

DIMENSIONS OF HOSPITAL ETHICS LEGAL STUDIES IN THE ERA OF DIGITALIZATION

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ABSTRACT

The aim of this research is to determine the impact and era of the industrial revolution 4.0 in the health sector, as well as the challenges faced by health ethics laws in the era of the industrial revolution 4.0. The method used is a qualitative descriptive method using a phenomenological approach. We examine the data using critical data coding, in-depth interpretation and drawing conclusions which are the answers to this research question by adhering to the principles of high validity and reliability. Next, we describe the data in the findings section by adding criticism and discussion to understand whether the data is relevant to answering the problem. For the reporting stage, we chose qualitative data reporting based on data or literature reviews, which we limited to information and data released between 2010 and 2021 to look for the latest information and data. The results of the discussion carried out are that health ethics is taken from the word ethics, which is a discipline that begins with identifying, organizing, analyzing and deciding human behavior by applying principles to determine good behavior in a situation at hand. Industrial Revolution 4.0 is a phenomenon that combines cyber technology and automation technology. Industrial Revolution 4.0 is also known as "cyber physical system". The health sector is the sector most likely to benefit from the Industrial Revolution 4.0 because of the joining of physical, digital and biological systems. The conclusion from this research is that there are changes and advances in the health sector, especially in dental implants, cosmetic surgery and oncology. The era of industrial revolution 4.0 presents challenges that are not easy in the health sector. Apart from the abundant demographic bonus, other challenges also exist in the realm of health service technology innovation.

Keywords: Legal Studies; Hospital Ethics; Digital era; Cyber Physical Systems

INTRODUCTION

Technological development cannot it is undeniable that it has changed life people man from each era. Every day life We intersects with technology, be it cell phones, social media or even equipment House ladder. In development technology there is term industry 1.0, industry 2.0, industry 3.0, industry 4.0. Industry 1.0 began with the invention of the steam engine by James Watt (1763) and start revolution industry in all over world (Favaretto, Shaw, De Clercq, Joda, & Elger, 2020).

Industry 2.0 begins with the discovery of new energy sources such as electricity by Thomas Alfa Edison (Rezaei, Jafari-Sadeghi, Cao, & Mahdiraji, 2021), gas and petroleum. Method communicate changed with the discovery of the telegram And telephone.

Means of transportation also changed with the invention of cars and aircraft on beginning century 20th. Industry 3.0 be marked with development sector electronic, technology

information (transistor, microprocessors, mobile phones, and computers) as well as process automation in where are the robots? And machine start replace role man (Nittari et al., 2020).

Lastly is industry 4.0. The development of the internet has begun industrial revolution 4.0. With the internet, a production process can be regulated virtually and interconnected with a cloud computing system (Cloud), analysis data, And IoT (internet of things). (Solimini, Busardò, Gibelli, Sirignano, & Ricci, 2021).

The era of industrial revolution 4.0 provides real challenges that are not light in sector health. Besides bonus demographics Which overflow, challenge other Also there is on realm innovation technology service health (Popa, van Hilten, Oosterkamp, & Bogaardt, 2021).

METHODS

Next, we describe the methodology and steps used in conducting research which aims to obtain the views and perspectives of legal experts regarding the existence of just laws and the position of universities regarding the government's ability to implement these laws. law. We will present our views in the form of an interpretation that can be used as new learning for academics and other readers (Brall, Schröder-Bäck, & Maeckelberghe, 2019) looking for data and other information related to the theme of this research and looking for encouragement. and motivation for how this situation can be resolved by getting lots of input (Kaplan, 2020). Our data was searched through online search engines in various publications in scientific journals, government circulars, newspapers and other website services that actively discuss the position of higher education and its urgency for law and law students. Through a phenomenological approach, we examine the data using critical data coding, in-depth interpretation and drawing conclusions which are answers to this research question by adhering to the principles of high validity and reliability (Kuntardjo, 2020)

RESULTS AND DISCUSSION

A. Definition Ethics Health

Ethics comes from the Latin word, which is related to *words mores* and *ethos*, which means morals, customs, character, feelings, attitude Which Good, And Which worthy. Generally second say This in series of *mores of community* (community decency) and *ethos of the people* (human morals). So ethics is closely related to morals and morals, Which is mark sublime in Act in demand And Also relate very tightly with heart conscience (Nock et al., 2021).

