, especially for computer programs. Intelligence in question is intelligence like that of humans so that a computer can take action to solve problems with thoughts like a human. The research objectives of AI include reasoning, knowledge, planning, learning, processing natural language, perception and the ability to mobilize and manipulate objects. General intelligence is one of the long-term goals of AI. It has created a large number of tools to solve difficult problems in the computer field. The field refers to computer science,

mathematics, psychology, linguistics, philosophy, neuroscience, artificial psychology, and other fields. AI is a part of computer science that makes computer machines do work as humans do. Computers are only functioned as a calculating tool, but along with the development of the times, the computer becomes a companion to human life. Computers are no longer only used as a counting tool; computers can do everything that humans can do.

Humans can be intelligent in solving all problems in this world because humans have the knowledge and experience gained from experience. The more provision of knowledge possessed by someone, the abler to solve problems. Humans are also given the reason to do reasoning, drawing conclusions based on the knowledge and experience they have. Without having the ability to reason well, people with a wealth of experience and knowledge will not be able to solve problems correctly. Likewise, the ability to reason is excellent, but without the provision of adequate knowledge and experience, humans will also not be able to solve problems correctly. Computers must also be equipped with knowledge and have the ability to reason to act like and as good as humans. AI offers several methods to equip computers with intelligence so that the computer can become a smart machine.

4.1. Principles for the Use of Information and Communication Technology (ICT)

The Indonesian government through the Ministry of Health has designed the National Health Information System Network (SIGNALS). This network is a connection / virtual network of electronic health information systems managed by the Ministry of Health and can only be accessed when connected. The SIGNALS network is an integrated data communication network infrastructure using the Wide Area Network (WAN), a telecommunications network that covers a wide area and is used to send data remotely between different Local Area Networks (LANs), and other local computer network architectures. However, this network is still limited to the collection of health data for health statistics, has not been designed in an individual capacity for clinical services in its function as telemedicine. So it is still a health administration service (e-health). While for the development of e-health, especially telemedicine still requires a master patient index so that data can transact, and that will be collected from health facilities. If this electronic health information system has functioned optimally, it is hoped that it can fulfill the principle of benefit for the community.

4.2. Principles of Competence, Integrity, and Quality

Considering that medical practices with telemedicine require specialized skills and expertise, of course, these health workers need to be equipped with specialized knowledge and skills in the field of telemedicine. A trusted certification system must prove mastery of minimum quality standards by health workers. Professional Standards are a minimum limitation of abilities (knowledge, skills, and professional attitude) that must be mastered by an individual to be able to carry out professional activities in the community independently made by professional organizations. Likewise, for medical services using telemedicine, it can only be done if the right to use it has obtained legal certainty beforehand and there is no doubt about its professionalism. In Indonesia, so far, the medical profession organization has not explicitly regulated professional standards in the use of telemedicine. For this reason, measured professional standards must be part of the legal principle of the use of telemedicine by both Indonesian doctors and foreign doctors.

4.3. Principles of Equality, Goodwill, Independence and Volunteerism and Legal Certainty

If health services from medical facilities that are abroad as providers of telemedicine want to open their virtual network to reach patients in Indonesia, to establish such cooperation, a

provision that regulates unprecedented cooperation between the two countries is based on the principle of equality, good faith and mutual respect between the two countries. In order for such cooperation to be easier to do, the cooperation should be carried out with countries that already have diplomatic relations with Indonesia. Likewise between health facilities of the two countries must be based on good cooperation on technical operations and professional accountability to the public/patient.

As is the case with traditional patient-physician relationships, the relationship between doctors and patients using telemedicine must also meet the requirements set out in Law Number 29 of 2004 concerning Medical Practices. Article 39 states that medical practice is carried out based on an agreement based on the relationship of trust between the doctor or dentist with the patient to maintain health, prevent disease, improve health, treat diseases and restore health. The agreement referred to is the maximum effort of the medical profession to be carried out by doctors and dentists in the healing and recovery of health of patients by service standards, professional standards, standard operating procedures and medical needs of patients. Likewise, the form of cooperation between hospitals in Indonesia and healthcare facilities abroad that want to establish cooperation using the telemedicine network must be based on the principle of equality and good faith.

