

## Implementation of the Transformational Leadership Style of the Head of Apparatus Performance and Awards at the Regional Civil Service Agency of South Sulawesi Province

St. Ramlah<sup>1</sup>, Sitti Hardiyanti Arhas<sup>2\*</sup>, Isgunandar<sup>3</sup>

<sup>1,2,3</sup>Faculty of Social Sciences and Law, Universitas Negeri Makassar

Email: [hardiyantiarhas@unm.ac.id](mailto:hardiyantiarhas@unm.ac.id)

### ABSTRACT

This study aims to determine the Application of Transformational Leadership Style of the Head of Apparatus Performance and Awards in the Regional Civil Service Agency of South Sulawesi Province. The approach and type of research used are qualitative approaches and descriptive research types, while the informants in this study are the Sub-Coordinator of each Apparatus Performance and Awards Division and employees of the Apparatus Performance and Awards Division at the Regional Civil Service Agency of South Sulawesi Province. The data collection techniques carried out are using observation, interview, and documentation methods. The data analysis techniques used are data condensation, data presentation, and conclusion drawn. The results of this study show that all indicators used in the research on the Implementation of Transformational Leadership Style of the Head of Apparatus Performance and Awards at the Regional Civil Service Agency of South Sulawesi Province are classified as good. The indicators in question are Ideal Influence which is classified in the good category which is supported by always respectful behavior, more concerned with work than personal affairs, and communicating well in terms of making decisions. Inspirational Motivation is classified as a good category which is supported by consistent behavior in providing motivation, in conveying something achieved enthusiastically, an effective vision, and in building good cooperation with employees. Intellectual Stimulation is classified as a good category which is supported by the behavior of developing ideas from employees, providing solutions to problems, and encouraging employees to be creative and innovative. Paying Attention to Individuals is classified as good because of their behavior in giving advice, implementing a personal approach, listening to every suggestion or problem of subordinates well, and paying attention to the needs of employees.

**Keywords:** Leadership, transformational, style

### INTRODUCTION

Human resources include an important role in helping an organization to achieve predetermined goals, this is always seen in the life of community organizations even in the world of work. In the world of work, humans must be able to adapt in the organization where they work. An organization with good quality of human resources will have a good influence on the organization. When the strength of an organization's human resources is greater than the organization's weaknesses, it will be easier for the organization to achieve the goals that have been set.

An organization is a container, tool, pattern, form of association and system used by two or more people, they have the same goals and desires, to achieve these goals and desires (Arhas, 2022; Darwis et al., 2022; Niswaty et al., 2020). Organizations are seen not only as a place for human activities, but also as a process to encourage interaction between people involved in the organization (Akib et al., 2022; Isgunandar et al., 2024; Saleh et al., 2024).

The success of an organization can be measured by its leadership abilities and the people in it. Leadership is the key to optimizing organizational performance (Darwis et al., 2018; Ismayani et al., 2015; Niswaty et al., 2019). Leadership is the ability of a leader to mobilize and guide people towards their desired direction (Andriana et al., 2021; Haq et al., 2021; Rajamemang et al., 2019). Organizing requires skilled and professional leaders and employees to achieve the vision and be able to carry out the organization's mission well. Every leader

must have different characteristics and personalities to improve the quality of the company, these different characteristics and personalities are known as leadership styles.

Leadership style essentially consists of a way or style that aims to develop employee performance in achieving maximum goals (Darwis et al., 2023; Rifdan et al., 2022; Saleh & Arhas, 2024). Leadership style is a unique and distinctive trait, habit, character, and personality that distinguishes a leader from others, thus shaping his behavior and the way the leader (Frich et al., 2015; Said, 2022; Yusuf et al., 2021). A leader, when demonstrating his leadership ability, usually uses several types or styles of leadership to influence subordinates in carrying out their respective duties and activities that reflect the personality traits of a leader. Therefore, leaders need to focus on leadership styles and look at the state of employees under their direction, because in reality the abilities and desires of subordinates are different. In some situations, employees usually do not have the skills and are not serious about working, so in such circumstances a leader can show his leadership style according to these conditions.

There are types of leadership styles that can be used in leading an organization, namely, democratic leadership style, autocratic leadership style, transactional leadership style, transformational leadership style and participant leadership style. Based on these types of leadership styles, what will be discussed is transformational leadership styles. Transformational leadership shows that every member of the organization feels its presence, making the members of the organization feel more trust, sympathy, and loyalty to their leaders.