According to Priharjo (Nock et al., 2021), ethics is something discipline Which started with identify, organize, analyze And decide human behavior by applying principles to determine behavior Which Good to something situation Which faced.

According to Martin (Nock et al., 2021), ethics is defined as " *the discipline.*" which can act as the performance index or reference for our control system ". Thus, ethics will provide a kind of limitation or standard Which will arrange association man in in group social. According to Dictionary Big Language Indonesia, ethics explained with differentiate three meaning as following :

- 1) Knowledge about what Which good and what the bad one and about right And obligation moral (morals).
- 2) Gathering principle or value if you mind with morals.
- 3) Values regarding right and wrong that are held a group or society.

Ethics health public is something order moral based on a value system that applies universally in existence prevent the development of risks to individuals, groups and society

which results in suffering from illness and disability, as well as increasing community empowerment to live healthy and prosperous lives. Health ethics public very different with ethics medical Which state that in carrying out medical work a doctor should not influenced by considerations personal, a doctor must always remember the obligation to protect human life, a doctor treats his colleagues as if he were himself want to treated, a doctor must still look after health himself (Kolasa & Kozinski, 2020).

B. Definition Era Revolution Industry 4.0

Revolution Industry 4.0 is phenomenon Which collaborating on cyber technology and automation technology. Revolution Industry 4.0 is also known as " *cyber physical system* ". Draft its implementation centered on automation. Helped technology information in process its application, involvement power man in the process can reduce. Therefore, effectiveness and efficiency in a work environment automatically increases. In the world industry, matter This impact significant on quality Work And cost production. However actually, No only industry, all over layer public Also Can get benefit general from system This (Patil, Ambritta, Mahalle, & Dey, 2022)

Definitions regarding Industry 4.0 vary because they are still in stages research and development. Chancellor German, Angela Merkel (2014) opinion that Industry 4.0 is comprehensive transformation from all aspects of production in industry through the combination of technology digital And Internet with industry conventional. Schlechtendahl et al (Fosch-Villaronga & Millard, 2019) emphasize definition to element speed from availability information, namely an industrial environment in which all entities always connected And capable share information One with Which other.

Understanding Which more technical presented by Kagermann et al (Fosch-Villaronga & Millard, 2019) that Industry 4.0 is integration from *Cyber Physical Systems* (CPS) and *Internet of Things and Services* (IoT and IoS) into the process Industry includes manufacturing and logistics as well as other processes. CPS is technology to combine the real world with the virtual world. This combination can be realized through integration between physical processes and computing (*embedded computers* and network technology) in a *closed loop* (Trentesaux & Karnouskos, 2022). Hermann et al (2015) add that Industry 4.0 is a term to refer to a collection of technologies and chain organizations value in the form of *smart factories* , CPS, IoT and IoS. *Smart factory* is a factory modular with technology CPS Which monitor process physique production Then display it virtually and decentralize it decision-making. Through IoT, CPS are able to communicate with each other and collaborate in real time, including with humans. iOS is all service applications that can be utilized by each stakeholder interests both internally and between organizations. There are six principle design Industry 4.0 that is *interoperability* , virtualization, decentralization, ability *real time* , oriented service And nature modular. Based on the explanations above, Industry 4.0 can be interpreted as an industrial era in which all entities in it can each other communicate in *real time* at any time based on utilization of internet and CPS technology to achieve goals creation of new value or optimizing existing value from each process in industry.

