

Leadership Detection Across Social Media Hashtags

Oleksandr Romanovskiy, Nina Pidbutska, Anastasiia Knysh and Eugene Vorobieva

National technical university "Kharkiv polytechnic institute", Kyrpychova str. 2, Kharkiv, 61002, Ukraine

Abstract

The paper deals with the problem of identifying leaders on the basis of social media hashtags. The relevance of the research topic is determined by the growing interest of employers in employees with developed leadership qualities and the need for clear and accurate detection of leadership abilities without recourse to in-depth psychodiagnostic testing. In this connection, the analysis of the content of social networks of seekers can be a reliable way to identify potential leaders. With a view to studying the specifics of the use of social media hashtags, a group of 214 students (average age 21.4 ± 1.2) studying in various professional fields (technical, humanities, social sciences) was selected, including 109 women and 105 men. The Transformational Leadership Questionnaire was used to study the level of leadership development. To study the attitude to different types of hashtags, we've developed a questionnaire aimed at evaluating different types of hashtags. Descriptive statistics and T-test methods were used to process the study data. The study has found that leaders prefer mixed hashtags, using verbs and calls to action. Not leaders prefer short hashtags with nouns and expressions of their own feelings. The features of the hashtags used by leaders on social media identified in the study can be used in modern professional selection for a prompt and comprehensive assessment of job seekers.

Keywords

Leadership, hashtag, social media, self-presentation, self-perception.

Introduction

In today's world, leadership is one of the most sought-after personality traits [9]. Leadership can be seen both as a personality trait [6] and as an ability to interact [1] and a willingness to lead others [3]. People with leadership potential are good at taking responsibility and making decisions in situations where others lose their footing [19]. Scientists have been talking about the importance of leadership for the development of society, the introduction of innovations, and the people's unification around shared goals since the early twentieth century. However, in recent years, the topic of leadership has become particularly relevant in connection with the total digitalization, which is making its changes in all spheres of public relations [23].

The current stage of social development can be characterized by the following features:

- an increasing impact of technology on all spheres of life;
- an increasing level of flexibility in the areas of education and professional development of the individual in connection with the use of distance technologies;
- rapid emergence of "new" and the demise of "old" professions;
- the growing role of individual entrepreneurship [24].

The described characteristics force employers to take a more strategic approach to the process of requirements formation and staff selection [14, 22, 25]. Not just good professionals come to the fore, but people who are characterized by high flexibility, adaptability, creativity, willingness to take

COLINS-2022: 6th International Conference on Computational Linguistics and Intelligent Systems, May 12–13, 2022, Gliwice, Poland
EMAIL: romanovskiy_a_khpi@ukr.net (O. Romanovskiy); podbutskaya_nina@ukr.net (N. Pidbutska); n_knysh@ukr.net (A. Knysh);
evorobjova@ukr.net (E. Vorobieva).
ORCID: 0000-0002-0602-9395 (O. Romanovskiy); 0000-0001-5319-1996 (N. Pidbutska); 0000-0003-0211-2535 (A. Knysh); 0000-0002-6269-578X (E. Vorobieva).



© 2022 Copyright for this paper by its authors.
Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).
CEUR Workshop Proceedings (CEUR-WS.org)

responsibility and demonstrate leadership in everyday life and in crisis situations [5]. Such requirements also need special approaches to the diagnosis of leadership, which will not be limited to psychological testing [8].

Related works

Recent research in the field of psychodiagnostics shows that the risk of erroneous conclusions is increasing dramatically when testing candidates in the process of professional selection. This is due to the desire of seekers to make a more positive impression on interviewers and testers. That is why in recent years, alternative ways of diagnosing and collecting information about the seeker have been developed, in particular through the analysis of social networks.

Social networks today are a scope for self-presentation and self-perception in the virtual world. On the one hand, such a perception is somewhat artificial, because individuals try to emphasize their own positive traits and aspects. On the other hand, in this pursuit of the ideal self-perception, individuals reveal themselves, demonstrating their values, interests, priorities and even personal characteristics. Photos and videos, content, hashtags and the frequency of new posts have been analysed by researchers with a view to determining person's personality traits based on the social media content.

To date, the analysis of hashtags is very carefully used to analyse the psychological characteristics and states of a person. The most successful area is the study of manifestations of stress through special combinations of hashtags [4, 13]. However, studies on the political preferences of social media users, which create opportunities to predict a person's political choice based on the hashtags they use are more common [15, 18, 20].

Analysis of recent research indicates that leaders have a special style of activity that manifests itself at all levels: in communication, writing, self-presentation. Understanding that individuals with strong leadership qualities and abilities will follow a special style of self-presentation on social media enabled us to form a hypothesis that people inclined to leadership use specific hashtags. This has determined the purpose of this paper - to conduct an empirical study and analysis of the features of using the hashtags by people with leadership abilities.

