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## DIGITALIZATION AND BIG DATA IN PREVENTING CORRUPTION IN EDUCATION SECTOR: TOWARDS INCLUSIVE AND EQUITABLE EDUCATION

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Article	Abstract
<p><b>Keywords:</b> big data, corruption, inclusive and equitable education</p> <p><b>History of Article:</b> Received: April 04, 2022; Reviewed: April 07, 2022; Accepted: April 16, 2022; Published: April 30, 2022.</p> <p><b>DOI:</b> <a href="https://doi.org/10.56282/slrv1i1.53">https://doi.org/10.56282/slrv1i1.53</a></p>	<p>Corruption in the education sector is a big question considering enacting the education and anti-corruption laws. The substantial education fund in Indonesia is to increase human resources as the principal capi-tal in national development. It is necessary and urgent to answer why and how digitalization and Big Data can prevent corruption in the edu-cation sector from achieving inclusive and equitable quality education in Indonesia. This paper is a normative juridical study with an interdisciplinary approach. The ultimate goal is to apply digitalization and Big Data rules to narrow the space for corruption and predict and control social phenomena in the education sector. The existing regulations in the management of education funds are only repressive and not adequate in terms of prevention which will be effective and efficient when involving technology (especially digitalization and Big Data in the education sector). The burden of this paper lies in the study, which is still normative and qualitative. An empirical study with a quantitative approach is needed, but this study is sufficient to enrich the literature for future empirical studies. The existence of digitalization rules and Big Data in national education controlled by the Chief Digital Officer can prevent corruption in the education sector. It can be a means of checks and balances and succeed in the framework of every education policy carried out by the government, whose primary output and outcome is the use of funds targeted to education and the achievement of inclusive and equitable quality education in Indonesia by 2030.</p>

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### 1. INTRODUCTION

Even though it is in line with Article 31 of the 1945 Constitution of the Republic of Indonesia (UUD 1945), which has emphasized that every citizen has the right to education, the 2030 Agenda for Sustainable Development, as stated in the Sustainable Development Goals (SDGs) number 4 which has emphasized guarantee the quality of inclusive and equitable education and increase lifelong learning opportunities for all, however, in

practice, irresponsible parties have intentionally injured the constitutional mandate and SDGs with rampant corruption in the education sector.

This happens in the following facts. The results of a study by Indonesia Corruption Watch<sup>1</sup> in 2003-2013 found 296 cases of education corruption with an indication of a loss of Rp. 619 billion. The Supreme Court (*MA*) cassation decision against a former member of the House of Representatives (*DPR*), USA, in the procurement case at the Ministry of Education and Culture and the Ministry of Youth and Sports, which imposed a sanction of 12 years in prison, and was required to pay replacement money of Rp. 12, 58 billion, as well as the case of corruption in non-school education in the Province of NTT, which is alleged to have harmed the state's finances in the amount of Rp. Seventy-seven billion (Integrito, 2014). In addition, until 2019, many corruption cases in BOS funds have been handled by law enforcers, such as the detention of the principal and the treasurer of one of the Vocational High Schools (SMK) in SR Regency has harmed state finances in the 2015 – 2017 fiscal year amounting to Rp. 603.56 million (Pontas, 2019), and the police Hand Arrest Operation (*Operasi Tangkap Tangan/OTT*) on May 9, 2019, against unscrupulous school principals in one of the district's provinces in Indonesia with evidence in the form of cash amounting to Rp. 336.75 million (Republika, 2019). The occurrence of corruption is suspected of having been carried out in various modes in various regions in Indonesia, such as evil school principals being asked to deposit a certain amount of money to the manager of BOS funds to unscrupulous education officials under the pretext of administration and speeding up the process of disbursing BOS funds, corrupt school principals collecting BOS funds. To bribe government auditors, the management of BOS funds is not by technical guidelines, school personnel intentionally negate the role or do not form a School Committee and Education Council, specific individuals only manage BOS funds, and the school still collects donations to parents on the pretext of To improve the quality of education, BOS funds are intentionally managed in a non-transparent manner (many schools do not put up information boards about *BOS* funds). Unscrupulous school principals often mark up the number of students receiving BOS funds and make false reports (such as falsifying the signatures of teachers, falsifying receipts for purchasing office stationery or school infrastructure, and borrowing BOS funds for personal use<sup>2</sup>.