The number four in the term Industry 4.0 refers to the revolution fourth. Industry 4.0 is a unique phenomenon in comparison with three revolution industry Which precede it. Industry 4.0 announced a priori because the actual event has not yet occurred and still in the form of ideas (Drath & Horch, 2014). The term Industry 4.0 itself was officially born in Germany precisely when the Hannover Fair was held in 2011 (Kagermann, Lukas, & Wahlster, 2011). Germany own interest Which big related matter This Because Industry 4.0 become part from policy plan its construction Which called High-Tech Strategy 2020. Policy the aim For maintain Germany to always be at the forefront of the world manufacturing (Fernandes Tino et al., 2024). Several other countries also participated in

realize draft Industry 4.0 However use term Which different like *Smart Factories* , *Industrial Internet of Things* , *Smart Industry* , or *Advanced Manufacturing* . Although own mention different terms, all have the same goal, namely to increasing the competitiveness of each country's industry in facing the market very dynamic global environment. This condition is caused by the rapid development of the use of digital technology in various fields (Liang et al., 2024).

C. Impact Era Revolution Industry 4.0 On Field Health

The health sector is the sector most likely to gain the advantages of the Industrial Revolution 4.0 due to the joining of physics systems, digital and biology, although these sectors are probably also the least Ready accept. The Economist Intelligence Units do survey against 622 business leaders from various industries around the world who strengthen that matter. Various detailed data about health and a person's fitness status can be collected by a mobile phone And tool fitness Which used daily. Data the can used For study health And Also potential For transforming individual health and medical needs. The study The Economist Intelligence Unit said that in part doctor believe that technology telephone clever very role in empowering patient For arrange health proactively (Hamzah et al., 2023).

There is Lots impact from Revolution Industry 4.0 in field health. There is change and progress in health, specifically in implant tooth, surgery beauty, And oncology. Planning And placement implant tooth Which appropriate done with imaging 3D modern And system planning maintenance implant. Approach This has introduced And allowed For transfer virtual planning to clinical procedures, allowing for operations not enough invasive, placement implant Which adequate, subtraction post-operative discomfort, and creation of prosthetic structures before procedure surgery.

Orthognathic surgery currently uses 3D technology for increase planning And results surgery. During This technology two dimensions (2D) own limitations For identify, especially for patients with facial asymmetry. But 3D technology makes it possible presentation accurate form 3D Which complex For reconstruction model framework craniofacial And For predict results end. Guide intraoperative procedures such as surgical splints, positioning guides, and plans navigation preoperative designed in a way digital And prepared with simulate operation on model picture CT 3D. Business Which needed for 3D printed surgical cover splints for orthognathic surgery more A little than artificial splints manually using a bow conventional face And model casting tooth on the articulator.

Besides That, there is potency *telemedicine* Which explored by many health care providers. *Telemedicine* is monitoring and treatment patient from distance Far via sensors Which connected to Internet. Treatment of the elderly Which suffering from disease chronic is expected can helped by exists *telemedicine*. In the future check up medical possible For can done in House inhabitant Alone with comfortable. Besides That, public isolated Can get maintenance medical through *telemedicine*. Combination technology physics, digital And biology including pill For arrange release drug, robot Which responding to the patient's thoughts as well as *virtual reality* psychotherapy can incorporated into a medical application in future. However, opinion UNI Europe disclose that around 38% executive health believe that they Enough For Revolution Industry 4.0. Matter This imply that effort provider service health For integrate the Industrial Revolution 4.0 into their life habits needs to be improved. If health care providers are not ready, role And business they will taken over by troops from startups digital.

There are several technologies used in the field of biotechnology medical And develop on era Revolution Industry 4.0:

1. Clustered Regularly Interspaced Short Palindromic Development Repeat (CRISPR) / CRISPR- associated protein (Cas) 9 system rapidly in a very short time and has been used for various gene target on man, bacteria, fish zebras, worm *C.elegans* , plants, *Xenopus tropicalis* , rats, mice, etc. Method This used researcher For make *point mutation* (deletion or insert) in gene target certain through single gRNA. CRISPR has has developed over the years The last 20 years from what started as a DNA sequencing tool with function biological Which No is known become editor genome Which has succeed used in test with various cell. Matter This useful in biology synthetic, screening genome functional, modulation transcription, And therapy gene (Law et al., 2018).
2. Tool computing in silico has help search drug new by developing small molecules over three decades as well is strategy Which very effective For develop a new drug. Over the last decade there has been an increase in method computing invention drug like docking molecular, pharmafore modeling and mapping, de novo design, calculation similarity molecular And screening virtual based order proteins. However along walking time, needed technology computing in silico Which very advanced. Finally appear process *high throughput screening* Which based by more sophisticated in silico programs and very computers qualified. Molecule drug own Lots challenge For penetrate various biological barriers in order to bond effectively effective on targets, even at low concentrations (Sinaga, Wu, & Chen, 2022). Toxic effects in organisms can caused by existence off-target reactions from something molecule although potency drug the in a way pharmacological Enough tall. Problem main indevelopment of a drug is toxicity. Often in stagesdevelopment, toxicity new detected later (Harahap & Sativa, 2023).
3. Microbiota intestines can role in give rise to disease specific to humans and maintain health directly. Matter This show that combination antibiotics, probiotics And prebiotics Which cause change composition microbes commensals may be a new therapeutic approach. To help understand interaction complex bacteria And cell "host" as well as Their relationship pathophysiologically requires a phenotype perspective 'system', so that can done change in composition microbiota intestines in status disease. Appearance metagenomics And metabonomics that is technology 'omics' can applied to study the molecular level of gut ecology microbes. Data the will give opportunity For disclose function physiological from microbiota intestines For human health. In the future, in the treatment of patients will utilise microbiota intestines For various disease Which the more complex. Amount target potential microbiome on genome man own total more from 3,000 target. For arrange microbiome And as a result restore homeostasis ecology intestines from hosts, can used combination antibiotics, probiotics and prebiotics. Metagenomics 'omics' technology platform And metabonomics catch variation biochemistry in a way holistic And dynamic Which related with condition pathophysiology from hosts so that approach therapy the can monitored And evaluated. As a result, integration data metabonomics And metagenomics will produce pharmacological and clinical data can be the basis for the development of diagnostic and prognostic tools Which comprehensive about disease complex (Shaikh, Rasool, & Verma, 2023).

4. Correlation simple between clinical syndrome And analysis pathological starting from the late 19th century underlies contemporary views human disease. Approaches to disease diagnosis, prognosis, and this treatment is not yet completely perfect and available serious shortcomings for the modern era of genomic medicine because This method is a derivative derived from reductionist analysis and principle experimentation although Already used dozens year as well as Good for world medicine. Appearance era new systems biology more promises to see treatment from holistic side because it can quantify system changes in man. Matter This can straighten up diagnosis, define predilection disease, develop treatment strategy in a way individual based on molecular pathobiology modern as well data Complete genomes are available for populations and individuals. Biology system apply computational models and mathematics on complex biological systems. Engineering engineering approach to scientific biological research in this case is used. Example of use system holistic is project *sequencing* genome man onin 2000 which is a collaborative project in the field of genetics. Benefits of using a holistic approach based network is that We can characterizing various type disease with a system based on molecular interactions between cells and tissues and organs without following system principles reduction semiempirical. Treatment Which obtained with biology system This in period front will bring revolution new Forpractice medical (Sliwa, 2019).

D. Challenge Which Confronted Ethics Health in Era Revolution Industry4.0

Era revolution industry 4.0 give challenge Which No lightin the health sector. Apart from the demographic bonus abundance, challenges there are others too on realm of innovation technology service health.

D.1. Health Public

The prevalence of infectious diseases, especially tuberculosis, is still high. Besides That, unhealthy lifestyles also encourage the increase non-communicable diseases such as stroke, heart disease and diabetes. System manage environment Which bad become notes, like pollution air, water, hazardous and toxic waste. All forms of pollution This can cause health problems ranging from mild to serious Serious. (Sihombing, 2019)

Freedom information in era digital This Also often called as a disruptive era, namely an era where technology and society can develop dynamically in a very fast time, Good in positive things as well negative and can become viral in just seconds. In the field of health, information that circulate freely often cannot be accounted for the truth and becomes a hoax that misleads the public. Of course this can be a challenge for health workers community, especially the health promotion section because of its circulation Misinformation about health will have a big impact for pattern behavior Healthy in environment public. (Iro, 2019)

D.2. Medical

There is presumption that profession doctor will experience competition. If formerly doctor Which determine all diagnosis and treatment, now patients can search for all the information freely without depend with doctor.

