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**| RESEARCH ARTICLE**

# The Role of Sludge Dewatering Technologies in Modern Wastewater Management

**Paniteja Madala**
*AECOM, Bakersfield, California*
**Corresponding Author**: Paniteja Madala, **E-mail**: pani.madala@gmail.com

**| ABSTRACT**

Ever growing global population and water consumption levels are surging wastewater treatment demands to implement innovative technologies for sludge removal and dewatering. The process emphasizes protecting the ecosystem and the health of the population by making water free from effluents. This paper is a literature study about efficient use of sludge dewatering techniques to reduce the influence on the environment. Using qualitative study as a literature review process, the research continues to generate insights about different methods used for sludge dewatering processes. The study also creates insights into the advanced techniques for efficiency in operations. The outcomes highlights use of chemical, mechanical, and heating procedures for handling situations. The paper provides conclusions about the importance of emphasizing advanced water waste treatment procedures.

**| KEYWORDS**

Waste water treatment, Sludge, dewatering, advanced sludge treatment, Sustainability, resource recovery, environmental impact, wastewater management

**| ARTICLE INFORMATION**

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## 1. Introduction

### *1.1 Context and criticality of managing wastewater*

Freshwater scarcity is continuously enhancing with substantial consumption levels showing the importance of managing the quality of water using an efficient wastewater treatment process. According to Zhang, et al (2024), This is regarded as the most implemented format for regulating pollution. The existence of water-collecting sewers, pump locations, and treating plants extensively relies on wastewater-treating plants (Zhang, et al., 2024). These exert stress to utilize sophisticated technologies to manage the wastewater collected from sewers with domestic and industrial wastes.

Sludge in water has colloids with minerals and biosolids accumulating in sewage plants as a residue. This is a partly solidified substance ranging with various levels of density that forms due to chemical precipitation. This is regarded as primary level wastage as sludge. According to Heindl (2024) sludge includes biological wastes leading to dreadful diseases owing to increased water pollution resulting in the second-level sludge category. Treating and disposing of the material are regarded as critical concepts while developing wastewater treatment plant (WWTP) design and operation (Heindl, 2024). Thus, generated material is devoid of odor and could be managed by alleviating the risk of health hazards. The process also decreases the expenses for water purification.

### *1.2 Issues in handling sludge*

It is noteworthy to see the extent of sludge present in the water to purify as the metrics rely on the mode of wastewater treatment process implemented. Sewage and sludge thus create risks for the environment. According to Rao etal (2022) disposing of this is the

challenge faced by wastewater processing plants, as the expenses incurred for these activities are significant. Although advanced procedures are used in the plants, using sustainable techniques of disposal of water purification waste is important. Using these for landfilling and incineration results in excessive expenses as well as releasing greenhouse gases into the ecosystem (Rao, Wang, & Xu, 2022). The process involves intricacies to manage using advanced technological capabilities for balancing by release into the environment.

*1.3 Sludge dewatering process*

The sludge dewatering concept involves the separation of sludge in solid and fluid forms to reduce wastage to conserve costs incurred for disposal. Levacher etal (2024) states that dewatering separates the thick components by easing the process of handling for efficient disposal (Levacher, Allariz, & Hussan, 2024). The process especially focuses on decreasing the size of sludge along with disposal expenses for coordination.

The aim of studying these aspects is to support readers with a holistic review about the efficient dehydration of sludge. Review highlights the fundamental goals of treating sludge in water to decrease the volume for making materials stable. The procedures found are assessed according to efficiency. The advancements in these processes' efficiency are assessed to see evolving trends in motivating esteem sludge management operations in water treatment.

**2. Literature review**

Sludge produced from municipal wastage, industry water-treating plants and sewages needs dewatering processes for extended usage. Increasing expenses for disposing of sludge shows the necessity of managing sludge by concentrating the solids effectively. According to Yuan etal (2024), the process involves a reliably effective mechanisms for concentrating wastes as solidified cakes are filtered for convenient with cost-efficient disposal processes (Yuan & Zhu, 2024). This activity is motivated by following regulations. Following sustainability initiatives is also important while managing environmental guidelines effectively.