4.4. Principles of Data Security and Confidentiality and Standardization

Everyone has the right to the secret of his health condition that has been stated to the healthcare provider (Article 57 paragraph (1) of Law No. 36 of 2009 concerning Health). In the use of telemedicine, protection of patients' privacy rights over their health data that is recorded electronically in health care facilities, needs to be regulated so as not to be easily accessed by unauthorized parties. For this reason, it must be carried out by an authorized officer and has special permission for it. The guarantee of confidentiality of the patient's medical data is determined in the form of a written agreement with the patient so that it can have legal implications if there is abuse. Each Electronic System Operator must operate electronic systems reliably and safely and be responsible for the correct operation of the electronic system (Article 15 paragraph (1) of Law Number 11 of 2008 concerning Information and Electronic Transactions). The assurance of the security and reliability of electronic systems in the practice of telemedicine needs to be carried out by legal entities or competent institutions that are recognized both nationally and internationally.

4.5. Principles of Patient Autonomy and Freedom in Choosing Neutral Technology or Technology

Each patient has the right to accept or reject a part or all of the actions for assistance that will be given to him after receiving and understanding the information about the action in full (Article 56 paragraph (1). UU no. 36 of 2009 concerning Health). Patients also have the freedom to choose neutral technology or technology. After being given information about the benefits and risks of using technology. So that every decision taken by the patient can equally provide a sense of security, justice, and legal certainty

5. CONCLUSIONS

Indonesia's geographical condition as an archipelago presents its challenges in health development because in addition to causing high costs in infrastructure development it is also faced with a variety of health problems that are identical with the problematic of developing countries, it requires a unique approach to health development in Indonesia by its characteristics. Telemedicine applications can be used as a solution to overcome health problems in Indonesia. Therefore, as a consequence, the regulation preparation is needed to

answer the legal issue. Such as, the use of telemedicine in the practice of the caretaker is the granting of licenses, accreditation, privacy and confidentiality of the patient's electronic medical records, SOP, liability in the event of malpractice, and jurisdiction, The principles and rules for the use of telemedicine in medical practice are ease of access, state responsibility, competence, integrity and quality, good faith, data security and confidentiality, standardization, patient autonomy and freedom to choose technology or technology neutral. Benefits, justice, humanity, balance, legal protection, telemedicine dispute resolution for alleged doctor malpractice is carried out based on the legal principle that the applicable law is the law in which the patient resides because the interests of the patient as the aggrieved party must be prioritized. In the case of proof, the principle of data protection applies, the principles of forensic IT, the principles of best practices, and Legal Audit standards, as well as justice.

REFERENCES

- [1] A. P. U. Siahaan *et al.*, "Combination of Levenshtein Distance and Rabin-Karp to Improve the Accuracy of Document Equivalence Level," *Int. J. Eng. Technol.*, vol. 7, no. 2.27, pp. 17–21, 2018.
- [2] R. B. Purba, "Village Financial Management To Realize Transparent and Accountable Apbdes in During Villages," *Cyber Crime Viewed from Var. Perspect. Sci. Semin. Result Res. Community Serv.*, 2018.
- [3] A. Galih Prasetyo and A. Muis, "Pengelolaan Keuangan Desa Pasca UU No. 6 Tahun 2014 Tentang Desa: Potensi Permasalahan dan Solusi," *J. Desentralisasi*, vol. 13, no. 1, pp. 16–31, 2015.
- [4] A. S. Nurillah, "Pengaruh Kompetensi Sumber Daya Manusia, Penerapan Sistem Akuntansi Keuangan Daerah (SKPD), Pemanfaatan Teknologi Informasi, dan Sistem Pengendalian Intern Terhadap Kualitas Laporan Keuangan Pemerintah Daerah (Studi Empiris Pada SKPD Kota Depok)," *Skripsi Univ. Diponegoro*, vol. 3, pp. 1–13, 2014.
- [5] P. Hukum *et al.*, "(The Law Enforcement Against Narcotic And Drug Crimes Impacting On Security And State Sovereignty In The Era Of International Free Trade)," pp. 1–16, 2017.
- [6] S. Aryza, M. Irwanto, Z. Lubis, A. P. U. Siahaan, R. Rahim, and M. Furqan, "A Novelty Design of Minimization of Electrical Losses in A Vector Controlled Induction Machine Drive," in *IOP Conference Series: Materials Science and Engineering*, 2018, vol. 300, no. 1.
- [7] Menteri, D. T. Desa, Pembangunan Daerah Tertinggal, And Republik Indonesia, "Peraturan Menteri Desa, Pembangunan Daerah Tertinggal, Dan Transmigrasi Republik Indonesia Nomor 3 Tahun 2015 Tentang Pendampingan Desa," pp. 1–10, 2015.
- [8] Misdawita and A. A. P. S. Sari, "Analisis Dampak Pengeluaran Pemerintah Di Bidang Pendidikan, Kesehatan, Dan Pengeluaran Subsidi Terhadap Kemiskinan Di Indonesia," *J. Ekon. Kebijak. Publik*, vol. 4, pp. 147–161, 2013.
- [9] K. Hawari, B. Ghazali, J. Ma, R. Xiao, and S. Aryza, "An Innovative Face Detection Based on YCgCr Color Space," *Phys. Procedia*, vol. 25, pp. 2116–2124, 2012.
- [10] T. Eddy, B. Alamsyah, S. Aryza, and A. P. U. Siahaan, "An Effect Phenomena Circle Living Field in Secanggang Langkat," *Int. J. Civ. Eng. Technol.*, vol. 9, no. 7, pp. 1575–1580, 2018.
- [11] E. Elwiwani, A. Putera Utama Siahaan, and L. Fitriana, "Performance-based Stable Matching using Gale-Shapley Algorithm," in *Proceedings of the Joint Workshop KO2PI and The 1st International Conference on Advance & Scientific Innovation*, 2018.

