



Edition II of TPS 3R Management Development Model Based on Social Learning: Collaboration and Partnership

Deri Firmansyah^{1*}, Asep Suryana², Asep Achmad Rifa'i³, Dwinanto Priyo Susetyo⁴

^{1,3,4}STIE Pasim Sukabumi, West Java

²Universitas Linggabuana PGRI Sukabumi, West Java

Corresponding Author: Deri Firmansyah deri@stiepasim.ac.id

ARTICLE INFO

Keywords: Management Development Model, TPS 3R, Social Learning, Collaboration, Partnership

Received : 3 December

Revised : 19 December

Accepted: 20 January

©2024: Firmansyah, Suryana, Rifa'i, Susetyo. This is an open-access article distributed under the terms of the [Creative Commons Atribusi 4.0 Internasional](https://creativecommons.org/licenses/by/4.0/).



ABSTRACT

The implementation of PKM is a critical concern related to the classic problem of waste disposal, by offering a model for improving the development of TPS3R management based on social learning involving continued collaboration and partnership in the second edition. Small surveys, conservation and socialization become part of the methodological aspects of the implementation of this PKM, social learning, environment, dynamic interaction and the way people learn are adopted, synthesis of the results of the implementation of activities is carried out. The results of the activity, social learning bridging cognitive aspects with behavior, adaptation and adoption of successful TPS3R waste management need to be imitated by emphasizing the culture of innovation, the importance of awareness and habits of sorting organic and non-organic waste starting from the community and households into a realistic core point that must be done by the household community up to the TPS3R management level. Evaluation, feedback and multiple effect benefits from increasing public awareness will facilitate waste management and handling at the TPS3R management level to the DLH level in the landfill area towards zero waste to zero residue in the future, where social learning is the basis; Learning culture, dynamic interaction, adaptive and innovative behavior are important for waste disposal management development.

INTRODUCTION

The implementation of this community service activity (PKM) is a continuation of the previous PKM activities with the theme “Model Pengembangan Pengelolaan TPS 3R: Kolaborasi dan Kemitraan Minimalisasi Menuju *Zero Waste*”. The results of the PKM concluded that to improve sustainable waste handling, the TPS3R management development model through minimization partnerships towards zero waste by involving four relevant actors (quadruple helix) to be adopted and developed. In the current implementation of PKM, elements of the social environment are considered and social learning is included as a media base that facilitates and bridges cognitive aspects with behavior. Because, in the course of each individual's activities towards success and success cannot be separated from learning, experience, dynamic interaction, social and environmental aspects. Also, for the goals and outputs that are expected to be achieved in the implementation of this PKM.

According to Firmansyah et al., (2023:p.1), waste disposal will continue to be an endless problem as long as human activities are not accompanied by awareness of the importance of cleanliness and environmental sustainability, both in urban and rural areas. In fact, the waste problem is a very serious environmental problem in Indonesia and requires special attention and involvement of all roles in waste management.

On the other hand, various new innovations in waste management that have now begun to develop only occur in a few regions so that they have not been able to overcome this problem evenly. Referring to data from the Sistem Informasi Pengelolaan Sampah Nasional (SIPSN) Kementerian Lingkungan Hidup dan Kehutanan (KLHK), Indonesia produced 35,83 million tons of waste generation during 2022 (Databoks, 2023). The waste generation rate increased by 21.7% compared to 2021, as well as being the highest level in the last four years from 2019 to 2022. Where there are 68 million tons of waste produced by the Indonesian people (Ruhlessin, 2023).

While in West Java province with 5.43 million ha inhabited by 49.4 million people. In line with this population, the waste produced in a day can reach 24,790 tons (Nindita, 2023), and throughout 2022 waste generation reaches 4,894.6 tons (SIPSN, 2022). Previously in 2021, the most waste-producing area in West Java was Sukabumi district, which ranked first of the five most waste-producing regions in West Java, with waste generation reaching 397.9 thousand tons (Rizaty, 2022). The waste can be seen from the type and source, with the composition dominated by household waste including food waste, then plastic waste and paper waste. Therefore, the core point that needs and must be able to be done by the community and other related parties is how the composition of household waste including food waste and plastic waste can be reduced.

The involvement of various parties is needed to develop the management and handling of these two types of waste, both by handling sorting, collecting, transporting, limiting the use of plastic bags, transportation, waste banks to *Reduce, Reuse and Recycle* (TPS3R) Waste Treatment Sites, and various other types of waste processing innovations. Although it is recognized that public authorities through related departments and units have succeeded in managing

and reducing waste problems as a waste management program that continues to be developed. Good environmental or organizational management is the achievement of progress according to objectives and subjectively so that the people or society within it continue to have happiness, live in a clean and peaceful environment and are physically and mentally healthy (Firmansyah & Wahdiniwati, 2023). Where in this case, health and cleanliness are related to waste disposal management behavior patterns.