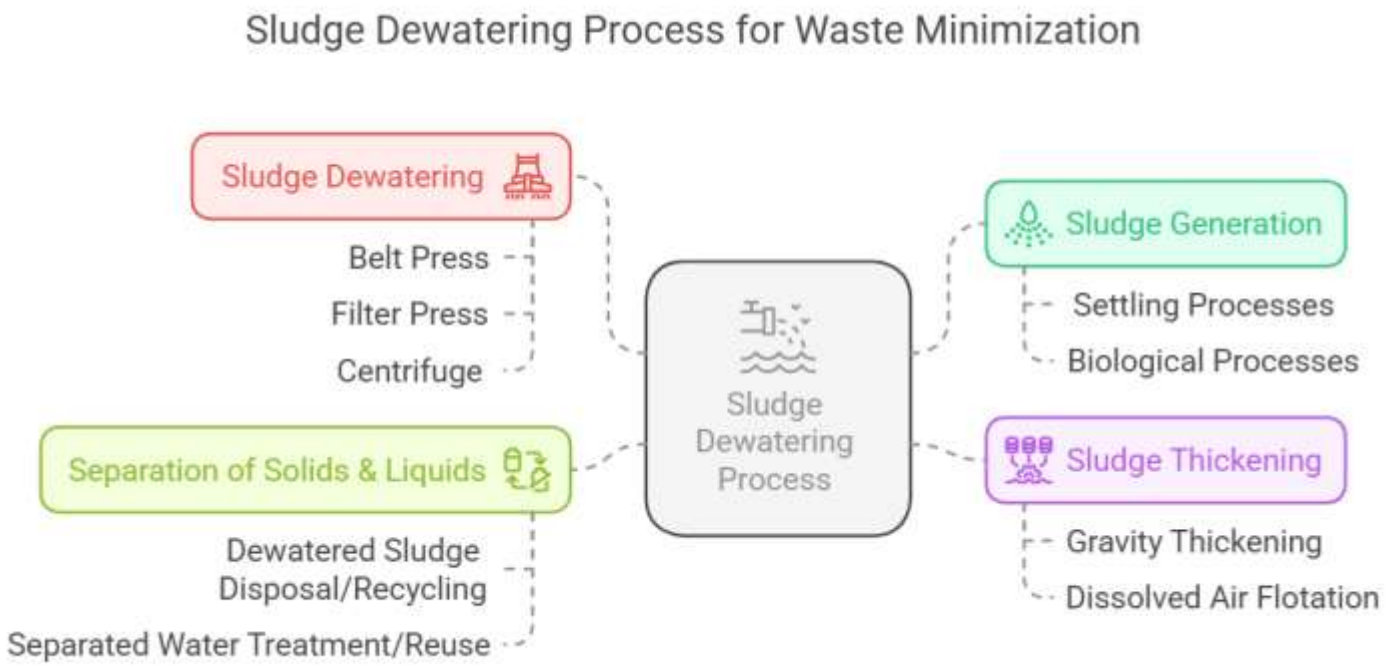


**Figure1 Literature review Source *(Chang & Zhao, 2025)***

*2.1 Mechanism of sludge dewatering*

The process of solidifying sludge by removing water is an important sophistication in water-treating procedure. The activity includes separating the solids in the mixture and decreasing moisture to maximum levels. According to Senfter, et al (2024) different methods are applicable for the accomplishment of these objects according to the features of sludge and generating the exceed outcomes. These techniques aim to conduct the least moisture levels possible in the content. The plants could manage this mode of sludge conveniently using cost -conservative mechanisms (Senfter, et al., 2024). The sludge dewatering process could be performed using machines, chemical treatment, or thermal energy implementation.

*2.1.1 Mechanical dewatering*

Using mechanical techniques and machinery for dewatering the water in sludge involves separating the residual material from wastewater for sanitizing the liquid parts. The prominent methods used are implementing belt filters, centrifugation, and chamber filters. According to He, et al (2024) mechanical techniques are advanced and expensive for working at community levels at smaller volumes. The process is devoid of sludge treatment as this only separates the solid from the liquid (He, et al., 2024). The separated parts have harmful material even after separation.

