

- Abourizk, S., 2010. Role of simulation in construction engineering and management. *J Constr Eng Manag* 1140–1152. <https://doi.org/10.1061/ASCECO.1943-7862.0000220>
- Ahmad, F. salam, 2022. Dampak pembangunan jalan tol trans jawa terhadap pertumbuhan ekonomi di jawa tengah. *Jurnal Ekonomi Dan Kebijakan Pembangunan* 11, 1–18. <https://doi.org/10.29244/jekp.11.1.2022.1-18>
- AHSP bidang bina marga bm.5, 2018.
- Alsakka, F., Khalife, S., Darwish, M., Al-Hussein, M., Mohamed, Y., 2020. Deploying discrete-event simulation and continuous improvement to increase production rate in a modular construction facility. IEEE Press.
- Andani, I.G.A., Geurs, K., Puello, L.L.P., 2019. Effects of toll road construction on local road projects in indonesia. *J Transp Land Use* 12, 179–199. <https://doi.org/10.5198/jtlu.2019.1258>
- Anisari, R., 2021. Keserasian alat muat dan angkut untuk pencapaian target produksi pengupasan batuan penutup pada pt adaro indonesia kalimantan selatan.
- Banks, J., Carson, J.S., Nelson, B.L., Nicol, D.M., 2010. *Discrete-event system simulation*, 4 ed.
- Buendia, C., Tanabe, E., Kranjc, K., Baasansuren, A., Fukuda, J., Ngarize, M., Osako, S., Pyrozhenko, A., 2019. 2019 refinement to the 2006 ipcc guidelines for national greenhouse gas inventories task force on national greenhouse gas inventories, dalam: Buendia, E.C., Tanabe, K., Kranjc, A., Jamsranjav, B., Fukufa, M., Ngarize, S., Osako, A., Pyrozhenko, Y., Shermanau, P., Federici, S. (Ed.), . *Intergovernmental Panel on Climate Change*, Kanagawa.
- Carras Pamela M Franklin, J.N., Hu, Y., Singh, A.K., Tailakov, O. V, Picard Azhari M Ahmed, D.F., Gjerald, E., Nordrum, S., Yesserkepova, I., 2006. Fugitive emissions, dalam: Carruthers, I., Jaques, A., Tejada, F. (Ed.), *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Insitute for Global Environmental Startegis (IGES), Hayama.



- Casban, Kusumah, L.H., 2016. Analisis keseimbangan lintasan untuk menciptakan proses produksi pump packaging system yang efisien di pt bumi cahaya unggul. Seminar Nasional Sains dan Teknologi.
- Caterpillar, 2017. Caterpillar performance handbook, 47 ed. Caterpillar, Peoria, Illinois, U.S.A.
- Chen, P., Buis, K., Zhao, X., 2023. A comprehensive toolbox for the gamma distribution: The gammadist package. *Journal of Quality Technology* 55, 57–69. <https://doi.org/10.1080/00224065.2022.2053794>
- Darmawan, R.R., Supani, 2018. Simulasi operasi konstruksi pekerjaan beton pada proyek hotel dafam kayon surabaya menggunakan cyclone (Fakultas Teknik Sipil, Lingkungan dan Kebumihan). Insitut Teknologi Sepuluh November, Surabaya.
- David, 2025. Discrete event simulation (des) in the construction industry [WWW Document]. Bryden Wood.
- Eggleston, H.S., 2006. 2006 IPCC guidelines for national greenhouse gas inventories, dalam: Eggleston, S., Buendia, L., Miwa, K., Ngara, T., Tanabe, K. (Ed.), . Institute for Global Environmental Strategies, Kanagawa.
- Gan, F.F., Koehler, K.J., 1990. American society for quality goodness-of-fit tests based on p-p probability plots goodness-of-fit tests based on p-p probability plots.
- Graselia Sahuleka, G., Sugito, B., 2022. Analisis produktivitas excavator dan dump truck pada proses pengisian tongkang di pt.xyz, Grace Graselia Sahuleka, SNTM.
- Guo, B., Wang, B.X., 2018. Control charts for the coefficient of variation. *Statistical Papers* 59, 933–955. <https://doi.org/10.1007/s00362-016-0797-0>
- Gurcanli, G.E., Turkoglu, H., Bilir, S., 2017. Heavy equipment scheduling for horizontal construction projects, dalam: *Procedia Engineering*. Elsevier Ltd, hlm. 265–273. <https://doi.org/10.1016/j.proeng.2017.03.189>
- Hacksteiner, M., Duer, F., Ayatollahi, I., Bleicher, F., 2017. Automatic assessment of machine tool energy efficiency and productivity, dalam: *Procedia CIRP*. Elsevier B.V., hlm. 317–322. <https://doi.org/10.1016/j.procir.2016.06.034>

Hadjicosta, E., Richards, D., 2018. Integral transform methods in goodness-of-fit testing, I: The gamma distributions.