However, the development of waste management must still be socialized to the community and household environment as the largest producer of waste, even education deserves to be given from an early age. Social learning theory (SLT) and social cognitive theory (SCT), identify learning as a dynamic interaction between people, environment, and behavior (Firmansyah & Saepuloh, 2022). Social learning contributes directly to the development of interaction skills, multilateral, cooperation, communication and conflict management, innovation capabilities and competitiveness, interaction of organizational and community actors linking learning and knowledge management into one continuous process (Hamburg et al., 2014; Firmansyah & Saepuloh, 2022). This statement does not seem to be an exaggeration if it is associated with social learning for the purpose of improving waste management in the community, because waste is part of community and environmental activities, even the principle of zero waste is important to be realized throughout life activities. Where people learn from each other through observation, imitation and modeling influenced by factors such as attention, memory, motivation, attitudes and emotions, as Bandura (1977) theorized about social learning.

Through the role of RT / RW and TPS3R managers spread in various regions, it is very potential for socialization to be carried out appropriately and continuously by various related parties (DLH district / city, academics and other parties and communities), because from the role of these three actors information and socialization of the importance of waste management awareness will come down to individuals, communities and households to avoid the dangers of health problems, environmental damage (earth, water and air elements). The role of district / city DLH in managing and handling waste problems is clear. Meanwhile, various contributions from academics are needed, one of which is through the implementation of community service (PKM). Of course, on the basis of attention that the problem of waste as a classic problem has a long-term effect, it must be known and realized by many parties, it is also possible to be handled more appropriately together on an ongoing basis so that it can provide results, outcomes and long-term benefits. Willingness to learn, culture of innovation and adaptive to the environment are part of the driving factors in an effort to achieve success (Firmansyah, Ahman, et al., 2023).

The implementation of this PKM was carried out in Sukabumi, involving the managers of TPS3R Gading Sukabumi RW 15 (consisting of 5 RTs) and RW 17 (consisting of 5 RTs) as partners in implementing activities, with the aim of increasing development in TPS3R management as an effort to minimize

household waste towards zero *waste* and zero *residue* In the future it was soon reached. The development of waste management can be done by involving several parties (actors). This model is inspired and adopts the involvement of helix roles framed in synergy and continuous innovative collaboration in finding solutions, solving problems and achieving goals done together. For example, what Saepuloh et al., (2022), did, suggested a solution to national economic recovery after COVID-19 by involving four actors (quadruple helix); Wahdiniwaty et al., (2022), considering the involvement of five helixes (quintuple helix) in efforts to find solutions to national economic recovery after COVID-19; and Firmansyah et al., (2022), who consider the role of the six helix (hexa helix) as a model of collaboration, innovation and multi-actor synergy initiatives to help find solutions to national economic recovery after COVID-19 in implementing government policies. The social element in learning and being close to society (Bandura (1977), in the study of Firmansyah & Saepuloh (2022), seems to be relevant for individuals and society, because it is very suitable for their learning habits in the social environment, their behavior and activities.

The above model of multiactor involvement and cooperation will be adopted in the implementation of this PKM in a similar way but with different objectives, where this activity is carried out to help manage and reduce waste through the development of TPS3R management, by involving TPS3R managers, communities (households) and academics, DLH actors as *aggregators* who are part of public authorities. Where dual roles clearly apply to be able to solve this problem. The social learning element is included as a basis that bridges the mindset and knowledge of the community with adaptive and innovative behavior to support waste disposal management at the TPS3R level which is developing continuously.

IMPLEMENTATION AND METHODS

The implementation of this activity begins with conducting a small survey, where observation is chosen to be carried out as a method of implementing activities for the initial stage related to searching and extracting information, potential, identifying and determining the theme and objectives of PKM implementation. Small observations and surveys aimed at the sub-subject ecosystem of a particular area to seek preliminary information and identification of current social phenomena (Hibberts et al., 2012; Firmansyah, Suryana, Rifa'i, & Susetyo, 2022), with the aim of knowing the opinions of individuals/samples/subjects, the observation area can be supplemented by observation and face-to-face interviews (Firmansyah, 2022).