*2.1.2 Press dewatering equipment*

Advanced belt filter pressing machines are constructed in combination with chemical release for conditioning, draining systems, by applying machines for pressing the sludge. These include using high pressure for discharging the water using compressors forcing water out of the material. According to Sun, et al (2023)This compression process creates dewatered material solidified and processed followed by drying the solid residue. This model squeezes the sludge using belts under tension (Sun, et al., 2023). This is attached with diametric rollers for separating the moisture for dewatering effectively.

The screw press modes have metal wires punched with clamps like wedges with screws for pressurizing. According to Zhang etal, (2022), This has filtering cloths and rollers positioned on either side. These apply compressive strength to force water out of the solid. In filter press machine is also common as this has chambers with the application of compressive strength for removing water (Zhang, Ye, & Wu, 2022). The multiple disk rewatering machine follows a rotation process of slower with differential pressure application leading to discharge.

*2.1.3 Chamber filter*

The sludge water separation is continued using a chamber filter with a press system to separate the materials on sockets. According to Zeng, et al., (2024) There would be chambers stacked on a plate. This is added with filter cloths followed by mixing with coagulants in the opposite direction of the filter frame. The filtration passes through cloth and material collected from the ports present (Zeng, et al., 2024). This filtrate gathered on the frame along with a medium in chambers could be washed down effectively.

*2.1.4 Centrifugation*

Implementing centrifugation for separating water from material includes rotation of the sludge on the highest rotations per minute in the machine container with small pores. According to Qi, et al (2023), The centrifugation process is rapid working with high capabilities to process the high volume of sludge in a shorter period for effective outcomes (Qi, et al., 2023). The quicker separation process is effective for use by bigger industrial urban sewage systems. The water would be removed from sludge about 80%. This processes heavily sludge each hour to managing bigger manufacturing units in urban systems. However, the power consumption needs are higher for these processes.

Mechanical systems are high-end with need advanced design. This is an expensive sophisticated process for implementing in municipal water processing activities. Pasalari etal (2024) states that cost-efficient method relies on factors like size of the plant and processing needs(Pasalari, Farzadkia, Khosravani, Ganachari, & Aminabhavi, 2024). This process could be productive with ongoing flocculant use to generate expected results.

*2.2 Chemical dewatering*

Sludge dewatering chemicals are important for processes in easy disposal. These are suitable for the optimization of the activities and solidify material. Guo et al (2024) said about the selection of suitable chemicals as important and relies on the features of the sample. An efficient dewatering process has coagulators and flocculating agents for making the solids present in sludge aggregate with each other (Guo, Li, Yu, Baroutian, & Young, 2024). Coagulants support in neutralizing the charge of solids present in sludge.

Extensively used materials such as alum and poly aluminum halides. Flocculants are associated with lumps generated due to coagulation. Tan et al ( 2024) this increases the size and weight of the lumps and enables setting for easy removal. Critically, flocculants also use polyacrylamides for effective separating. Using exclusive dewatering material relies on the target outcomes. Appropriate choice and enable best performance. Effective use of chemicals is important in the required dose (Tan, Huong, Tang, & Saptoro, 2024). Any randomness in this format results in finding that the chemicals are selected for effective treatment of sludge.

*2.3 Thermal dewatering*

Using thermal energy for treating sludge is an initiative-taking mechanism for reducing thickness and dewatering activities. Thermal processes are implemented for conditioning sludges. This heat degenerates the sludge floccules and other bio solids thereby releasing the water into solids. Chang and Zhao (2025) These forms agglomerates, and the extent of free water is enhanced.

This process is also effective for thickening the material in water in advance. Commercialized hydrothermal sludge processing (HPT) works at an extremely elevated temperature of two hundred degrees (Chang & Zhao, 2025). This works with a high pressure of 10 bars. 80% water could be executed from the slurry by combining thermal and chemical mechanisms.

Incinerating sludge is the method of drying material at 800 to 1200 degrees. This technique is efficient or decreases volume and destroys disease-causing pathogens. Incinerating also leads to decreasing the sludge volume by 90% with ash release. Paffrath, etal (2024) say that the power used also could be reused along with emissions like carbon dioxide, nitrogen, and different gaseous compounds. Using drying systems depends on naturally evaporating the material using solar power. The beds have shallow spaces with gravel are dispersed as a layer for drying. This is based on heat in climate (Paffrath, Carissimi, Schner, Ferrari, & Etchepare, 2024). Locations with less sunlight with atmospheric pressure are unsuitable for these operations.