Hasad, A., 2011. Verifikasi dan validasi dalam simulasi model. Bogor.

Hendra, S., 1998. Alat-alat berat. Universitas Atma Jaya, Yogyakarta.

Hoad, K., Robinson, S., Davies, R., 2010. Automated selection of the number of replications for a discrete-event simulation. *Journal of the Operational Research Society* 61, 1632–1644. <https://doi.org/10.1057/jors.2009.121>

Hodson, T.O., 2022. Root-mean-square error (RMSE) or mean absolute error (MAE): when to use them or not. *Geosci Model Dev*. <https://doi.org/10.5194/gmd-15-5481-2022>

Hodson, T.O., Over, T.M., Foks, S.S., 2021. Mean Squared Error, Deconstructed. *J Adv Model Earth Syst* 13. <https://doi.org/10.1029/2021MS002681>

Hong, B., Lü, L., 2022a. Assessment of emissions and energy consumption for construction machinery in earthwork activities by incorporating real-world measurement and discrete-event simulation. *Sustainability (Switzerland)* 14. <https://doi.org/10.3390/su14095326>

Hong, B., Lü, L., 2022b. Assessment of emissions and energy consumption for construction machinery in earthwork activities by incorporating real-world measurement and discrete-event simulation. *Sustainability (Switzerland)* 14. <https://doi.org/10.3390/su14095326>

Imansuri, F., 2022. Perancangan model simulasi dan perbaikan sistem: studi kasus pelayanan perbankan. *Journal of Industrial & Quality Engineering* 10.

Indrawan, I.E., Handayani, T.N., Marleni, N.N.N., 2024. Permodelan produktivitas alat berat dalam proses pemindahan tanah menggunakan ezstrobe sebagai inisiasi optimalisasi biaya konstruksi dan emisi karbon. *Simposium Nasional Teknologi Infrastruktur*.

Indri, P., Wardani, K., Ratih, S.Y., Primantari, L., 2022. Analisis produktivitas alat berat excavator dan dump truck (studi kasus proyek pembangunan gedung indoor manahan kota surakarta).

Ioannou, Photios G, 2025. EZStrobe Description [WWW Document].

Ioannou, Photios G., 2025. Ezstrobe model options [WWW Document]. The National Science Foundation.

IPCC, 2014. . [Intergovernmental Panel on Climate Change].

IPCC guidelines for national greenhouse gas inventories, 2006.

Isnaeni, K.Moh.A., Ayu, S.T., Sepriadi, 2023. Optimalisasi cycle time alat angkut dump truck cge37084r untuk pencapaian target produktivitas pengangkutan batubara di pt wahana bandhawa kencana site pt bara alam utama lahat, sumatera selatan. *Junal Cakrawala Ilmiah* 2, 3551–3562.

Jenderal Ketenagalistrikan Kementerian ESDM, D., Energi -Sub Bidang Ketenagalistrikan, B., 2018. Pedoman penghitungan dan pelaporan inventarisasi gas rumah kaca. Direktorat Jendral Ketenagalistrikan, Jakarta.

Jian, N., Henderson, S.G., 2015. An introduction to simulation optimization. IEEE.

Jiradamkerng, W., 2016. Productivity management of road construction in thailand by ezstrobe simulation system—case study: 0.15 m. thick subbase course construction. *Engineering Journal* 20, 183–195. <https://doi.org/10.4186/ej.2016.20.3.183>

Jiradamkerng, W., 2013. Evaluation of ezstrobe simulation system as a tool in productivity analysis-a case study: precast concrete hollow-core slab installation. *Engineering Journal* 17, 75–84. <https://doi.org/10.4186/ej.2013.17.2.75>

Johnson, W.P., Garrettson, P.R., 2010. Band recovery and harvest data suggest additional american black duck records from texas. *Bull.Texas Ornith* 43, 34–40.

Joseph, V., Mustafa, N.K., Isa, C.M.M., 2024. Strategies of carbon reduction management in construction operations.

Kusuma Admaja, W., Sriwinarno, H., 2018. Identifikasi dan analisis jejak karbon (carbon footprint ) dari penggunaan listrik di institut teknologi yogyakarta.

Lestari, H., 2015. Pemodelan simulasi.

Lestari, H., 2013. Simulasi sistem diskret dan kontinyu.

LMS-SPADA Indonesia, 2015. Simulasi sistem diskrit vs kontinu. Kemdiktisaintek.