At this stage, information about site conditions and waste problems among social units was obtained, complemented by the results of interviews that have shown a participatory response from PKM partners as involved actors, namely TPS3R managers and household communities so that information faced is obtained related to waste management problems at TPS3R, which realistically may be minimized through the stages of implementing PKM activities by the implementation service team PKM with the theme "Development Model of TPS 3R Management Based on Social Learning: Collaboration and Partnership". Therefore, the implementation of PKM is

through a series of activities starting from surveys and observations, identification, analysis of information and waste management problems faced by PKM partners, selection of alternative solutions as a basis for determining possible PKM themes that can be done, stages of PKM implementation, evaluation of results as feedback and outputs as targets to be achieved in the long term.

In short, the method of implementing PKM activities is carried out through several stages: (1) conducting small surveys, observations, interviews and socialization to PKM partners; (2) identification and analysis of problems and needs of partners that have relevance to the theme of PKM; (3) discussion with TPS3R managers regarding problems, ideas and development of alternative solutions; (4) implementation of PKM activities by socializing and implementing alternative waste management solutions that can be done today, both for TPS3R and the community (5); learning, piloting, imitating and adopting TPS3R management methods in other developed areas/cities; and (6) evaluation of results and outputs.

RESULTS AND DISCUSSION

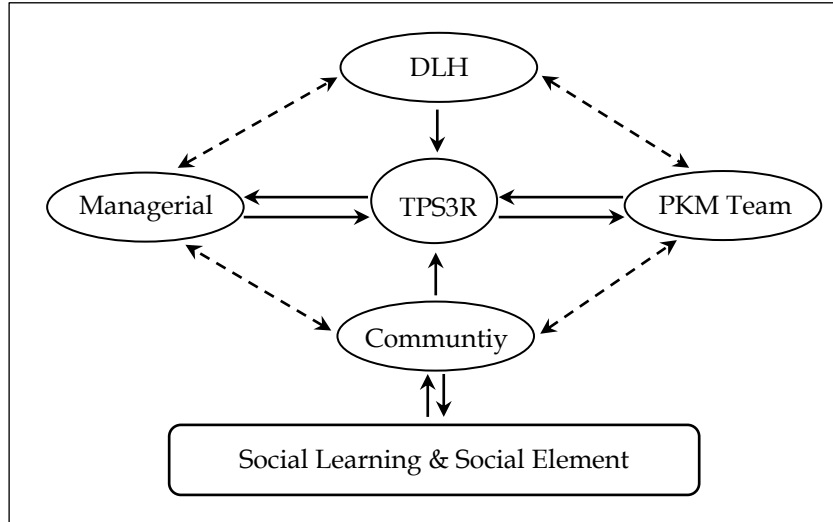
The implementation of activities is carried out with surveys and observations equipped with face-to-face interviews carried out together with the service team on weekends in January 2024. The implementation of PKM will be carried out from January 19, 2024 to February 16, 2024. The Service Team consists of four people who specifically have multiple actors/roles in accordance with competence, scientific fields, and time willingness to carry out each task during the implementation of service.

1. Discussion Stage and Digging Information

Identification and discussion were carried out at this stage, the aim was to extract information with TPS3R managers who are PKM partners regarding management and current management achievements, also revealing classic problems faced by TPS3R managers who accommodate waste generation derived from community contributions of 10 RTs under the leadership and management of two RWs. Including information on what waste disposal management methods have been learned and adapted from social elements and TPS3R managers in other developed regions. Information on the role of DLH related to having the role of transporting waste to landfill (Tempat Pembuangan Akhir/TPA) is also obtained.

Information obtained from the results of the implementation of phase 1 activities are: (1) the majority of people have the habit of waste from piles without any separation between organic waste and non-organic waste; (2) *gap* in awareness and responsibility for waste handling, where more responsibility rests on TPS3R managers and the role of DLH; (3) coordination and communication among TPS3R managers are still weak; (4) social learning as a dynamic interaction to improve learning culture, imitation of waste management models in other regions that TPS3R managers have successfully adopted but are still not evenly distributed individually in the community; (5) the cost aspect is still a classic and crucial problem for imitation, radical

innovation in modeling and developing non-organic waste management and handling at TPS3R; and finally (6) the transportation of waste to the landfill (TPA) is still high and far from the principle of zero waste, while in the landfill area there is more and more waste generation such as mountains where the empty area is like shrinking.