*2.4 Emerging technologies*

Using chemical treatments, heat mechanical pressure for separating water from sludge as mentioned above was implemented for a longer period. However, these techniques target to enhance the sustainability initiatives followed by efficiency and using dewatering facilities.

Using electrochemical mechanisms for sludge water removal is an evolving mechanism for using electricity by applying efficiency in dewatering processes. Hyrycz etal indicates about this activity includes applying direct power support in breaking down bonds across water with solids. This method promises to decrease power consumption as well as implement an environmentally compatible mechanism. This process empowers in managing the solids for separation of water along with the reduction of power consumption linked with traditional dewatering mechanisms (Hyrycz, Ochowiak, Krupińska, & Włodarczak, 2023). This method is under study for further sophistication. It is important to assess using electrochemical mechanisms for extended process efficiency.

Biological de-watering is another mechanism under research for processing. This includes implementing biological agents like microbes for the removal of water. These microbes reduce the organic material as sludge to decrease the moisture levels. Power consumption would be less with this method. However, stringent processing is important for releasing harmful material from water.

*2.5 Summary*

Dewatering impurities and reducing pathogens released into the atmosphere. It is complicated process requires using techniques beyond simple sedimentation. These could be done with the application of pressure with advanced equipment. Using chemicals is also an effective method of separating water. However, this technique could result in atmospheric issues as the chemicals are released. Implementing thermal energy is another method to follow that has prominent results.

## 3. Research method

*3.1 Qualitative research with literature review*

Qualitative research method collects individual experiences with feeling of phenomena while working with root cause as underlying elements for each operation pertinent to the research. Topic, context, and prejudicial beliefs are essential elements of this research compared to quantitative research.

To investigate wastewater management methods pertinent to technologies such as " sludge dewatering," this research is pursued through study of literature conveying details with a holistic overview of authors, previous researchers to revise case studies, create an analysis of entire research to attain insights. This includes an assessment of large volumes of literature explaining about dewatering methods with technologies that can be used as a wastewater management method.

As articulated by Rivard, (2024), a literature review includes diverse materials can be utilized as an essential aspect to conduct this research with a specific emphasis on research material available from several sources that can help to revise to derive outcomes with a combination of text, materials, reports, research outcomes, journals, etc. (Rivard, 2024). As part of this literature analysis and verification details about wastewater management methods, scholarly articles, research reports of earlier industrial studies, and wider elements examining patterns.

*3.2 Process used to perform literature review*

**A.** Literature review emphasizes on findings that are extracted from studies within a cohesive environment while understanding all methods to complete cost-effective, energy-efficient, sustainable solutions.

- To perform qualitative research analyzing literature review is to prove research questions, create a target for entire study and offer guidance to select topics that are relevant to topic. Example questions that can be used as part of this research are
    - What is most prevailing sludge dewatering methods as part of wastewater management?

  - What methods can be identified as environmentally friendly technologies?
  - How costly and effective are Sludge dewatering methods used in Modern Wastewater Management?
- Background information pertinent to this method can be collected while processing online database sources, books, and industrial reference reports finding journals, peer review papers created by mechanical, chemical, and thermal solutions to examine technologies that are used for each type of technology developed for wastewater management.
- After collecting research materials, reports, data need to be explored to recognize themes for each technology created and all research findings need to be analyzed for several aspects including impact on environment, costs included in investing with a particular process, performance patterns, failures or backlogs due to research, etc. can be analyzed contributing essential details to entire research information.

*3.3 Advantages of literature review*

Analyzing and synthesizing details from comprehensive data explores benefits in investigating critical research areas to analyze Sludge Dewatering methods. This is a critical assessment summary of research with complicated procedures for analysis with higher efforts.