The continued occurrence of corruption in the education sector is a big question. It must be handled with alternative prevention by maximizing law and technology. Indonesia has had Law no. 31 of 1999 concerning the Eradication of Corruption Crimes as amended by Law no. 2001. The quality of school education is in line with the state's desire to increase human resources, which are the principal capital of national development<sup>3</sup>. The state will receive many benefits if it has a highly educated population, considering that education is one of the most effective ways for developing countries to improve their

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<sup>1</sup> ICW, "ICW Annual Report 2013", Indonesia Corruption Watch, Jakarta, available at <https://www.antikorupsi.org/sites/default/files/laporan%20Akhir%20Tahun%20ICW%202013.pdf> (accessed 22 August 2021).

<sup>2</sup> Teras Lampung, "Inilah 14 Modus Penyelewengan Dana BOS", (accessed 21 August 2021) available at <https://www.teraslampung.com/inilah-14-modus-penyelewengan-dana-BOS/>.

<sup>3</sup> Central Bureau of Statistics, Potret Pendidikan Indonesia: Statistik Pendidikan 2019, Katalog BPS: 4301008, Badan Pusat Statistik, Jakarta. 2019.

citizens' standard of living<sup>4</sup>. This must be paid more attention to considering the number of students in Indonesia for the 2018/2019 extensive GE. Out of 268.07 million people in Indonesia, 26.93 million are elementary, and the equivalent, 13.16 million, are high school students. First and match, 10.99 million people are high school students or equivalent<sup>5</sup>. Thus, a study is needed to answer why and how digitalization and Big Data can prevent corruption in the education sector from improving the story of inclusive and equitable education in Indonesia by 2030.

## 2. METHODS

This study is a normative juridical study with an interdisciplinary approach whose limitations are to answer why and how digitalization and Big Data prevent corruption in the education sector. This study is adequate to use qualitative research to produce deductive research conclusions. What is meant by qualitative research in this study is research that is not based on numbers conducted on natural legal objects<sup>6</sup>; that is, objects that develop as they are, are not manipulated by researchers. The presence of researchers does not affect the dynamics of the thing.

The instrument in qualitative research is a person or human tool, the researcher, who must have a broad theory and insight to ask questions, analyze, take pictures, and construct the social situation understudy to be more precise and meaningful<sup>7</sup>. The normative juridical method in this study is ultimately to predict and control existing social phenomena for prescriptive purposes, as the use of technology and information systems in this study to help improve the future through past learning<sup>8</sup>.

## 3. ANALYSIS AND DISCUSSION

### a. Law on Education Funds to Ensure Inclusive and Equitable Quality of Education

The rampant corruption in the education sector cannot be left unchecked, even though the government has made many efforts, such as criminalizing perpetrators, conducting routine audits by authorized agencies, and forming school committees and boards in each school. Even so far, many external parties have monitored BOS funds, starting from involving Non-Government Organizations (NGOs) and the mass media, opening the public complaint box, until now the Government of Indonesia has issued complete and latest provisions on the management of BOS funds in the Regulation of the Minister of Education and Culture Number 8 of 2020 dated February 5, 2020, regarding the Technical Guide-lines

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<sup>4</sup> Suryadarma, D., "How corruption diminishes the effectiveness of public spending on education in Indonesia", *Bulletin of Indonesian Economic Studies*, Vol. 48, No.1, pp. 85-100. 2012.

<sup>5</sup> Central Bureau of Statistics, *Potret Pendidikan Indonesia: Statistik Pendidikan 2019*, Katalog BPS: 4301008, Badan Pusat Statistik, Jakarta. 2019.

<sup>6</sup> Waters, D., *Quantitative Methods for Business*, Pearson Education Limited, Essex. 2011.

<sup>7</sup> Sugiyono. *Metode Penelitian Kuantitatif Kualitatif dan R&D*, Penerbit Alfa Beta, Bandung. 2013.

<sup>8</sup> Gregory, R.W., and Muntermann, J. "Research Note—Heuristic Theorizing: Proactively Generating Design Theories", *Information Systems Research*, Vol. 25, No. 3 (2014), pp. 639-653.

for Regular School Operational Assistance, the summary of which includes: (a) Managed by the school based on the principles of flexibility, effectiveness, efficiency, accountability, and transparency, (b) Given directly to the school after filling and updating the primary education data and having an officially registered national school number, where the absolute responsibility for the correct-ness of the data rests with the Principal Schools, (c) Used to finance the operational implementation of education in schools whose expenditure is through the mechanism of applicable laws and regulations, (d) Head of the Education Office in charge of schools receiving related BOS funds to ensure natural conditions in the school, (e) School BOS Team must report all use of Regular *BOS* funds at each stage to the reporting system of the Ministry of Education and Culture, (f) the Minister of Education and Culture, Governors, and Regents/Mayors (accord-ing to their authority) monitor and evaluate the management of the BOS funds.