Picture 1. Development of TPS3R Management Through Discussion and Information Search

Source: The Results of the Implementation of Activities Were Constructed and Developed by the Author, PKM Team (2024)

Information:

← - - - → Demonstrate the involvement of cooperation through important roles in accordance with their fields

————→ Shows the contribution and direction of information flow

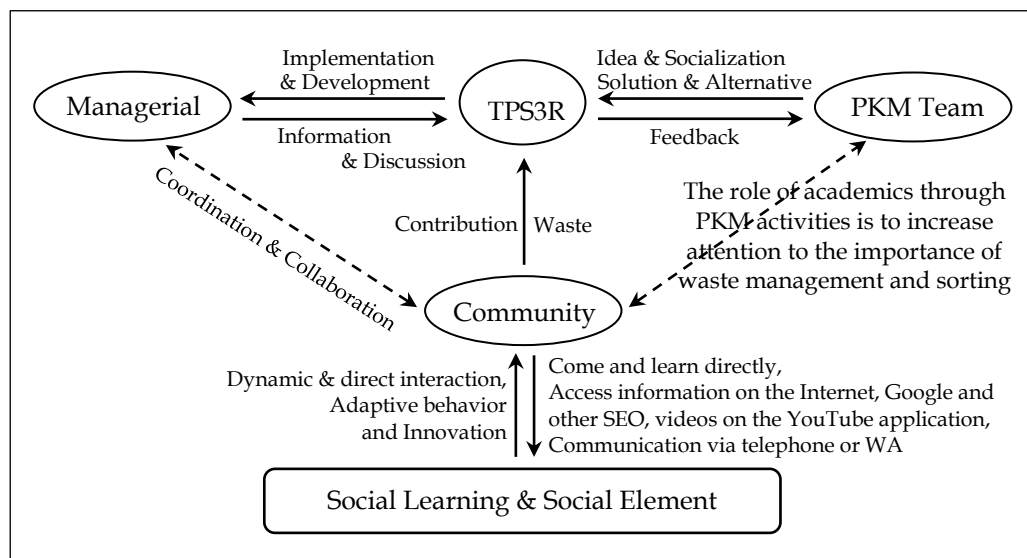
2. Socialization Stage of Alternative TPS3R Management Solutions Based on Social Learning

The implementation of stage 2 activities is carried out by referring to information obtained from the results of the implementation of stage 1 activities. Socialization of alternative solutions for waste management development: 1) to ease waste management and handling, the importance of the habit of sorting organic and non-organic waste starts from waste-producing sources, namely communities and households. 2) Socialization of increasing insight into the dangers of waste that have long-term effects on health and the surrounding environment (air, water and soil pollution), this effort is simple and contains general information but in fact the community and households seem to forget or forget, so it is hoped that with socialization in a certain intensity periodically it can remind again to trigger the emergence of a stronger awareness that the waste problem becomes part of the shared responsibility.

In addition, 3) socialization by implementing social learning theory (SLT) about the importance of learning how good waste disposal is carried out and managed by TPS3R in other areas; can be done by adapting waste disposal behavior that reduces waste generation by other communities and waste management by TPS3R in other areas, both nearby areas are within reach and other areas that are far beyond reach, but the information and modeling can be

accessed via the internet on videos in the YouTube application through search engines such as Google or other Search Engine Optimization (SEO). The results of socialization and discussion there are two imitations to be adapted and developed; 1) waste management behavior with radical waste processing innovations towards zero waste and even zero residue can be carried out in the future, but requires large costs; and 2) adaptation of realistic and wise waste disposal behavior that can be done by each individual community at no cost, but has the potential to bring additional income (passive income), is to increase awareness in implementing a culture of waste sorting between organic waste and organic waste. Where the role of TPS3R managers has an important role for the intensity of further socialization to the surrounding community related to sorting organic/non-organic waste.

The implication, 4) to motivate and increase awareness and habits of waste sorting by the community, coordination and further socialization by TPS3R managers can bridge the achievement of this goal, even with modest cash owned can be allocated to buy non-organic waste, especially those that have selling value such as cardboard, various plastic bottles and paper. Finally, the sorting of organic and non-organic waste in greater quantities and compositions.



Picture 2. Socialization of TPS3R Management Development Based on Social Learning