- Literature review can be meticulous and logical through structured information synthesis while exploring conclusions with cautious summary extraction offering a comprehensive image.
- Literature review permits to attainment of higher knowledge with diligent assessment through data summary for setting up patterns for entire study.
- As articulated by Satar, Musadiq, Hutahayan, & Solimun, (2024), systematic research can help attain a competitive leverage for significant growth (Satar, Musadiq, Hutahayan, & Solimun, 2024).
- Theoretical framework can help to gain an intensive intellect on wastewater management system.
- Qualitative literature review can be a cost-effective tool while performing research through analysis of experiments, surveys that can be completed at best costs with efficient solutions.
- As articulated by Sharma, et al., (2024), samples are collected through analysis for estimated data credibility (Sharma, et al., 2024).
- Abundant data is available to measure sludge dewatering method ability.

*3.4 Challenges of literature review*

- A major challenge manifests while selecting details from a wide range of research reports documents organized and any deviation leads to oversampling of data with larger deviation among pattern studies.
- Another major issue, that while majorly depending on secondary research, creates limitations on exploring modern methods that have appeared since last research.
- This creates major gaps in outcome, which is critical for a sophisticated field.

*3.5 Summary*

Qualitative research through literature review can be a promoting method that investigates role of technology such as sludge dewatering methods can synthesize outcomes from earlier reports and patterns while setting up comprehensive solutions that can be applied to wastewater management methods. These methods can be considered cost-efficient to provide a detailed understanding despite challenges due to data overload.

**4. Research results and findings**

Results obtained through literature review analysis can be set up using essential insights for performance reviews for each technology used for wastewater management along with role of sludge dewatering method including energy consumed to include this method, efficiency or percentages of data reached from earlier reports.

*4.1 Mechanical Press Sludge Dewatering*

Primary methods to complete sludge dewatering methods are through application of centrifuges and filter presses. These methods are highly efficient in reducing major volume of moisture reduction. As articulated by Yılmaz, (2024), from 75 to 80 % and 20% to 90 % of water is reduced by reaching 70 % content. Despite its water extraction efficiency, using a mechanical press dewatering method consumes a large volume of energy ranging from 0.1-0.3 kWh for one KG of sludge (Yılmaz, 2024). Due to increased energy requirements, this is also identified as a costly procedure applicable for organizations with large operations such as small or medium typically rely on cost-effective solutions with lower energy consumption.

Belt filter press is another mechanical press that is researched to use by organizations to remove water content ranging from 80 to 85 % as recorded by researchers. This method delivers lowered performance and consumes less energy compared to centrifugal presses. Typical energy needed to run these machines is 0.05 to 0.1 kWh per kg with a cost-effective solution for facilities with smaller output. Screw presses are used with a performance of reducing water content toll 85 % consuming energy like belt presses while reducing water content from sludges from 98 % to 85 %. Sludges decrease requirement for added procedures.

*4.2 Chemical technologies for sludge dewatering*

Chemical method is invented to apply using polymers or coagulants while increasing its applications to regions. These methods are researched and presented in literature reviews. Application to polymers can help perfect dewatering effectiveness as these materials are found to decrease moisture volume as desiccants at rate of 20 to 30 % without any added treatment. Inclusion of anionic polymers reduces moisture content from sludge at 27 to 30 % and can be further investigated through optimized operation of solid form liquid to perfect integration methods while decreasing maintenance frequency for machinery.

Coagulants like ferric chloride or aluminum sulfate depict a higher rate of sludge dewatering methods. As articulated by Tan, et al., (2024), inorganic coagulants are important to conduct sludge dewatering methods. Based on studies or research, ferric chloride is used for to first removal of moisture and can be used for 15 % of removal. For example, 905 water content can be reduced to 75 % (Tan, et al., 2024). Nevertheless, chemicals included in water are deluded to increase operational costs could be delimited with restrictions for small-scale organizations.

*4.3 Thermal technologies*

Sludge dewatering during wastewater treatment is completed using incineration of sludge followed by thermal drying. According to He, et al (2024)These details are revised using literature for supporting to provide a substantial amount of decrease rising to 90 %. Incinerating sludge reduces initial moisture content and leaves a small volume of residue. This method is considered an effective method to mandate higher energy for incineration that can rise to 1.2-1.5 kWh for 1 kg sludge (He, et al., 2024). This is also an impact due to carbon emissions creating concerns for environment sustainability mandating efficient control systems.