Indeed, the effort to issue the new regulation is expected to improve the management of education funds. However, these efforts can still not eliminate the fraudulent modes described previously. For example, even though the BOS funds are directly disbursed by the schools concerned, the position of the principal is still determined by the regional heads where the big schools are located, so the principals are "forced" to obey the order, and even though the *RKAS* (School Activity Plans and Budgets) effectiveness, efficiency, accountability, and transparency but the potential for fraud is still significant from Kalderanews, 2020. Even the Regulation of the Minister of Education and Culture Number 8 of 2020 has secured the existence of a school committee, as stated in Article 1 point 2 of the Regulation of the Minister of Education and Culture Number 75 of 2016 concerning School Committees, which defines the School Committee as an independent institution consisting of parents/guardians of students, the school community, as well as community leaders who care about education, is still receiving criticism from certain circles. As the results of the research reported by the Directorate General of Primary and Secondary Education in 2009 showed that 50% of the Board of Education and School Committees were not functioning optimally from okezone 2014, and business processes in carrying out the duties of school committees in Indonesia were not transparent and accountable, even though the function of the school committees should be able to improve the quality of education services in their schools through transparent monitoring and evaluation per semester<sup>9</sup>.

The existence of corruption in education is still embedded in a systemic and chronic process, as empirical research conducted in the higher education sector shows that the elites are still interested in and benefit from non-monetary corruption. At the same time, the people themselves still tend to be willing to bribe both in money and non-cash money. In fact, non-monetary bribery, for example, in the form of retaliation, is hazardous given the aspect that composes it in the form of exchange instability, and the existing control

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<sup>9</sup> Sinaga, E.N., and Sinaga, H.D.P., "Business process reengineering of school committee in Indonesia". In Hendayani, R., et al. (eds.), *Synergizing Management, Technology and Innovation in Generating Sustainable and Competitive Business Growth*, Routledge, London, pp. 84-92. 2021.

mechanisms will only ensure that social ambitions will continue to breed profound injustice<sup>10</sup>. This will mobilize people in the education sector to compete to satisfy their personal or group interests, which of course, only causes the neglect of inclusion policies in the education sector as part of the constitutional rights agenda of every community in demanding access and equality in education<sup>11</sup>. In preventing corruption, any inclusive education policy and education equality must refer to how, where, and why, and with what consequences it can educate all students. The implementation, among others, is an education policy that respects and increases the participation of all students and teachers equally, which views differences between students as a source to support learning (not as a problem), and recognizes the constitutional right of every community to obtain education to improve the standard of living of students. Life emphasizes education's role in sustaining, building, and developing values in students, teachers, schools, communities, and countries<sup>12</sup>.

#### **b. Digitization and Big Data in Preventing Corruption in The Education Sector**

The development of digitalization, software, and the processing power and Big Data accompanying it has created significant changes, dilemmas, and possibilities in the financial management of organizations, institutions, and corporations. The tendency that data standards and sharing mechanisms will be more perfect in the future as recently a lot of data has to be online, open, shared on the internet, and other related things, shows that Big Data has prospects in the field of public security<sup>13</sup>. This prospect is even more real when at this moment, the realization of digitalization has been manifested in the modernization of the education, training, and reskilling system, the development of information and communication technologies (ICTs), and an adaptation of the regulatory framework and the use of Big Data analytics. As an essential supporting tool in presenting and presenting data and evidence quickly and exceptionally<sup>14</sup>.

Digital convergence initially started with the shift to “paperless” operations and has continued to expand on efforts to expand into digital operations, extracting data from multiple sources, including devices and processes enabled by digitization, and then analyzing the extracted data and linking it to digital operations and other data sources to extract valuable intelligence for the organization. Considering that in 2020 alone, there are already 50 billion smart objects connected to the Internet, many organizations have realized the magnitude of the challenges that will come in terms of monitoring various

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<sup>10</sup> Sabic-El-Rayess, A., and Mansur, N.N., “Favor reciprocation theory in education: New corruption typology”, *International Journal of Educational Development*, Vol. 50, pp. 20–32. 2016.

<sup>11</sup> Florian, L. “Special or Inclusive Education: Future Trends”, *British Journal of Special Education*, Vol. 35, No. 4 (2008), pp. 202-208.