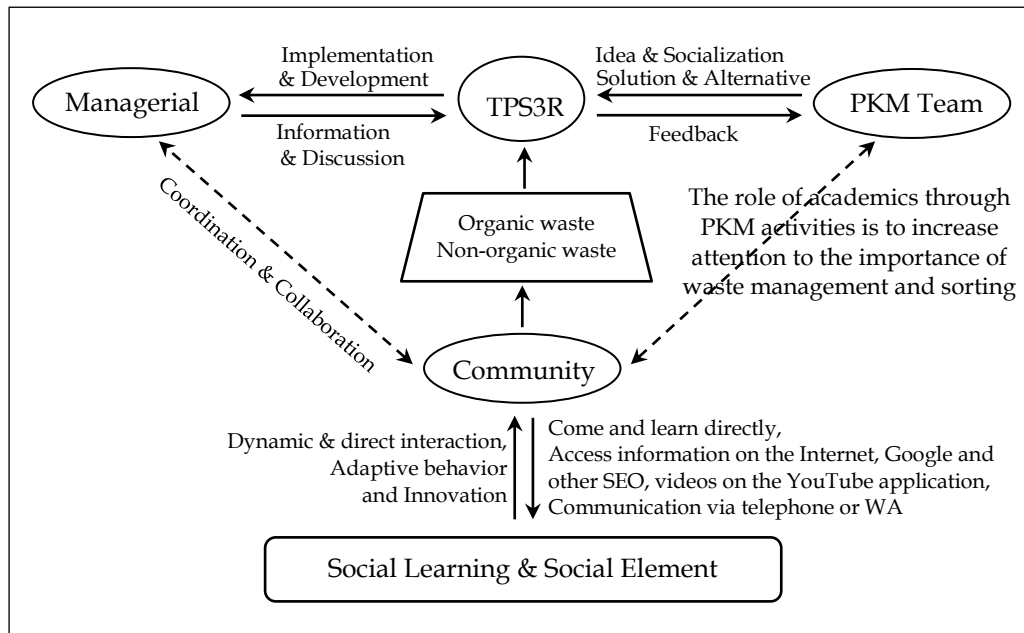
Source: The Results of the Implementation of Activities Were Constructed and Developed by the Author, PKM Team (2024)

Must also be carried out at the TPS3R management level. Non-organic waste that has no selling value or can be said to have a selling value but is very low is a challenge that requires further handling through the development of ideas, management and processing innovations that allow for ready adoption and investment including the necessary technology, where costs and funding are needed to be able to develop low / no selling value non-organic waste processing towards *zero residue* in the future.

Socialization in the implementation of phase 2 activities is illustrated by a social learning-based TPS3R management development model, involving three actors, namely TPS3R managers, communities and PKM TEAMS that consider social and environmental elements, see picture 2 (above).

2. Socialization of the Importance of Sorting Non-Organic Waste that has Selling Value at the TPS3R Management Level Useful for Working Capital

Socialization in this phase 3 activity emphasizes not precipitating individual interests from the managers but the smooth operation and development of TPS3R management is important to be achieved together at this time. As for non-organic waste sorting activities that have selling value, long before the service team carried out PKM activities with related partners, it was known that the sorting activities had been carried out but with low intensity and activity, and with importance and authentication of objectives that did not show the allocation of operational costs and management development.



Picture 3. Socialization of the Importance of Sorting Organic & Non-organic Waste at TPS3R & Managerial Level

Source: The Results of the Implementation of Activities were Constructed and Developed by the Author, PKM TEAM (2024)

The implementation of social learning has bridged the mindset and aspects of knowledge with adaptation behavior and imitation of wise waste management. In simple terms, social learning in PKM means the importance of sorting organic and non-organic waste containing selling value at the TPS3R manager level, even plus purchases using existing cash must have a goal oriented towards efforts to increase finance for working capital that is useful for financing TPS3R management operations. It is not an exaggeration, that the most likely thing can be done to get financial resources regularly, with the hope that there is a positive difference between operational costs and purchases with

the sale of non-organic waste when it has been collected and entered the sales stage.



Picture 4. TPS3R Building Gading Resik Madani; Generation of Non-Organic Waste with Post-Sorting Value

In addition, the benefits of sorting activities and then arranging waste storage at the same time have a linear effect with tidiness in the room of the *Reduce, Reuse and Recycle* (TPS3R) Waste Treatment Site building. The building room looks to have space and looks neat after sorting waste followed by the arrangement of non-organic waste storage that has selling values such as cardboard and various plastic bottles and the like. In picture 4, it can be seen the generation and storage of non-organic waste types of cardboard and various types of plastic bottles and other types of non-organic waste that have selling value. This generation results from sorting activities coupled with purchasing activities, then stored before resale.

3. Evaluation Stage of Results and Outputs

The implementation of stage 4 activities is an evaluation carried out jointly by the service team, this stage is used as an effective measurement model for TPS3R management development as the theme offered by the Team to related partners in the implementation of this PKM activity. One of the feedback that has become a concrete output that can be seen within a few weeks is the additional generation of non-organic waste that has selling value, both the results of elections made by TPS3R managers and purchases as a form of contribution from the household community in the surrounding area which began to show an increase in awareness of waste disposal management into a shared responsibility to maintain health, cleanliness and preserve the environment.