Lopatecki, J., 2023. Kolmogorov smirnov test for ai: when and where to use it [WWW Document]. Arize AI.

Malik, W., Singh, S., Singh, N., 2021. A review on simulations use in constructions. International Research Journal of Engineering and Technology.

Maritinez, J.C., 2001. Ezstrobe-general-purpose simulation system based on activity cycle diagrams, dalam: Medeiros, D.J., Watson, E.F., Caron, J.S., Manivannan, M.S. (Ed.), Proceedings of The 1998 Winter Simulation Conference. Civil & Environmental Engineering Department, Virginia, hlm. 341–348.

McCrimmon, C.M., 2018. Distance metrics for gamma distributions.

Measures of skewness and kurtosis [WWW Document], 2025. . National Institute of Standard and Technology.

Muflih Al Faruq, Alief Syahnur Almaida, Khoirul Fajri, Anggit Naufal Nararya Fawwaz Tyaga, 2025. Model indeks kekuatan negara dengan regresi beta: analisis pengaruh stabilitas ekonomi, demografi, dan infrastruktur teknologi terhadap kemampuan pertahanan dan keamanan. Populer: Jurnal Penelitian Mahasiswa 4, 247–259. <https://doi.org/10.58192/populer.v4i1.3005>

Mundfrom, D.J., Schaffer, J., Kim, M.J., Shaw, D., Thongteeraparp, A., Preecha, P., Supawan, P., 2011. Number of replications required in monte carlo simulation studies: A synthesis of four studies. Journal of Modern Applied Statistical Methods 10, 19–28. <https://doi.org/10.22237/jmasm/1304222580>

Muthaher, A.M.M., Nugroho, A.S.B., Aminullah, A., 2021. Penggunaan simulasi komputer untuk optimalisasi kebutuhan alat berat pekerjaan pemindahan tanah. Rekayasa Sipil 15.

Nguyen, H. Du, Nguyen, Q.T., Tran, K.P., Ho, D.P., 2019. On the performance of vsi shewhart control chart for monitoring the coefficient of variation in the presence of measurement errors. International Journal of Advanced Manufacturing Technology 104, 211–243. <https://doi.org/10.1007/s00170-019-03352-7>

Ningsih, D.S., A, R.D.S., Krismoni, G., 2019. Simulasi sistem industri. Madura.



Ferdinandus, 2020. Uji kesesuaian distribusi frekuensi curah hujan pada pt xyz (fitting test of rain frequency distribution in pt xyz). *Jurnal Teknik Pertambangan (JTP)* XX, 106–113.

Parente, M., Correia, A.G., Cortez, P., 2016. Metaheuristics, data mining and geographic information systems for earthworks equipment allocation, dalam: *Procedia Engineering*. Elsevier Ltd, hlm. 506–513. <https://doi.org/10.1016/j.proeng.2016.06.064>

Peurifoy, R.L., Schexnayder, C.J., Shapira, A., 2024. Construction planning, equipment, and methods, dalam: Mc Graw Hill (Ed.), *Construction Planning, Equipment, and Methods*. hlm. 179–223.

Prasetyo, 2022. Faktor-faktor yang mempengaruhi produktivitas alat berat.

Pusparini, P.D., Widyana, I.G., Pharresia, S.Z., Fawlung, M.H., 2023. Analisis penerapan pajak karbon dan ulez terhadap penurunan emisi karbon di indonesia. *Jurnal Pajak Indonesia* 7, 57–66.

Rahardian, Putra, 2023. Penggunaan simulasi dalam menentukan kombinasi alat berat optimal.

Rathnayake, A., Middleton, C., 2023. Systematic review of the literature on construction productivity. *J Constr Eng Manag* 149. <https://doi.org/10.1061/jcemd4.coeng-13045>

Renold, M., Kurniawan, M.L.A., 2023. Analisis hubungan emisi CO<sub>2</sub> dan variabel makro ekonomi (studi kasus perbandingan indonesia dan malaysia). *Jurnal Ilmu Ekonomi dan Studi Pembangunan*.

Ridiani, F., 2013. Pendugaan parameter distribusi beta dengan metode momen dan metode maksimum likelihood. *Jurnal Matematika UNAND* 3, 23–28.

Rochmanhadi, 1992. *Alat-alat berat dan penggunaannya*. Jakarta: Yayasan Penerbit Pekerjaan Umum.