Transformational leadership is the ability of a leader to motivate employees in an organization beyond his or her personal interests, so that everything they provide in their work is done solely for the betterment of the organization, transformational leadership involves building a closer relationship between leaders and employees, not just an employment agreement, but more than that it is based on mutual trust and commitment for the benefit of the organization (Haeruddin et al., 2021; Rajamemang et al., 2019; Wader et al., 2020). Transformational leadership in an organization demonstrates the behavior and ability to manage the organization and provides inspiration and motivation to subordinates to be able to develop and achieve higher levels of performance and achieve results that exceed previous expectations.

Based on the results of initial observations in the Field of Apparatus Performance and Awards, on August 11, 2023, it was seen that there were several employees who were often not on time, arrived late, went home early and often prioritized personal needs over work interests. Based on the problem, the leader must set a good example, especially in terms of discipline in working hours and provide an example in doing work, carrying out his duties well and giving more importance to work affairs than personal affairs so that employees imitate the example that has been done so that employees do their work well and optimally. On the other hand, leaders provide positive influence and motivation, build cooperation, provide inspiration, build employee morale and are able to make the best decisions for their organization. Based on the problems that have been described, it is interesting to research on the Implementation of the Transformational Leadership Style of the Head of Apparatus Performance and Awards at the Regional Civil Service Agency of South Sulawesi Province.

## **METHODS**

Qualitative research is used to obtain in-depth data or actual data, the data collected is usually in the form of words or speech/writing, this research requires an observation study /

going directly to the research site to ascertain and observe the actual phenomenon supported by observation, interviews and documentation guidelines.

This type of research is descriptive research. In descriptive research, the data analysis is to manage and present data systematically so that it is easier to understand and conclude. The use of the type of descriptive research aims to find or explore facts about the application of the transformational leadership style of the head of the apartment performance field and awards at the Regional Civil Service Agency of South Sulawesi Province.

The focus of this study is to focus on the transformational leadership style of the Head of Apparatus Performance and Awards. Some of the indicators that are the focus of this research are: 1) Ideal Influence, 2) Inspirational Motivation, 3) Intellectual Stimulation, 4) Paying Attention to Individuals (Hapudin et al., 2023). In this study, it consisted of 5 informants, namely the Head of Sub-Coordinator and employees in the Field of Apparatus Performance and Awards.

The data collection techniques and procedures used are observation, interviews, and documentation. Meanwhile, the data analysis technique in this study uses the interactive mode of Miles, Huberman, and Saldana which consists of data condensation, data display, and conclusion drawing (Suprianto, 2024).

## **RESULT AND DISCUSSION**

To find out the Application of the Transformational Leadership Style of the Head of Apparatus Performance and Awards at the Regional Civil Service Agency of South Sulawesi Province, this study uses 5 informants who can provide valid and accurate information. This study uses 4 indicators, namely: ideal influence, inspirational motivation, intellectual stimulation, and paying attention to individuals. The following are the results of data analysis obtained from the research process in the Field of Apparatus Performance and Awards at the Regional Civil Service Agency of South Sulawesi Province.

### **Ideal Influence**

Transformational leaders behave as role models for their followers, are admired, respected, and trusted and exemplify good morals especially in terms of work and discipline. The leader gives directions to the employees before carrying out the task, besides that the leader acts as a strong example for the followers, so that the followers will imitate the attitude of the leader. Leaders set an example to prioritize work affairs over personal affairs, and act like a leader and be able to make the best decisions for their organization. The ideal influence of a transformational leader will create a strong bond between the leader and his subordinates by being an example, a role model, setting a good example, always giving direction before his subordinates carry out their duties and always behaving like a leader.

Based on the results of interviews regarding the ideal influence by 5 informants, it can be concluded that in behaving the head of the field always behaves well and has become an example, role model, giving examples, and direction, especially in terms of assigning tasks so that employees do not experience difficulties and mutual respect, in addition to the behavior of the head of the field who focuses more on work affairs and the achievement of goals has been implemented so that employees are inspired to work harder, It shows a strong commitment to the success of the team or organization. The behavior of the field head who conveys information in advance and discusses with subordinates can create an open and participatory environment, so that subordinates feel heard and involved in decision-making.