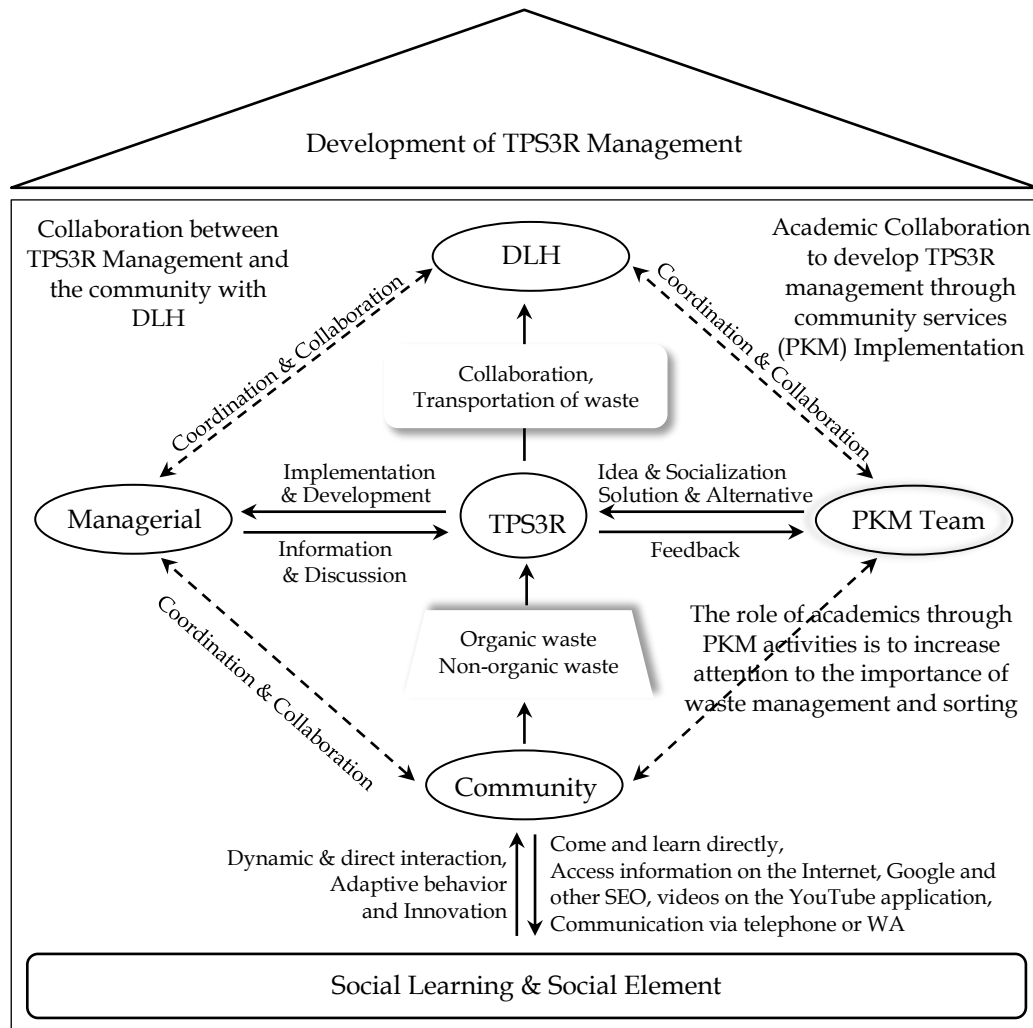
Picture 5. Additional Generation of Non-Organic Waste Selling Value from the Results of Sorting and Purchasing

Social learning implemented to improve learning culture, adaptation and dynamic interaction with outside community elements who have good experience in waste management and TPS3R has facilitated and bridged the creation of imitation, adaptation and innovative behavior patterns in TPS3R management.

There are multiple effect benefits from increasing public awareness about the dangers of waste generation and the importance of waste handling, at least with the habit of sorting organic and non-organic waste disposal: 1) has facilitated waste management and handling at the TPS3R manager level to the DLH level related to the landfill area. 2) sorting of non-organic waste with selling value if it can be done consistently at the TPS3R management level in a routine and sustainable intensity, has the potential to open access to financial resources regularly, although not large, but can be planned and managed properly for working capital that is useful for financing TPS3R management operations, even in the future it can be distributed for managers to enjoy.

In addition, 3) social learning activities can lead to the habit of sorting non-organic waste starting from the household community to the consistency and discipline of TPS3R managers related to this habit for the purpose of developing TPS3R management. So the next stage of handling non-organic waste that has no selling value is possible to be easy, in addition to socializing restrictions and reducing the use of plastic waste to the community, it can also focus more on advanced handling through the development of ideas, management and processing innovations that allow for readiness for adoption and investment including in the necessary technology, as well as by imitation of TPS3R other regions that have succeeded in innovating In handling and processing waste towards zero waste and zero residue can be achieved evenly so that in the future there is no transportation of waste to the related landfill. However, to realize the handling of the problem of non-organic waste does not have this selling value through advanced processing, of course, it requires costs so it needs the attention and support of various parties, including academics through their contributions in absorbing grant programs for related themes or

issues, potentially able to use it to help finance the development of TPS3R management in handling and overcoming the problem of these types of non-organic waste.