Thermal drying is another highly embraced dewatering technology that is identified as an effective method that reaches lower moisture levels. Small volume of 10 to 20 % are removed consuming energy of 1.0 to 1.2 kWh for 1 Kg. As articulated by Rao, et al., (2024), relation between consuming energy attaining higher efficiency while treating sludge can be helpful while working with thermal drying methods (Rao, et al., 2024). Thermal drying methods are used for municipal wastewater treatments while reducing sludge are considered an environmentally friendly and yet costly method due to higher energy requirements.

*4.4 Modern evolving technologies*

Emergent techniques including electrochemical treatment, or bio-chemical dewatering methods are highly resolved and estimated through a literature review. Using electrochemical methods includes application of electric fields to remove water at an enhanced rate from 15 to 25 %. Hou, et al., 2024 says that this is considered efficient compared to traditional mechanical methods. Electrochemical methods are likely to reach 25 % liquid reduction with a consumption of 0.08 kWh per 1 kg sludge with highly energy-effective solutions (Hou, et al., 2024). Nevertheless, these technologies are experimental and appear those mandates intensive research before application for large-scale water treatment activities.

Bio-dewatering methods include microorganisms to disintegrate organic materials and decrease with a promising rate. Research is performed with reports including bio-dewatering methods that can decrease content of sludge from 90 to 60 % using microbes. As articulated by Hou, et al., (2024), due to increased energy consumption and operational issues of mechanical press dewatering methods, there is increasing importance in exploring new chemical agents that can be conducted and utilized in wastewater treatment (Hou, et al., 2024). This is an eco-friendly solution through conventional tools. Nevertheless, it needs to be completed using meticulous management mandates researched by bio-organisms and professionals that can help to enhance procedures.

*4.5 Summary*

Based on the analysis presented as part of wastewater management methods that can be applied for sludge dewatering, energy consumption, performance, amount of water that can be removed, kept moisture are measured. Compared to machines and thermal dewatering, chemical dewatering tools while using polymers and coagulants utilize lower energy yet deliver chemical residue along with water removal. Thermal dewatering can be used and yet there is a major impact on environment due to increased carbon footprint. Emerging technologies depict promoting results with lower energy, higher output, sustenance and yet mandate intensive research while applying to large-scale organizations.

## 5. Conclusion

Sludge dewatering is an essential method for wastewater treatment and mandates the correct technology to work with a substantial impact on organizational economy or decide environmental solutions. Reising mechanical, chemical, and thermal methods, mechanical dewatering tools are universally used by insurers making them correct for large-scale water treatment. Emerging methods depict potential for highly sustainable solutions that are a future of sludge dewatering methods that are potential to include shifting toward energy efficient systems combining hybrid solutions including mechanical, thermal, or chemical based on requirement for industry or organization. Including automated technologies can help work with large-scale operations with sustainable solutions to avoid a lower carbon footprint. Based on variations and compilations for types of sludges, firms need to adapt to flexible and hybrid solutions while including research projects that are essential to estimate and include long-term and energy-efficient performance while contributing to a wider target for environmental security and wastewater treatment. This can help organizations to conduct their operations within efficient boundaries including time, costs, and energy efficiency, avoiding added carbon or nitrous oxide emissions.

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### References

[1] Chang, H., & Zhao, Y. (2025). Mini review of inventory data for the dewatering and drying of sewage sludge. Waste Management & Research: The Journal for a Sustainable Circular Economy, 41(6), 1-10. Retrieved from https://backend.orbit.dtu.dk/ws/portalfiles/portal/321263181/0734242x221139170_1_.pdf

[2] Hou, J., Hong, C., Ling, W., Hu, J., Feng, W., Xing, Y., . . . Feng, L. (2024). Research progress in improving sludge dewaterability: sludge characteristics, chemical conditioning, and influencing factors. Journal of Environmental Management, 351(1), 1-26. Retrieved from https://doi.org/10.1016/j.jenvman.2023.119863

[3] Hyrycz, M., Ochowiak, M., Krupińska, A., & Włodarczak, S. (2023). Influence of Effluent Quality from Sludge Dewatering on Electricity Consumption. Polish Journal of Chemical Technology, 25(3), 50-55. Retrieved from https://sciendo.com/de/article/10.2478/pjct-2023-0024