Ideal influence is the behavior possessed by a leader where he makes his followers admire and trust him and act as an example/role model for his followers, behavior that is more

important to work affairs than personal interests that make employees inspired, always be kind to subordinates so that subordinates will also respect him and be able to make the best decisions for the organization. Nurjanah et al., (2023, h. 30) that "The ideal influence is that the leader behaves in a way that is an example or role model for his subordinates so that they can be admired, respected, and trusted". Leaders who set an example for their followers in the hope of creating a comfortable work environment.

Suwatno, (2022, h. 111) said that "Transformational leaders exhibit behaviors that are more concerned with their group and work than their ego as leaders". The same thing was also said by Nurjanah et al., (2023, h. 33) that "Transformational leaders are an example in working in an organization where they are able to prioritize work for the sake of creating common targets and achieving organizational goals and leaders inspire subordinates to work well". Implementing these behaviors will show a strong commitment to the success of the team or organization.

### **Inspirational Motivation**

Dalam konteks kepemimpinan, motivasi inspirasional sering kali menjadi salah satu aspek of transformational leadership. Leaders who are able to provide stronger motivation to employees, convey enthusiastically about something they want to achieve, communicate an interesting vision, raise enthusiasm and inspire subordinates to achieve goals and form good cooperation so that the goals that have been set can be achieved.

Based on the results of the interview regarding inspirational motivation conducted, it was concluded that the behavior of the head of the field always provides motivation for subordinates to be more enthusiastic in their work. The way the head of the field conveys directions clearly, directly, and precisely makes employees feel confident and motivated to carry out the tasks given. Leaders are also effective in communicating the organization's vision, so that all team members understand the direction and goals they want to achieve. By dividing tasks in an organized manner within a team, each team member has their own responsibilities that allow for efficient cooperation to achieve common goals.

Inspirational motivation is a leader's behavior that provides high motivation to subordinates so that they are able to achieve good results, in delivering something to be achieved always conveys enthusiastically and in the implementation of duties and responsibilities, leaders communicate the vision effectively, and establish good cooperation with subordinates for the achievement of organizational goals. In inspirational motivation, transformational leaders provide motivation and inspiration for their subordinates to achieve a common vision and goal. Transformational leaders have the ability to motivate and inspire their subordinates with a clear vision and motivate employees to achieve it". In addition to motivating employees, leaders form cooperation with employees to make it easier to achieve organizational goals (Eliyana et al., 2019; Lee et al., 2023; Zhu & Huang, 2023). The cooperation formed will make it easier for them to remind each other and make it easier to carry out tasks and work (Bakker et al., 2023; Deng et al., 2023; Kaur Bagga et al., 2023). Cooperation will facilitate the process of carrying out tasks and work.

### **Intellectual Stimulation**

Intellectual stimulation is the ability of a leader to expand the intellectual capacity and creativity of organizational members and encourage the expression of thoughts or ideas from subordinates to be developed, the behavior of leaders who provide solutions to every problem faced by subordinates. Leaders who use intellectual stimulation tend to encourage team members to think creatively, innovate in problem solving.

Based on the results of the interviews regarding the intellectual stimulation carried out, it can be concluded that the head of the field shows an attitude that is open to input and new ideas, and always considers each idea carefully, focusing on its impact on the organization. If the idea is considered to have positive potential for the development of the organization, the leadership will support it and develop it further. In addition, the attitude of the leadership is also seen to be active in dealing with problems that arise in the organizational field. This shows that the leadership has a proactive attitude in dealing with challenges and finding solutions. The head of the department also often gives good aspirations to employees and always encourages positive ideas that show the importance of motivating and strengthening the creativity of team members. Thus, leaders are not only mentors, but also a source of inspiration for employees in creating new ideas that are beneficial to the organization.

Leaders who demonstrate transformational leadership are constantly exploring new ideas and creative solutions from the people they lead (Chi et al., 2023; Karimi et al., 2023; Lai et al., 2020). Leaders provide creative solutions to the problems faced by their subordinates. In the aspect of intellectual stimulation, it is the character of a transformational leader who is able to foster new ideas, provide creative solutions to problems faced by subordinates (Cheng et al., 2023; Nguyen et al., 2023).