Rosyadi, M.I., Albana, A.S., Chandra, H., 2024. Perbaikan sistem layanan untuk mengurangi waktu tunggu antrean dengan simulasi diskrit. *Jurnal Media Teknik dan Sistem Industri* 8, 19. <https://doi.org/10.35194/jmtsiv8i1.3633>



- Roy, A., McCabe, B.Y., Saxe, S., Posen, I.D., 2024. Review of factors affecting earthworks greenhouse gas emissions and fuel use. *Renewable and Sustainable Energy Reviews*.  
<https://doi.org/10.1016/j.rser.2024.114290>
- Rozi, F., Pasaribu, U.S., Mukhaiyar, U., Irianto, D., 2023. The modified double sampling coefficient of variation control chart. *Journal of Mathematical and Fundamental Sciences* 55, 56–76. <https://doi.org/10.5614/j.math.fund.sci.2023.55.1.4>
- Salim, H.K., Setiawan, K., Hartanti, L.P.S., 2016. Metode ranked positional weights, *Jurnal Teknik Industri*.
- Salo, L.A., 2020. Model simulasi perencanaan pengiriman dan kapasitas penyimpanan untuk bahan baku gandum (Program Magister Manajemen Logistik dan Rantai Pasok). Institut Teknologi Sepuluh November, Surabaya.
- Schaffer, J.R., Kim, M.J., 2007. Number of replications required in control chart monte carlo simulation studies. *Commun Stat Simul Comput* 36, 1075–1087.  
<https://doi.org/10.1080/03610910701539963>
- Shankar, A.U., 1991. *Discrete-event simulation*.
- Sheskin, D.J., 2011. *Handbook of parametric and nonparametric statistical procedures*, 5 ed. Taylor & Francis Group, London, New York. <https://doi.org/10.4324/9780429186196>
- Simulation with arena simulasi monte carlo dan pemodelan discrete event*, 2014.
- Sokop, R.M., Arsjad, T.Tj., Malingkas, G., 2018. Analisa perhitungan produktivitas alat berat gali-muat (excavator) dan alat angkut (dump ruck) pada pekerjaan pematangan lahan perumahan residence jordan sea. *Jurnal Tekno* 16, 83–88.
- Son, P.V.H., Van Tien, P., 2024. Apply ezstrobe to simulate the finishing work for reducing construction process waste. *Sci Rep* 14. <https://doi.org/10.1038/s41598-023-50442-4>
- Sugiarto, F., Buliali, J.L., 2012. Implementasi simulasi sistem untuk optimasi proses produksi pada perusahaan pengalengan ikan. *Jurnal Teknik ITS* 1, 236–241.
- Suhartoko, Y.B., Ekaristi, M.G.D., 2023. Dampak pertumbuhan ekonomi, penanaman modal asing, populasi, dan konsumsi energi terhadap emisi karbon dioksida di enam negara

<https://doi.org/10.33019/society.v11i2.557>

- Susanti, I.I., Ratri, M., Putri, A., 2021. Attribution 4.0 international (cc by 4.0) optimization heavy equipment productivity against costs on un-top soil and spreading work with linear programming simplex method. *International Journal Of Sciences, Engineering And Technology* 6.
- Sutomo, I., Ridhawati, R., 2023. Profitabilitas dan pengungkapan emisi karbon: studi empiris pada perusahaan energi yang terdaftar di bej tahun 2016-2021. *Jurnal Wawasan Manajemen* 11, 263–273.
- Uslu, B., 2011. Discrete event simulation model for project selection level pavement maintenance policy analysis. Virginia Polytechnic Institute and State University, Virginia.
- Utama, A.W., 2017. Analisa penggunaan sumber daya manusia dengan perangkat lunak stroboscope pada proyek pembangunan water tower pt. gudang garam kediri (Fakultas Teknik Sipil dan Perencanaan). Institut Teknologi Sepuluh November, Surabaya.
- Vacanas, by, Ioannou, P.G., Likhitruangsilp, V., 2020. Proceedings of international structural engineering and construction holistic overview of structural design and construction edited alamillo bridge: construction simulation models in ezstrobe.
- Walpole, R.E., Myers, R.H., Myers, S.L., Ye, Keying., 2017. Probability & statistics for engineers & scientists : mystatlab update. Pearson.
- Wilastika, P., 2022. Produktivitas alat berat excavator dan dump truck pada pekerjaan galian dan pembersihan pada proyek the luxury collection jimbaran.
- Zaldi, H.I., Majid, I.A., Maulina, F., 2023. Faktor-faktor dominan yang berpengaruh terhadap produktivitas aktual alat berat konstruksi pada pelaksanaan proyek konstruksi jalan. *Universitas Syiah Kuala Jalan Syech Abdurrauf* 5.
- Zhang, J., Wu, Y., 2022. Beta approximation to the distribution of kolmogorov-smirnov statistic. *The Insitute of Statistical Mathematics* 54, 577–584.