<sup>12</sup> Runswick-Cole, K., “Time to end the bias towards inclusive education”, *British Journal of Special Education*, Vol. 38, No. 3, pp. 112-119. 2011.

<sup>13</sup> Si'en, C., Luqing, Y., and Shouhui, X. “Analytics: The Real-World Use of Big Data in Financial Services Studying with Judge System Events”, *Journal of Shanghai Jiaotong University (Science)*, Vol. 21, No. 2 (2016), pp. 210-214.

<sup>14</sup> Hipgrave, S., “Smarter fraud investigations with Big Data analytics”, *Network Security*, Vol. 2013, Iss 12 pp. 7-9. 2013.

digital strategies and drives by creating a Chief Digital Officer (CDO), which is expected can significantly impact an organization's systems, solutions, and business processes and intrinsically enable a continuous process of innovation and creativity<sup>15</sup>. Rikowski reveals several advantages that can be obtained from digitization, such as providing much more significant and accessible access to various types of desired materials, being able to provide excellent search facilities, being able to compare materials invaluable and creative ways, and consuming less money. less storage space, helps ensure that originals are not damaged by multiple handling, resources can be utilized in the future and at unexpected times, and transfers or shipments of materials can be accomplished promptly<sup>16</sup>.

Understanding Big Data lies in the critical role of data integrity across all stages of collection and processing, designing work based on a broader understanding of knowledge, enabling the increased deployment of emerging technologies for data collection and analysis, and adopting a more nuanced analysis of linked control strategies. The complexity of cost management and outsourcing of cloud-based technology<sup>17</sup>. Unfortunately, the magnitude of the benefits of Big Data has not been fully maximized, considering that there are still many areas of Big Data that have not been researched in accounting and finance, such as risk and security, data visualization, and predictive analysis data management, and data quality<sup>18</sup>.

Several studies have explored the use of Big Data in accounting and finance in various sectors, especially in preventing or detecting fraud<sup>19</sup>, such as fraud, abuse, waste, and errors in health insurance<sup>20</sup>. Efficient in fighting fraud, protecting the legal entities' bottom line, safeguarding the organizational reputation, and complying with legislative requirements<sup>21</sup>. The relation between Big Data and the quality and reliability of financial information lies in its efforts to prove a digital footprint regarding who is responsible for financial information. Prins et al. emphasized the need for seriousness by the government by marking it based on the following three processes that are "the networking of data (i.e., the shared use and management of information within a network of actors), the compiling and enhancing of data (i.e., creating new knowledge and profiles based on different sources in different contexts), and pursuing a preventive and proactive policy based on information (i.e., actively evaluating and intervening in society based on an information-driven risk

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<sup>15</sup> Rayes, A., and Salam, S. *Internet of Things From Hype to Reality: The Road to Digitization*, Springer Nature Switzerland AG, Cham. 2019.

<sup>16</sup> Rikowski, R., "Digital Libraries and Digitisation: An Overview and Critique". In Ruth Rikowski (Ed.), *Digitisation Perspectives*, Sense Publishers, Rotterdam, pp. 21-41. 2011.

<sup>17</sup> Bhimani, A., and Willcocks, L. "Digitisation, 'Big Data' and the transformation of accounting information", *Accounting and Business Research*, Vol. 44, No. 4 (2014), pp. 469-490.

<sup>18</sup> Cockcroft, S., and Russell, M, "Big Data Opportunities for Accounting and Finance Practice and Research", *Australian Accounting Review*, Vol. 28, No. 3 (2018), pp. 323-333.

<sup>19</sup> Cockcroft, S., and Russell, M, "Big Data Opportunities for Accounting and Finance Practice and Research", *Australian Accounting Review*, Vol. 28, No. 3 (2018), pp. 323-333.

<sup>20</sup> Srinivasan, U., and Arunasalam, B., "Leveraging Big Data Analytics to Reduce Healthcare Costs", *IT Professional*, Vol. 15, No. 6. pp. 21-28. 2013.

<sup>21</sup> Hipgrave, S., "Smarter fraud investigations with Big Data analytics", *Network Security*, Vol. 2013, Iss 12 pp. 7-9. 2013.

calculation). In the context of Big Data, the three information processes make it possible always to be refined and adapted to policy, obtain a comprehensive picture of the community and existing policy issues, and be based on the necessary proactive actions<sup>22</sup>.