In intellectual stimulation, the leader encourages his followers to think, be creative, and be innovative towards problem solving. Intellectual stimulation is the ability of leaders to inspire their subordinates to be more creative in solving problems. Transformational leaders foster creative and innovative thinking in their teams or organizations through intellectual stimulation, leaders encourage their subordinates to think creatively, ideas and find the best solutions.

### **Paying Attention to Individuals**

Giving respect to individuals is the ability or behavior of leaders in giving advice to employees, leaders carry out a personal approach with subordinates and open space for employees to convey inputs, ideas, problems or concerns and listen attentively and consider the needs of employees so that subordinates are enthusiastic about working so that the goals that have been programmed can be achieved.

Based on the results of interviews related to the indicator of paying attention to individuals, it can be concluded that leaders in this field have shown a very caring attitude and give good advice and build close relationships with subordinates through a personal approach, which creates a sense of mutual respect and trust among the team. When there are problems faced by employees, leaders are always open to receive and listen attentively. The leader not only listens, but also tries to find the right solution to solve the problem and in terms of meeting the needs of the employees, the leader responds quickly and proactively, the leader strives to ensure that every employee has everything they need to do their job well, ensuring that the subordinates can work optimally and productively.

Transformational leaders pay attention to their subordinates personally, respect each individual's differences and provide advice. Personal attention is the initial identification of the potential of subordinates, leaders always open space for their subordinates to convey ideas or ideas and listen to them well and consider the needs of their subordinates.

Transformational leaders not only provide direction, but also open up space for employees to express their opinions (Grošelj et al., 2020; Madi Odeh et al., 2023; Manzoor et al., 2019). Transformational leaders provide deep attention to each team member, understand the needs and desires of subordinates, and provide the necessary support to help subordinates grow and



develop as individuals. Thus, transformational leaders not only lead, but also inspire and guide team members towards personal success and overall team success.

## CONCLUSION

Based on the results of the data obtained and the discussion that has been described, it can be concluded that the Implementation of the Transformational Leadership Style of the Head of Apparatus Performance and Awards at the Regional Civil Service Agency of South Sulawesi Province can be categorized as good. Ideal influence, the behavior of the head of the field is in accordance with the characteristics of transformational leadership, namely being kind, always respecting subordinates so that subordinates also respect their leaders, it can also be seen that the behavior focuses more on work than on personal affairs, and involves all employees if they want to make the best decision or decision. Inspirational Motivation, in this case the head of the field always motivates the employees both regarding discipline and in completing work so that employees also feel more enthusiastic about working, the head of the field is also in terms of conveying something done enthusiastically and the employee considers that the head of the field is effective in conveying the vision, and always builds teamwork for the sake of the common good so that the goals that have been set can be achieved. Intellectual Stimulation, the behavior of the head of the field always encourages ideas and input from subordinates to be developed, provides creative solutions to problems experienced by his subordinates and strives for employees to think creatively and innovatively in solving problems. Paying Attention to Individuals, in this case the head of the field always gives direct advice to his subordinates, always carries out a personal approach to subordinates who may lack enthusiasm in work, and listens attentively to inputs or suggestions from subordinates so that subordinates will feel appreciated or respected by their leaders and the head of the field always strives to meet every need of his employees for career development.

## REFERENCES

- Akib, H., Abdullah, N. R., Niswaty, R., Arhas, S. H., & Awaluddin, M. (2022). Maintenance of Office Facilities at the Makassar City Public Works Service. *Jurnal Ilmiah Ilmu Administrasi Publik*, 12(1), 69–76.
- Andriana, A. N., Sanjaya, A., & Elvara, S. (2021). The Effect of Leader Member Exchange on Employee Performance at PT Gawi Makmur Kalimantan, Penajam Paser Utara. *Jurnal Ad'ministrare*, 8(1), 1–10.
- Arhas, S. H. (2022). *Administrasi Umum dan Keuangan* (Muh. Darwis, Ed.). Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi.
- Bakker, A. B., Hetland, J., Kjellevold Olsen, O., & Espevik, R. (2023). Daily transformational leadership: A source of inspiration for follower performance? *European Management Journal*, 41(5). <https://doi.org/10.1016/j.emj.2022.04.004>
- Cheng, P., Liu, Z., & Zhou, L. (2023). Transformational Leadership and Emotional Labor: The Mediation Effects of Psychological Empowerment. *International Journal of Environmental Research and Public Health*, 20(2). <https://doi.org/10.3390/ijerph20021030>
- Chi, H., Vu, T., Nguyen, H. V., & Truong, T. H. (2023). How financial and non-financial rewards moderate the relationships between transformational leadership, job satisfaction, and job performance. *Cogent Business and Management*, 10(1). <https://doi.org/10.1080/23311975.2023.2173850>