[4] Qi, Y., Chen, J., Xu, H., Wu, S., Yang, Z., Zhou, A., & Hao, Y. (2023). Optimizing sludge dewatering efficiency with ultrasonic Treatment: Insights into Parameters, Effects, and microstructural changes. Ultrason Sonochem, 2023(1), 1-10. Retrieved from https://pmc.ncbi.nlm.nih.gov/articles/PMC10767495/

[5] Rao, B., Tu, H., Jia, H., Ding, Z., Xu, P., Zhang, Y., . . . Qin, X. (2024). The cooperative effect of mechanical dewatering and thermal drying for activated sludge deep reduction. Process Safety and Environmental Protection, 185(1), 9-20. Retrieved from https://doi.org/10.1016/j.psep.2024.02.053

[6] Rao, B., Wang, G., & Xu, P. (2022). Recent advances in sludge dewatering and drying technology. Drying Technology, 40(15), 3049-3063. Retrieved from https://doi.org/10.1080/07373937.2022.2043355

[7] Rivard, S. (2024). Unpacking the process of conceptual leaping in the conduct of literature reviews. The Journal of Strategic Information Systems, 33(1), 1-8. Retrieved from https://doi.org/10.1016/j.jsis.2024.101822

[8] Satar, A., Musadiq, M. A., Hutahayan, B., & Solimun. (2024). A systematic literature review: Determinants of sustainability competitive advantage. Business Strategy and the Environment, 33(3), 1675-1687. Retrieved from https://doi.org/10.1002/bse.3561

[9] Sharma, S. K., Mudgal, S. K., Gaur, R., Chaturvedi, J., Rulaniya, S., & Sharma, P. (2024). Navigating Sample Size Estimation for Qualitative Research. Journal of Medical Evidence, 5(2), 133-139. Retrieved from https://doi.org/10.4103/JME.JME_59_24

[10] Sun, L., Hassanpouryouzband, A., Sun, H., Wang, T., Zhang, L., Yang, L., & Zhao, J. (2023). Advancement in Sewage Sludge Dewatering with Hydrate Crystal Phase Change: Unveiling the Micro-Moisture Migration and Dewaterability Mechanisms. ACS Publications, 11(32), 12075–12083. Retrieved from https://doi.org/10.1021/acssuschemeng.3c02718

[11] Tan, J., Huang, Y., Chi, B., Xiong, Z., Zhou, W., Yang, Z., . . . Zhang, J. (2024). Comparative study of iron and aluminum coagulants in conditioning sludge: Sludge dewatering performance, physicochemical properties, and risk of heavy metal migration. Journal of Environmental Chemical Engineering, 12(4), 1-22. Retrieved from https://doi.org/10.1016/j.jece.2024.113168

[12] Tan, Y. Y., Huong, Y. Z., Tang, F. E., & Saptoro, A. (2024). A review of sewage sludge dewatering and stabilization in reed bed system: towards the process-based modelling. International Journal of Environmental Science and Technology, 21(1), 997–1020. Retrieved from https://link.springer.com/article/10.1007/s13762-023-05063-9

[13] Yılmaz, G. (2024). Sludge Dewatering by Chamber Filter Presses. Handbook of Water and Used Water Purification, 1(1), 839–846. Retrieved from https://doi.org/10.1007/978-3-319-78000-9_144

[14] Yuan, H., & Zhu, N. (2024). Progress of improving waste activated sludge dewaterability: Influence factors, conditioning technologies and implications and perspectives. Science of The Total Environment, 912(1), 1-10. Retrieved from https://doi.org/10.1016/j.scitotenv.2023.168602

[15] Zhang, H., Liu, W.-H., Gao, Y.-Y., Zeng, Y.-P., Ma, L.-L., Wu, J.-N., . . . Wang, H.-F. (2024). A novel approach for sludge deep-dewatering via flowing-out enhancement but not relying on cell lysis and bound water release. Water Research, 257(1), 1-10. Retrieved from

https://doi.org/10.1016/j.watres.2024.121743
[16] Zhang, X., Ye, P., & Wu, Y. (2022). Enhanced technology for sewage sludge advanced dewatering from an engineering practice perspective: A review. Journal of Environmental Management, 321(3), 1-10. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S0301479722015110?via%3Dihub