- [12] A. Putera Utama Siahaan, E. Elviwani, and B. Oktaviana, "Comparative Analysis of RSA and ElGamal Cryptographic Public-key Algorithms," in *Proceedings of the Joint Workshop KO2PI and The 1st International Conference on Advance & Scientific Innovation*, 2018.
- [13] Y. Rossanty, S. Aryza, M. D. T. P. Nasution, and A. P. U. Siahaan, "Design Service of QFC And SPC Methods in the Process Performance Potential Gain and Customers Value in a Company," *Int. J. Civ. Eng. Technol.*, vol. 9, no. 6, pp. 820–829, 2018.
- [14] Rusiadi *et al.*, "Simultaneous Response of Dividend Policy and Value of Indonesia Manufacturing Companies An Approach of Vector Autoregression," *Int. J. Civ. Eng. Technol.*, vol. 9, no. 6, pp. 313–323, 2018.
- [15] A. Ikhwan, M. Yetri, Y. Syahra, and J. Halim, "A Novelty of Data Mining for Promoting Education based on FP-Growth Algorithm," *Int. J. Civ. Eng. Technol.*, vol. 9, no. 7, pp. 1660–1669, 2018.
- [16] M. Furqan *et al.*, "A Review of Prim and Genetic Algorithms in Finding and Determining Routes on Connected Weighted Graphs," *Int. J. Civ. Eng. Technol.*, vol. 9, no. 9, pp. 1755–1765, 2018.
- [17] Khairul *et al.*, "Effect of Matrix Size in Affecting Noise Reduction Level of Filtering," *Int. J. Eng. Technol.*, vol. 7, no. 3, pp. 1272–1275, 2018.
- [18] Y. M. Saragih and A. P. U. Siahaan, "Cyber Crime Prevention Strategy in Indonesia," *SSRG Int. J. Humanit. Soc. Sci.*, vol. 3, no. 6, pp. 22–26, 2016.
- [19] S. Ramadhani, Y. M. Saragih, R. Rahim, and A. P. U. Siahaan, "Post-Genesis Digital Forensics Investigation," *Int. J. Sci. Res. Sci. Technol.*, vol. 3, no. 6, pp. 164–166, 2017.
- [20] Besar, "Kejahatan Dengan Menggunakan Sarana Teknologi Informasi," *Bina Nusantara*, 2016. [Online]. Available: <http://business-law.binus.ac.id/2016/07/31/kejahatan-dengan-menggunakan-sarana-teknologi-informasi/>. [Accessed: 01-Oct-2018].
- [21] Andre Hasudungan Lubis, S. Z. S. Idrus, and A. Sarji, "ICT Usage Amongst Lecturers and Its Impact Towards Learning Process Quality," *Malaysian J. Commun.*, vol. 34, no. 1, pp. 284–299, 2018.
- [22] A. Lubis and A. P. U. Siahaan, "Network Forensic Application in General Cases," *IOSR J. Comput. Eng.*, vol. 18, no. 6, pp. 41–44, 2016.
- [23] A. P. U. Siahaan and A. Lubis, "WLAN Penetration Examination of The University of Pembangunan Panca Budi."
- [24] W. Stallings, *Cryptography and Network Security: Principles and Practice*. New Jersey: Prentice Hall Press, 2013.
- [25] A. Focacci, "Empirical analysis of the relationship between total consumption-GDP ratio and per capita income for different metals," *Int. J. Soc. Econ.*, vol. 34, no. 9, pp. 612–636, Aug. 2007.
- [26] Rusiadi and A. Novalina, "Monetary Policy Transmission: Does Maintain the Price and Poverty Stability is Effective?," *Jejak J. Ekon. dan Kebijak.*, vol. 11, no. 102, pp. 78–82, 2018.
- [27] S. Suroso *et al.*, "Autoregression Vector Prediction on Banking Stock Return using CAPM Model Approach and Multi-Factor APT," *Int. J. Civ. Eng. Technol.*, vol. 9, no. 9, pp. 1093–1103, 2018.
- [28] A. Novalina *et al.*, "Confirmatory Factor Analysis Specimen in Calculating Independence Element of Coastal Woman," *Int. J. Civ. Eng. Technol.*, vol. 9, no. 9, pp. 1632–1644, 2018.