- Darwis, M., Arismunandar, M., Sailan, M., Muharram, M., & Viridi, M. (2018). Effectiveness of situational leadership director of Fajar TV Makassar, Indonesia. *Advances in Social Science, Education and Humanities Research*, 226, 1171–1174.
- Darwis, M., Hazimah, R. Y., & Arhas, S. H. (2022). Peranan Humas dalam Peningkatan Citra Sekolah pada SMK YAPMI Makassar. *Konferensi Nasional Ilmu Administrasi*, 6(1), 36–40.
- Darwis, M., Rivai, A. M., Arhas, S. H., & Purna, Z. A. (2023). School-Based Management From the Viewpoint of the Principal's Leadership (Study at State Vocational School 1 Bone). *Technium Social Sciences Journal*, 50, 503–508.
- Deng, C., Gulseren, D., Isola, C., Grocutt, K., & Turner, N. (2023). Transformational leadership effectiveness: an evidence-based primer. *Human Resource Development International*, 26(5). <https://doi.org/10.1080/13678868.2022.2135938>
- Eliyana, A., Ma'arif, S., & Muzakki. (2019). Job satisfaction and organizational commitment effect in the transformational leadership towards employee performance. *European Research on Management and Business Economics*, 25(3). <https://doi.org/10.1016/j.iedeen.2019.05.001>
- Frich, J. C., Brewster, A. L., Cherlin, E. J., & Bradley, E. H. (2015). Leadership Development Programs for Physicians: A Systematic Review. *Journal of General Internal Medicine*, 30(5). <https://doi.org/10.1007/s11606-014-3141-1>
- Grošelj, M., Černe, M., Penger, S., & Grah, B. (2020). Authentic and transformational leadership and innovative work behaviour: the moderating role of psychological empowerment. *European Journal of Innovation Management*, 24(3). <https://doi.org/10.1108/EJIM-10-2019-0294>
- Haeruddin, M. I. M., Kurniawan, A. W., Akbar, A., Burhanuddin, B., Dipotmodjo, T., & Mustafa, M. Y. (2021). Holier than Thou: A Comparative Study of Leader-Member Exchange (LMX) Effectiveness in Transactional and Transformational Leadership in IT Companies. *Jurnal Ad'ministrare*, 8(2), 285–290.
- Hapudin, H. M. S., Praja, I. A. A., & ST, M. B. A. (2023). *Kepemimpinan Pendidikan: Konsep dan Strategi Peningkatan Mutu Pendidikan*. Penerbit Andi.
- Haq, M. A., Sailan, M., & Niswaty, R. (2021). The Influence of Leadership Style and Organizational Commitment on Employee Performance of Makassar City Manpower Office. *Jurnal Ad'ministrare*, 8(1), 179–190.
- Isgunandar, Nurfadila, & Akib, H. (2024). Effectiveness of Archival Systems in Administrative Governance at Maccini Sombala Subdistrict Office Makassar City. *International Journal of Administration and Education (IJAE)*, 41–49.
- Ismayani, A. I., Niswaty, R., & Darwis, M. (2015). Peranan kepala sekolah sebagai leader di SMA negeri 8 kabupaten Bulukumba. *Ad'ministrare*, 2(2), 101–107.
- Karimi, S., Ahmadi Malek, F., Yaghoubi Farani, A., & Liobikienè, G. (2023). The Role of Transformational Leadership in Developing Innovative Work Behaviors: The Mediating Role of Employees' Psychological Capital. *Sustainability (Switzerland)*, 15(2). <https://doi.org/10.3390/su15021267>
- Kaur Bagga, S., Gera, S., & Haque, S. N. (2023). The mediating role of organizational culture: Transformational leadership and change management in virtual teams. *Asia Pacific Management Review*, 28(2). <https://doi.org/10.1016/j.apmr.2022.07.003>