With the Watson intelligence (Cabello, Karimipour, Jahromi, Dehghantanha, & Parizi, 2020), the patient does not need to meet doctor and

go to the hospital. Just by entering data- data to in program Watson, patient can obtain information regarding the diagnosis and possible treatment options chosen (Feliks, 2022).

No can denied that development technology has change health industry as a whole radical. This is certain give rise to worry on para practitioner health that service medical conventional Which emphasize exists stare advance between doctors And patient will is lost.

D.3. Nursing

In the era industry 4.0 This knowledge nursing must adopt technological developments due to patient care in the future will also differ as time goes by. Nursing in the future front will leads on use robot Which can replace some nursing functions. This is not a no Possible done with support technology moment This Already created robot Which Can give drug. Utilization technology And intelligence artificial operate various technology start from process production And distribution to consumer, what we can be certain of is will give chance new For increase Power competitive industry And change style life. (Liputo, 2019)

D.4. Pharmacy

Existence I.T in era revolution industry 4.0 like sword double-edged, on the one hand it provides excellent opportunities because helps in dealing with various health problems. But, in side other If utilized person No responsible answer can, can become boomerang for patient Because safety can be forgotten. Medication may or may not be used rational. Because, people can buy online, without anyone even a little bit instruction from power medical or pharmacist (Santos, Tabacow, Barboza, Leão, & Bock, 2022).

E. Method Face Challenge Ethics Health In Era Revolution Industry 4.0

Technological advances must be balanced with adaptive regulations, collaborative, upholding ethics, educating the public, profession health as well as regulators. Public need join in as well as reflect condition And readiness sector health Indonesia To use face Revolution Industry 4.0.

E.1. Health Public

Facing the industrial revolution 4.0, then someone Public health experts must have certain skills. Such as the ability to think critically, communication skills, collaboration, problem solving, ability adapt with technology And other etc (Wicaksono & Kusriyah, 2018).

The era of industrial revolution 4.0 is a post truth era . By therefore We need alert And public must the more intelligent sort information so that No trapped on Hoax. Matter This is due to the presence of technology that is dissertation with content will can form mark new in society (Noussia, 2021).

To respond to existing challenges, FK-KMK UGM has develop channel information health Trusted Which named INAHEALTH since 2017. As one movement promotion health digital, until moment This channel INAHEALTH on the YouTube platform has been subscribed to by more than 5000 customer. Through channel information This, public It is hoped that it will be easier to find sources of information health Which Trusted And can counteract hoaxes in media digital. Besides That, Wisaksono Adhi, as manager INAHEALTH Also expect it to be collaboration more wide along with content creator and power health public, so that you can increase the

number of interesting health information and trusted in the community and improve health literacy in public (Pritchard, Reckdenwald, Nordham, & Holton, 2018).

E.2. Medical

In the era of industrial revolution 4.0 or what is called the era of disruption innovation in the field of education, including medical education, must notice various characteristics And trend public in era This. Matter That like all round digital, internet of thing , big data , artificial intelligence, roboting, augmented reality , And other etc.

In respond presence era This, Higher Education has transform role college tall For produce graduate of Which No only as an agent of education and research but Also become an agent of culture, knowledge, and technology transfers . College pushed so that graduates capable become agent of economic development (Heriwiyanto, Soraya, & Bagus Yuherawan, 2021).

E.3. Nursing

A nurse must Can balance And adapt with a technology-based environment. Factors that important is Skills And competence nurse in power consistent medical care. Needs to be improved according to developments And prioritize safety patient. Nurse Also must Have critical thingking have idea innovative, And adaptive towards changes in the era facing all elements, including patients And power medical other.

The role of nurses is not limited to providing nursing care (ASKEP) but must own skill counseling For convey education on patient, phenomenon the has changing the nature of nursing services from vocational services which is only based on the services of professionals who work on mastery knowledge knowledge And technology nursing.