### **c. Literature Review: Corruption in The Education Sector and The Use of Technology as Prevention Efforts**

Corruption in the public sector almost occurs in many countries and sectors, including the educational system, which is not immune to corruption<sup>23</sup>. The understanding of education corruption cannot be separated from the general issues of corruption that have been considered the abuse of authority for material gain. In contrast, according to Heyneman, the definition of education corruption includes the abuse of charge for personal and material gain<sup>24</sup>.

Many studies from various countries have discussed corruption in education. Borisvora reveals that the actual consequences of corruption in education have been manifested in the low quality of educators and training of the younger generation, making it challenging to meet the community's needs. The existing legal aspects are only designed to combat the perpetrators who commit corruption, not how to combat the causes of corruption. Legal practice cannot define corruption in education as a systemic phenomenon disguised and occurring over a prolonged period. Osipian asserts that corruption is a severe and widespread problem in the education sector<sup>25</sup>. Still, the media do not do an excellent job of investigating corruption in linking the issue of corruption to the underlying processes occurring in the education sector, where media reports focus too much on corruption alone and often on its causes but do not offer a solution or how the public can fight the corruption. Borcan et al. designed a new building to understanding corruption in two dimensions. First, there is evidence that monitoring increases the effectiveness of the threat of punishment, thereby reducing corruption. Second, carry out an analysis of the consequences of fighting corruption from a distributional perspective, an issue that has often been overlooked in previous studies<sup>26</sup>.

Some of the literature studies that have been stated above show that corruption in education funds is hazardous for the education itself, especially in providing and preparing human capital in Indonesia because it has directly betrayed the Indonesian constitution and has discredited the dignity of education itself<sup>27</sup>. Remembering Law no. 20 of 2003

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<sup>22</sup> Prins, J.E.J., Broeders, D., and Griffioen, H.M. "iGovernment: A new perspective on the future of government digitisation", *Computer Law & Security Review*, Vol. 28, No. 3 (2012), pp. 273-282.

<sup>23</sup> Rummyantseva, N.L. "Taxonomy of Corruption in Higher Education", *Peabody Journal of Education*, Vol. 80, No. 1, Newly Emerging Global Issues, pp. 81-92. 2005.

<sup>24</sup> Heyneman, S.P. Education and corruption, *International Journal of Educational Development*, Vol. 24, No. 6, pp. 637-648. 2004.

<sup>25</sup> Osipian, A.L. "Will bribery and fraud converge? Comparative corruption in higher education in Russia and the USA", *Compare*, Vol. 44, No. 2, pp. 252-273. 2014.

<sup>26</sup> Borcan, O., Lindahl, M., and Mitrut, A. "Fighting Corruption in Education: What Works and Who Benefits?", *American Economic Journal: Economic Policy*, Vol. 9, No. 1 pp. 180-209. 2017.

<sup>27</sup> Duerrenberger, N., and Warning, S., "Corruption and education in developing countries: The role of public vs. private funding of higher education", *International Journal of Educational Development*, Vol. 62 (2018), pp. 217-225.

concerning the National Education System has emphasized the definition of education as a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have the power of self-control, intelligence, and skills needed by themselves, society, nation, and state.

As the constitution has guaranteed equality (education) among its citizens, digitalization and Big Data in the education sector are indispensable as a prerequisite for good governance transparently and independently and offer opportunities to reduce corruption in the management of education funds to realize the provision of quality and targeted education services to all citizens. The existence of digitalization and Big Data in the education sector will produce several vital benefits in Indonesia. First, in terms of being a framework for implementing every education policy carried out by the government, digitalization and Big Data will become a public monitoring, participation, and deliberative process that can provide information and consultations that reach the poorest and most vulnerable communities directly<sup>28</sup>, considering that almost all people have been able to use and utilize ICTs, such as smartphones, computers, and the internet. Second, within the framework of prevention and at the same time in combating corruption, digitalization and Big Data in the education sector will break all routine chains of illegal, hidden, and collective practices of actors who seek to cause harm to the state's finances or economy in every event<sup>29</sup>. Management of education funds whose purpose is solely to educate all citizens. Third, with the enormous amount of digital data, digitalization and Big Data in the education sector are hybrids in technology that simultaneously checks and balances centralized and decentralized systems. Some functions can be transferred to a superior hierarchical level. In contrast, others are transferred to a lower level, considering that centralization and decentralization cannot be separated from the function of the way business processes exist in students, teachers, schools, communities, and government agencies. Education in each region and country is organizationally hierarchical from a decision-making point of view during the decision-making process<sup>30</sup>. The centralized and decentralized systems, which are the advantages of this technology, will simultaneously make the interests and activities of students and teachers more accessible; there is an opportunity to find the best way to achieve significant learning outcomes<sup>31</sup>. It is recommended that the implementation of digitalization and Big Data to prevent corruption in the education sector from improving the quality of inclusive and equitable education, decision-makers who are authorized to access evaluation, monitoring, and prevention and

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<sup>28</sup> Wirawan, A., and Sinaga, B.R.P. "E-Governance in tobacco excise sharing funds: An Initiative to reduce the poverty of tobacco farmers in Indonesia". In Hendayani, R., et al. (eds.), *Synergizing Management, Technology and Innovation in Generating Sustainable and Competitive Business Growth*, Routledge, London, pp. 245-251. 2021.