- [29] W. S. Purba *et al.*, “Relationships Among Knowledge, Attitude And Behavioral Intention Of Waste Management Technology,” *Int. J. Civ. Eng. Technol.*, vol. 9, no. 9, pp. 792–798, 2018.
- [30] A. I. F. Lubis *et al.*, “Strategy for Improving Science and Welfare through Community Empowerment Technology,” *Int. J. Civ. Eng. Technol.*, vol. 9, no. 9, pp. 1036–1046, 2018.
- [31] M. Dharma Tuah Putra Nasution, A. Putera Utama Siahaan, Y. Rossanty, and S. Aryza, “Entrepreneurship Intention Prediction using Decision Tree and Support Vector Machine,” in *Proceedings of the Joint Workshop KO2PI and The 1st International Conference on Advance & Scientific Innovation*, 2018.
- [32] M. D. T. P. Nasution, Y. Rossanty, P. B. Sari, and A. P. U. Siahaan, “Online Shoppers Acceptance: an Exploratory Study,” *Int. J. Civ. Eng. Technol.*, vol. 9, no. 6, pp. 793–799, 2018.
- [33] M. D. T. P. Nasution, Y. Rossanty, A. P. U. Siahaan, and S. Aryza, “The Phenomenon of Cyber-Crime and Fraud Victimization in Online Shop,” *Int. J. Civ. Eng. Technol.*, vol. 9, no. 6, pp. 1583–1592, 2018.
- [34] Y. Rossanty and M. D. T. P. Nasution, “Information Search and Intentions to Purchase: The Role of Country of Origin Image, Product Knowledge, and Product Involvement,” *J. Theor. Appl. Inf. Technol.*, vol. 96, no. 10, pp. 3075–3085, 2018.
- [35] V. C. E. Tarigan *et al.*, “Cybercrime Case On Social Media In Indonesia,” *Int. J. Civ. Eng. Technol.*, vol. 9, no. 7, pp. 783–788, 2018.
- [36] N. Setiawan, V. C. E. Tarigan, P. B. Sari, Y. Rossanty, and M. D. T. P. Nasution, “Impact Of Cybercrime In E-Business And Trust,” *Int. J. Civ. Eng. Technol.*, vol. 9, no. 7, pp. 652–656, 2018.
- [37] Supiyandi, M. I. Perangin-angin, A. H. Lubis, A. Ikhwan, Mesran, and A. P. U. Siahaan, “Association Rules Analysis on FP-Growth Method in Predicting Sales,” *Int. J. Recent Trends Eng. Res.*, vol. 3, no. 10, pp. 58–65, 2017.
- [38] P. Lillrank, “The quality of information,” *Int. J. Qual. Reliab. Manag.*, vol. 20, no. 6, pp. 691–703, 2003.
- [39] S. Aryza, “Title : A Simulation Of Develop Society Welfare Towards Transportation,” p. 2455.
- [40] D. A. Fleming, K. E. Edison, and H. Pak, “Telehealth Ethics,” *Telemed. e-Health*, vol. 15, no. 8, pp. 797–803, Oct. 2009.
- [41] C. S. Pattichis, E. Kyriacou, S. Voskarides, M. S. Pattichis, R. Istepanian, and C. N. Schizas, “Wireless telemedicine systems: an overview,” *IEEE Antennas Propag. Mag.*, vol. 44, no. 2, pp. 143–153, Apr. 2002.
- [42] M. Parasol, “The impact of China’s 2016 Cyber Security Law on foreign technology firms, and on China’s big data and Smart City dreams,” *Comput. Law Secur. Rev.*, vol. 34, no. 1, pp. 175–179, 2018.