5 Soft skills that are most needed in facing this era revolution industry 4.0

- a) Creativity: One nurse have the ability to create something Which new For give idea creative in solving problems or as the ability to see relationships Which new between elements Which Already There is previously. Generally creativity as Person, Process, Press, Products. Fourth P This each other related, namely a creative Person who involves himself in process (Process) creative, And with encouragement And support (Press) from environment, produce product (Product) creative. So that creativity And innovation very important in face era revolution industry 4.0 in all things
- b) Persuasion: Nurse must use communication Which used For influence And convincing person other. Through persuasion every nurse try try influence patient beliefs and expectations. Persuasion on in principle is effort convey information And interact between humans in conditions where both parties party You're welcome understand And agreed For do something Which important for second split party. then We can build connection each other believe (BHSP) to patient We so that they more open inside process service health
- c) Collaboration: Power health must Can form interaction, discussion, compromise, cooperation Which relate with individual, group or a number of party health other, Besides That, collaboration means own values Which The same And strong as a component effective collaboration. has direction objective Which The same, perception determination For look for solution For heal patient By because That collaboration very in need between fellow energy health (Garcia, 2020).

- d) Adaptation: Nurse capable adjust/adapt against increasingly rapid global growth in the era of revolution Industry 4.0 so that nurses will not even be less competitive with technology though.
- e) management : Nurses must have a list the planning that will be done so that it will be well organized Good And until develop time to productivity time to achieve goals effectively and efficiently (Kusumaningtyas, Subekti, Jaelani, Orsantinutsakul, & Mishra, 2022).

E.4. Pharmacy

The method, service conventional Which the advantages is humans touch , must balanced by technology. Technology Which can make life the more simple And comfortable need prepared when entering the industrial revolution 4.0. Necessary things prepared between other problem readiness resource man.

Management college tall pharmacy will increase the existence of pharmacists. Lots of it number of pharmacy colleges show If pharmacist And candidate pharmacist actually own strength in Indonesia.

Drug which will be given to the patient must also be accompanied that explanation adequate. So that way, patients can use drug in a way Correct (Absori et al., 2022).

CONCLUSIONS

Based on the results and discussion, it can be concluded that health ethics is taken from the word ethics which is a discipline which begins with identifying, organizing, analyzing and deciding human behavior by applying principles to determine good behavior in a given situation faced. Industrial Revolution 4.0 is a collaborative phenomenon technology cyber And technology automation. Revolution Industry 4.0 known also with term “ cyber physical system ”. Sector health is sector Which most Possible get profit from the Industrial Revolution 4.0 Because joining system physics, digital and biology. There is change and progress within field health, specifically in implant tooth, surgery beauty, And oncology. The era of industrial revolution 4.0 presents challenges that are not easy health sector. Apart from the abundant demographic bonuses, there are challenges other Also there is on realm of innovation technology service health. The way to face challenges in the era of industrial revolution 4.0 is progress technology must be balanced with regulations that are adaptive, collaborative, upholding ethics, educating the public, health professions as well as regulators.

REFERENCES

- Absori, A., Hartotok, H., Dimyati, K., Nugroho, H. S. W., Budiono, A., & Rizka, R. (2022). Public Health-Based Policy on Stunting Prevention in Pati Regency, Central Java, Indonesia. *Open Access Macedonian Journal of Medical Sciences*, 10(E), 259–263. <https://doi.org/10.3889/oamjms.2022.8392>
- Brall, C., Schröder-Bäck, P., & Maeckelberghe, E. (2019). Ethical aspects of digital health from a justice point of view. *European Journal of Public Health*, 29(Supplement_3), 18–22. <https://doi.org/10.1093/eurpub/ckz167>
- Cabello, J. C., Karimipour, H., Jahromi, A. N., Dehghantanha, A., & Parizi, R. M. (2020). Big-Data and Cyber-Physical Systems in Healthcare: Challenges and Opportunities. In *Handbook of Big Data Privacy* (bll 255–283). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-38557-6_12