Picture 6. TPS3R Management Development Model Based on Social Learning, *Quadruple Helix* Involves Four Actors

Source: The Synthesis Results of the Stages of Implementing PKM Activities Developed by the Author, PKM TEAM (2024)

Meanwhile, until now the contribution of waste, especially non-organic waste, is still high sent to the relevant landfill and is still far from implementing the zero residue principle and even the zero waste principle. Where DLH officers are concerned, it is seen that they routinely carry out waste transportation from the TPS3R waste disposal area, which shows that coordination and responsibility flow well according to their respective roles so that this area does not show any waste generation. Therefore, to improve waste management in a sustainable manner, the TPS3R management development model based on social learning through minimization partnerships towards zero waste by involving four relevant actors (*quadruple helix*) is to be adopted. The social learning element is the basis for the development of knowledge and

mindset of all actors so as to facilitate the creation of habits, adaptation behaviors and innovations in the development of TPS3R management.

CONCLUSIONS AND RECOMMENDATIONS

The implementation of service by the PKM team was carried out in several stages. Waste handling and management cannot be done by certain parties alone but become part of awareness and shared responsibility involving the role of multiactors. The discussion stage and extracting information from TPS3R managers is a crucial stage carried out where various information obtained is used as a basis that guides the clarity of the direction of implementation of stage 2 and stage 3 activities, namely the importance of socializing alternative waste management development solutions, social learning activities offer two imitation models to be adapted and developed. However, the implementation of PKM activities currently focuses on the importance of adapting realistic and wise waste disposal behavior that can be done by each individual community at no cost, but has the potential to bring additional income (passive income), is to increase awareness in implementing a culture of sorting waste between organic waste and organic waste. This can be started from the source of waste generation, namely the community and households, to be the core point that realities can and must be done by the household community up to the TPS3R management level because it can have a long-term positive effect, while the relevant DLH parties may only transport non-organic waste that has no selling value. However, the role of TPS3R managers has an important role for the intensity of further socialization to the surrounding community related to the sorting of organic/non-organic waste.

The results of the phase 4 evaluation show feedback showing the presence of long-term results and outcomes, the addition of non-organic waste generation that has selling value, both the results of elections made by TPS3R managers and purchases as a form of contribution from the household community in the surrounding area which began to show an increase in awareness of waste disposal management into a shared responsibility to maintain health, cleanliness and preserve the environment. Multiple effect benefits from increasing public awareness: it will facilitate waste management and handling at the TPS3R management level to the related DLH level for the landfill area towards zero waste to zero residue in the future will soon be realized; the development of mindset, knowledge, learning culture, dynamic interaction with the social environment and sustainable innovative behavior in sorting non-organic waste for sale value if it can be done consistently at the TPS3R management level has the potential to open access to financial resources regularly even though it is not large.

Implications and recommendations, the growth of waste sorting behavior that has become a common culture, then the next stage of handling non-organic waste that has no selling value is possible will be easy, management can focus more on advanced handling through the development of ideas, management and processing innovations that allow for ready adoption and investment including in the necessary technology. To realize the handling

of the problem of non-organic waste does not have this selling value through advanced processing, attention and support from various parties, including academics through their contributions in absorbing grant programs for related themes or issues, can potentially use it to help finance the development of TPS3R management in handling and overcoming the problem of these types of non-organic waste. Finally, the synthesis of several PKM activities that have been carried out, to improve waste handling in a sustainable manner, the TPS3R management development model based on social learning through collaboration and partnership minimization towards zero waste by involving four actors (quadruple helix) who consider social and environmental elements in an innovative, relevant collaboration framework to be adopted and developed.

ACKNOWLEDGMENT

Acknowledgments to the PKM team, namely lecturers of the Management, Economics and Accounting study programs of STIE Pasim Sukabumi, and lecturers of Accounting at Universitas Linggabuana PGRI Sukabumi who have jointly implemented the tridharma of higher education as part of the implementation of self-service in the world of education and community service. LPPM STIE Pasim team and LPPM team Universitas Linggabuana PGRI Sukabumi, West Java. PKM partners, managers of TPS3R Gading Resik Madani Kota Sukabumi, Communities within TPS3R Gading Resik Madani Kota Sukabumi, DLH related and other related partners who also support the implementation of this Community Service activity, we thank you.