<sup>29</sup> Sinaga, H.D.P., and Hermawan, A.W. "Tax Reorientation as Corruption Prevention on Investment in Indonesia", *Journal of Accounting and Finance*, Vol. 5, No. 1, pp. 21-30. 2021.

<sup>30</sup> Pramugar, R.N., and Sinaga, R.Y. "E-Government in Optimizing Non-Tax Revenue of the Mining Sector in Indonesia", *Journal of Accounting and Finance*, Vol. 5, No. 1, pp. 36-44. 2021.

<sup>31</sup> Pramugar, R.N., and Sinaga, R.Y. "E-Government in Optimizing Non-Tax Revenue of the Mining Sector in Indonesia", *Journal of Accounting and Finance*, Vol. 5, No. 1, pp. 36-44. 2021.



control of corruption can use Big Data for every educational activity that is carried out. It has been digitized and collected from all academic institutions on a national and regional scale at a central institution, such as the Ministry of Education and Culture. Next, schools, teachers, students, analysis, monitoring, and evaluation are carried out periodically based on the hierarchy from the highest to the lowest. For example, in terms of the level of students, the funds that the government has disbursed can be measured, and how the realization of aid funds towards the progress and failures of these students can be measured. Then in terms of the teacher level, types of analytical information can be collected through feedback on the implementation of education funds for students and schools and the fundamental role of teachers in improving and improving the quality of students equally. Furthermore, the government can review more appropriate decisions based on data analysis from students and teachers regarding the school level. With adequate digitization and Big Data, governments can predict the performance of schools and student teachers through predictive analytics techniques to develop new policies, rearrange education funds and available resources, or design development programs for teachers and schools<sup>32</sup>.

#### 4. CONCLUSION

This study produces two conclusions. First, digitization and Big Data are the essential means of preventing corruption in the education sector which is still rampant in Indonesia, considering that substantial education funds are earmarked for continuing education for all Indonesians as mandated in Article 31 of the 1945 Constitution and the fourth objective of the 1945 Constitution. The 2030 Agenda for Sustainable Development. Digitization in the education sector will make available much more significant and easier access to a wide variety of desired materials, provide excellent search facilities, can compare materials in valuable and creative ways, take up less storage space, and help ensure that documents are original, not damaged by multiple treatments, resources can be utilized in the future, and at an unexpected time, transfer or delivery of materials can be fulfilled immediately. There is a digital footprint as evidence of every activity and accountability of education funds. Big Data is beneficial in terms of data integration and integrity at all stages (collection and processing), designing work on a broader scale, enabling the effectiveness and efficiency of data collection and analysis, as a control strategy of all educational activities, and adequate for detecting fraud, abuse, waste, and errors. Second, digitalization and Big Data are very effective and efficient in preventing and tackling all chains of illegal, hidden, and collective practices of actors who seek to cause losses to the state's finances or economy on education funds. It is recommended that rules be made for all state-owned schools and educational institutions so that education fund transactions are carried out

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<sup>32</sup> Reyes, J.A. "The skinny on Big Data in education: Learning analytics simplified", *TechTrends*, Vol. 59, No. 2, pp. 75-80. 2015.

digitally with data collected in national Big Data, whose responsibility is on the CDO in the Ministry of Education and Culture. So that with the CDO, all transactions and realization of education funds, as well as accountability, progress, and quality improvement of students, teachers, and schools throughout Indonesia, can be monitored, evaluated, and reported periodically. The implication of this study is the birth of regulations and the availability of budgets to create an ecosystem that supports digitalization and Big Data in the education sector. Indeed, it requires enormous costs and resources. Still, the medium and long-term benefits of the proper use of education funds and the achievement of inclusive and equitable quality education in Indonesia by 2030 will be achieved. This study still has limitations in empirical studies, but this qualitative and normative study can enrich empirical studies in the future.

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