- Favaretto, M., Shaw, D., De Clercq, E., Joda, T., & Elger, B. S. (2020). Big Data and Digitalization in Dentistry: A Systematic Review of the Ethical Issues. *International Journal of Environmental Research and Public Health*, 17(7), 2495. <https://doi.org/10.3390/ijerph17072495>
- Feliks, D. (2022). Legal Protection of Policyholders Due to Bankruptcy of Bumi Asih Jaya Insurance. *Khazanah Hukum*, 4(2), 80–91. <https://doi.org/10.15575/kh.v4i2.18100>
- Fernandes Tino, C., Cláudia Becker, A., Pereira, B., da Rosa Corrêa, L., Luiz Soares, M., & Nascimento-e-Silva, D. (2024). Ethical, legal, and information management aspects in the context of patient safety. *GeSec: Revista de Gestao e Secretariado*, 15(1).
- Fosch-Villaronga, E., & Millard, C. (2019). Cloud robotics law and regulation. *Robotics and Autonomous Systems*, 119, 77–91. <https://doi.org/10.1016/j.robot.2019.06.003>
- Garcia, A. (2020). A new era for bilingual education in California. *Phi Delta Kappan*, 101(5), 30–35. <https://doi.org/10.1177/0031721720903825>
- Hamzah, M., Islam, M. M., Hassan, S., Akhtar, M. N., Ferdous, M. J., Jasser, M. B., & Mohamed, A. W. (2023). Distributed Control of Cyber Physical System on Various Domains: A Critical Review. *Systems*, 11(4), 208. <https://doi.org/10.3390/systems11040208>
- Harahap, E. P., & Sativa, A. (2023). UNDERWRITER RESPONSIBILITIES IN POLICY CLOSING LIFE INSURANCE. *Academy of Education Journal*, 14(2), 277–288. <https://doi.org/10.47200/aoej.v14i2.1658>
- Heriwiyanto, E., Soraya, J., & Bagus Yuherawan, D. S. (2021). The Urgency of Using Police Diversion in Minor Crimes at the Investigation Stage in the Perspective of Restoration Justice. *International Journal of Multicultural and Multireligious Understanding*, 8(4), 476. <https://doi.org/10.18415/ijmmu.v8i4.2590>
- Kaplan, B. (2020). REVISITING HEALTH INFORMATION TECHNOLOGY ETHICAL, LEGAL, and SOCIAL ISSUES and EVALUATION: TELEHEALTH/TELEMEDICINE and COVID-19. *International Journal of Medical Informatics*, 143, 104239. <https://doi.org/10.1016/j.ijmedinf.2020.104239>
- Kolasa, K., & Kozinski, G. (2020). How to Value Digital Health Interventions? A Systematic Literature Review. *International Journal of Environmental Research and Public Health*, 17(6), 2119. <https://doi.org/10.3390/ijerph17062119>
- Kuntardjo, C. (2020). Dimensions of Ethics and Telemedicine in Indonesia: Enough of Permenkes Number 20 Year 2019 As a Frame of Telemedicine Practices in Indonesia? *SOEPPRA*, 6(1), 1–14. <https://doi.org/10.24167/shk.v6i1.2606>
- Kusumaningtyas, R. O., Subekti, R., Jaelani, A. K., Orsantinutsakul, A., & Mishra, U. K. (2022). Reduction of Digitalization Policy in Indonesian MSMEs and Implications for Sharia Economic Development. *JURIS (Jurnal Ilmiah Syariah)*, 21(2), 157. <https://doi.org/10.31958/juris.v21i2.6855>
- Law, B. E., Hudiburg, T. W., Berner, L. T., Kent, J. J., Buotte, P. C., & Harmon, M. E. (2018). Land use strategies to mitigate climate change in carbon dense temperate forests. *Proceedings of the National Academy of Sciences*, 115(14), 3663–3668. <https://doi.org/https://doi.org/10.1073/pnas.1720064115>
- Liang, Q., Zhao, S., Zhang, J., Deng, H., Damm, W., Hess, D., ... Biebl, B. (2024). Cyber-physical systems. *ACM Transactions on*, 8(1). <https://doi.org/https://doi.org/10.1145/3613531>
- Nittari, G., Khuman, R., Baldoni, S., Pallotta, G., Battineni, G., Sirignano, A., ... Ricci, G. (2020). Telemedicine Practice: Review of the Current Ethical and Legal Challenges. *Telemedicine and e-Health*, 26(12), 1427–1437. <https://doi.org/10.1089/tmj.2019.0158>