REFERENCES

- Bandura, A. (1977). *Social Learning Theory*. New York: General Learning Press.
- Databoks. (2023). *Sampah Indonesia Bertambah pada 2022, Terbanyak dalam Empat Tahun*. Dkatadata.Co.Id.
- Firmansyah, D. (2022). Teknik Pengambilan Sampel Umum dalam Metodologi Penelitian: Literature Review. *Jurnal Ilmiah Pendidikan Holistik (JIPH)*, 1(2), 85–114. <https://doi.org/10.55927/jiph.v1i2.937>
- Firmansyah, D., Ahman, E., Disman, D., Mulyadi, H., Rifa'i, A. A., & Suryana, A. (2023). Model for Increasing the Economic Competitiveness of MSMEs in the Creative Industry Sector in Indonesia. *Journal Of Advanced Zoology*, 44(S6), 1355–1365. <https://doi.org/10.17762/jaz.v44iS6.2482>
- Firmansyah, D., & Saepuloh, D. (2022). Social Learning Theory: Cognitive and Behavioral Approaches. *Jurnal Ilmiah Pendidikan Holistik (JIPH)*, 1(3), 297–324. <https://doi.org/10.55927/jiph.v1i3.2317>
- Firmansyah, D., Suryana, A., Rifa'i, A. A., Suherman, A., & Susetyo, D. P. (2022). Hexa Helix: Kolaborasi Quadruple Helix Dan Quintuple Helix Innovation Sebagai Solusi Untuk Pemulihan Ekonomi Pasca Covid-19. *EKUITAS (Jurnal Ekonomi Dan Keuangan)*, 6(4), 476–499. <https://doi.org/10.24034/j25485024.y2022.v6.i4.4602>

- Firmansyah, D., Suryana, A., Rifa'i, A. A., & Susetyo, D. P. (2022). DMT-CE (Digital Media Training-Capability Enhancement) Culinary Business Sector Sop Asep Amih Sukabumi to Improve Online-Based Adaptive Marketing Capabilities. *Asian Journal of Community Services*, 1(5), 217-230. <https://doi.org/10.55927/ajcs.v1i5.1826>
- Firmansyah, D., Suryana, A., Rifa'i, A. A., & Susetyo, D. P. (2023). Model Pengembangan Pengelolaan TPS 3R: Kolaborasi dan Kemitraan Minimalisasi Menuju Zero Waste. *Jurnal Pengabdian Multidisiplin*, 3(3). <https://doi.org/10.51214/00202303706000>
- Firmansyah, D., & Wahdiniwaty, R. (2023). Happiness Management: Theoretical, Practical and Impact. *International Journal of Business, Law, and Education*, 4(2), 747-756. <https://doi.org/10.56442/ijble.v4i2.244>
- Hamburg, I., Brien, E. O., & Engert, S. (2014). Engaging SMEs in cooperation and new forms of learning. *Computer and Information Science*, 7(1), 1. <https://dx.doi.org/10.5539/cis.v7n1p1>
- Hibberts, M., Burke Johnson, R., & Hudson, K. (2012). *Common Survey Sampling Techniques BT - Handbook of Survey Methodology for the Social Sciences* (L. Gideon (ed.); pp. 53-74). Springer New York. https://doi.org/10.1007/978-1-4614-3876-2_5
- Nindita, A. (2023). *Webinar Kontribusi ITB untuk Bangsa: Optimalisasi Rencana Pengelolaan Sampah Jangka Panjang*. Institute Teknologi Bandung.
- Rizaty, M. A. (2022). *Ini Wilayah Penghasil Sampah Terbanyak di Jawa Barat*. Databoks.Katadata.Co.Id.
- Ruhlessin, M. F. (2023). *Sepanjang Tahun 2022, Ada 12,54 Juta Ton Sampah Plastik di Indonesia*. Kompas.Com.
- Saepuloh, D., Firmansyah, D., Susetyo, D. P., & Suryana, A. (2022). Quadruple Helix Collaboration Concept As An Economic Recovery Solution After COVID-19. *Economica*, 10(2), 1-14. <https://doi.org/10.22202/economica.2022.v10.i2.4636>
- SIPSN. (2022). *Timbulan Sampah*. Sistem Informasi Pengelolaan Sampah Nasional (SIPSN).
- Wahdiniwaty, R., Firmansyah, D., Dede, Suryana, A., & Rifa'i, A. A. (2022). The Concept of Quadruple Helix Collaboration and Quintuple Helix Innovation as Solutions for Post Covid 19 Economic Recovery. *MIX JURNAL ILMIAH MANAJEMEN*, 12(3), 418-442. https://doi.org/10.22441/jurnal_mix.2022.v12i3.005