- Lai, F. Y., Tang, H. C., Lu, S. C., Lee, Y. C., & Lin, C. C. (2020). Transformational Leadership and Job Performance: The Mediating Role of Work Engagement. *SAGE Open*, 10(1). <https://doi.org/10.1177/2158244019899085>
- Lee, C. C., Yeh, W. C., Yu, Z., & Lin, X. C. (2023). The relationships between leader emotional intelligence, transformational leadership, and transactional leadership and job performance: A mediator model of trust. *Heliyon*, 9(8). <https://doi.org/10.1016/j.heliyon.2023.e18007>
- Madi Odeh, R. B. S., Obeidat, B. Y., Jaradat, M. O., Masa'deh, R., & Alshurideh, M. T. (2023). The transformational leadership role in achieving organizational resilience through adaptive cultures: the case of Dubai service sector. *International Journal of Productivity and Performance Management*, 72(2). <https://doi.org/10.1108/IJPPM-02-2021-0093>
- Manzoor, F., Wei, L., Nurunnabi, M., Subhan, Q. A., Shah, S. I. A., & Fallatah, S. (2019). The impact of transformational leadership on job performance and CSR as mediator in SMEs. *Sustainability (Switzerland)*, 11(2). <https://doi.org/10.3390/su11020436>
- Nguyen, N. P., Hang, N. T. T., Hiep, N., & Flynn, O. (2023). Does transformational leadership influence organisational culture and organisational performance: Empirical evidence from an emerging country. *IIMB Management Review*, 35(4). <https://doi.org/10.1016/j.iimb.2023.10.001>
- Niswaty, R., Juniati, F., Darwis, M., & Salam, R. (2019). The Effectiveness of Leadership Functions Implementation in The Makassar Departement of Manpower. *Jurnal Pendidikan Bisnis Dan Manajemen*, 5(1), 1–10.
- Niswaty, R., Mismadewi, M., Darwis, Muh., Arhas, S. H., & Saleh, S. (2020). Community Participation in Development at Soppeng Regency. *Jurnal Ilmiah Ilmu Administrasi Publik*, 10(2). <https://doi.org/10.26858/jiap.v10i2.16736>
- Rajamemang, R., Kasnawi, T., Anshari, A., Kahar, F., & Maidin, R. (2019). Determinant Factor of Transformational Leadership in the Age of Globalization. *Jurnal Ad'ministrare*, 6(1), 73–78.
- Rifdan, R., Anugrah, K., Niswaty, R., Arhas, S. H., Rifdan, R., Anugrah, K., Niswaty, R., & Arhas, S. H. (2022). *Character Based Leadership*. 12(2), 139–144.
- Said, M. (2022). The Influence of Parents' Leadership, Supervision and Communication on Teacher Performance. *Jurnal Administrare: Jurnal Pemikiran Ilmiah Dan Pendidikan Administrasi Perkantoran*, 9(2), 311–322.
- Saleh, S., Ahmad, A. T., & Arhas, S. H. (2024). Work Effectiveness of Administration Employees at SMK Negeri 2 Gowa. *Jurnal Ad'ministrare: Jurnal Pemikiran Ilmiah Dan Pendidikan Administrasi Perkantoran*, 42–48.
- Saleh, S., & Arhas, S. H. (2024). Principal's Leadership Style and Influence Workload Against Teacher Performance. *KnE Social Sciences*, 702–710.
- Suprianto. (2024). Memahami Esensi Penelitian Kualitatif : Pendekatan, Proses, dan Praktik Terbaik. *ASHA Publishing*. <http://ashapublishing.co.id/>.
- Wader, N., Darwis, M., Salam, R., & Baharuddin, A. (2020). Application of the Transformational Leadership Style at the BKKBN office in South Sulawesi Province. *PINISI Discretion Review*, 1(1), 7–12.



- Yusuf, M., Risal, M., & Srisapta, S. (2021). The Effect of Leadership, Motivation and Job Satisfaction on Organizational Commitment. *Jurnal Office*, 7(1), 101–110.
- Zhu, J., & Huang, F. (2023). Transformational Leadership, Organizational Innovation, and ESG Performance: Evidence from SMEs in China. *Sustainability (Switzerland)*, 15(7). <https://doi.org/10.3390/su15075756>