- Nock, M. K., Kleiman, E. M., Abraham, M., Bentley, K. H., Brent, D. A., Buonopane, R. J., ... Draper, J. (2021). Consensus statement on ethical & safety practices for conducting digital monitoring studies with people at risk of suicide and related behaviors. *Psychiatric research and clinical practice*, 3(2), 57–66.
- Noussia, K. (2021). Liability Insurance in the Context of the COVID-19 Pandemic. *icade. Revista de la Facultad de Derecho*, (110), 1–18. <https://doi.org/10.14422/icade.i110.y2020.006>
- Patil, R. V., Ambritta, N. P., Mahalle, P. N., & Dey, N. (2022). Medical Cyber–Physical Systems in Society 5.0: Are We Ready? *IEEE Transactions on Technology and Society*, 3(3), 189–198. <https://doi.org/10.1109/TTS.2022.3185396>
- Popa, E. O., van Hilten, M., Oosterkamp, E., & Bogaardt, M.-J. (2021). The use of digital twins in healthcare: socio-ethical benefits and socio-ethical risks. *Life Sciences, Society and Policy*, 17(1), 6. <https://doi.org/10.1186/s40504-021-00113-x>
- Pritchard, A. J., Reckdenwald, A., Nordham, C., & Holton, J. (2018). Improving Identification of Strangulation Injuries in Domestic Violence: Pilot Data From a Researcher–Practitioner Collaboration. *Feminist Criminology*, 13(2), 160–181. <https://doi.org/10.1177/1557085116653181>
- Rezaei, M., Jafari-Sadeghi, V., Cao, D., & Mahdiraji, H. A. (2021). Key indicators of ethical challenges in digital healthcare: A combined Delphi exploration and confirmative factor analysis approach with evidence from Khorasan province in Iran. *Technological Forecasting and Social Change*, 167, 120724. <https://doi.org/10.1016/j.techfore.2021.120724>
- Santos, B. J., Tabacow, R. P., Barboza, M., Leão, T. F., & Bock, E. G. P. (2022). Cyber Security in Health. In *Research Anthology on Securing Medical Systems and Records* (bll 238–254). IGI Global. <https://doi.org/10.4018/978-1-6684-6311-6.ch012>
- Shaikh, T. A., Rasool, T., & Verma, P. (2023). Machine intelligence and medical cyber-physical system architectures for smart healthcare: Taxonomy, challenges, opportunities, and possible solutions. *Artificial Intelligence in Medicine*, 146, 102692. <https://doi.org/10.1016/j.artmed.2023.102692>
- Sinaga, J., Wu, T., & Chen, Y. (2022). Impact of government interventions on the stock market during COVID-19: a case study in Indonesia. *SN Business & Economics*, 2(9), 136. <https://doi.org/10.1007/s43546-022-00312-4>
- Sliwa, J. (2019). Assessing complex evolving cyber-physical systems (case study: smart medical devices). *International Journal of High Performance Computing and Networking*, 13(3), 294. <https://doi.org/10.1504/IJHPCN.2019.098570>
- Solimini, R., Busardò, F. P., Gibelli, F., Sirignano, A., & Ricci, G. (2021). Ethical and Legal Challenges of Telemedicine in the Era of the COVID-19 Pandemic. *Medicina*, 57(12), 1314. <https://doi.org/10.3390/medicina57121314>
- Trentesaux, D., & Karnouskos, S. (2022). Engineering ethical behaviors in autonomous industrial cyber-physical human systems. *Cognition, Technology & Work*, 24(1), 113–126.
- Wicaksono, R. A., & Kusriyah, S. K. (2018). Implementation Of Restorative Justice Approach In Legal Protection Against Lightweight Crime By The Children. *Jurnal Daulat Hukum*, 1(4), 943. <https://doi.org/10.30659/jdh.v1i4.4136>