This study provides new opportunities for the use of social media content analysis in professional selection, which in turn will reduce the risk of bias in psychological testing.

Procedure

To cover a large number of respondents, it has been decided to conduct a study involving students of higher education institutions (Kharkiv, Ukraine). Students are active users of social media, have their own style of self-presentation on social media and do not need additional instruction on creating and maintaining their own accounts.

At the first stage of the study, the level of leadership qualities of respondents was determined to form groups with low and high levels of aptitude for leadership.

At the second stage of the study, respondents were offered questionnaires aimed at clarifying their attitude to hashtags:

- different lengths (short, long, mixed) [21];
- different parts of speech (nouns, adjectives, verbs) [11];
- different orientations (expression of feelings, call to action, motivation for self-development) [10].

The questionnaire included five examples of each type of hashtag that respondents were asked to rate using a 5-point Likert scale (1 - I would never use such a hashtag, 5 - I often use such hashtags).

At the third stage, a comparison of the results obtained in the groups of student leaders and not leaders was conducted in order to determine the types of hashtags that are inherent in each of the groups.

Study sample

To study the specific features of use of social media hashtags, a group of 214 students (average age 21.4 ± 1.2) studying in various professional fields (technical, humanities, social sciences) was selected, including 109 women and 105 men.

The criteria for inclusion of respondents in the study group were:

- 3rd or 4th year student of a higher education institution;
- activity in social networks;
- experience in using social media hashtags.

Methods

The Transformational Leadership Questionnaire [2] ($\alpha \geq 0.81$) was used to study the level of leadership development. This questionnaire includes 9 scales and provides an opportunity to diagnose various forms of manifestation of leadership. In the study, students with high scores on the integrated scales of transactional and transformational leadership were included in the category of people with a high aptitude for leadership. A number of recent studies show that both types of leadership, although characterized by different effects on followers, can still be equally effective in organizing, setting goals, directing followers to action. Therefore, the aptitude for at least one type of leadership was considered by us as a sign of the general aptitude of the individual for leadership.

To study the attitude to different types of hashtags, we've developed a questionnaire that contained examples of different types of hashtags as described in the previous section. Respondents evaluated their attitude to different hashtags and then the average score was calculated in relation to hashtags of each type (different lengths, with the use of different parts of speech, different orientations).

Descriptive statistics methods (arithmetic mean, percentages, standard deviations) were used to present the results of the study. In order to determine the characteristics of the attitude of respondents-leaders to hashtags of a certain type, a T-test was used. All calculations were made using IBM SPSS 21 program.

Results

Based on the results of the first stage of the study, the aptitude of respondents for a certain type of leadership was determined (Figure 1).

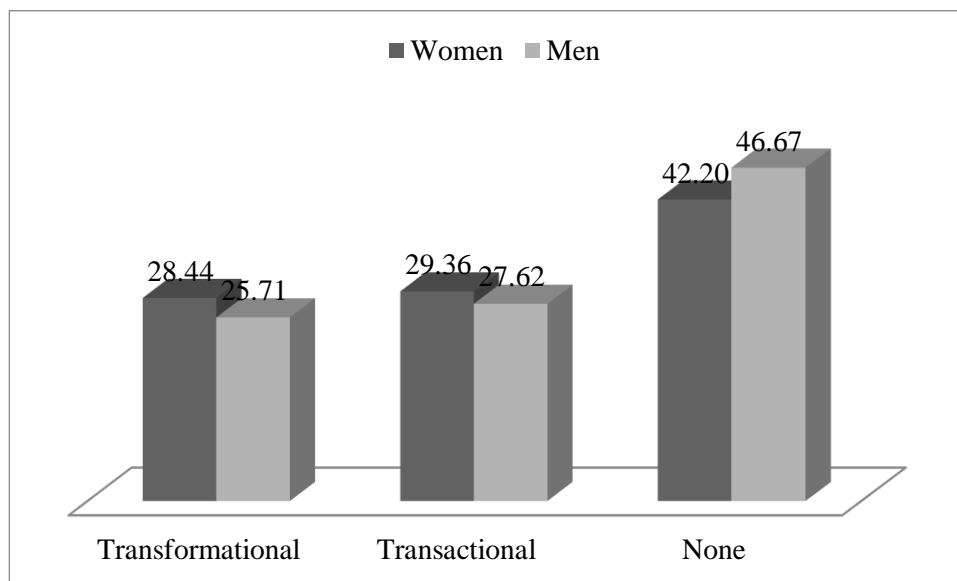


Figure 1: Results of Transformational Leadership Questionnaire (%)

It was found that among women there were 31 respondents (28.44%) with a pronounced aptitude for transformational leadership, 32 respondents (29.36%) with an aptitude for transactional leadership and 46 respondents (42.2%) without a pronounced aptitude for leadership.

Among men, 27 respondents (25.71%) with a pronounced aptitude for transformational leadership, 29 respondents (27.62%) with an aptitude for transactional leadership and 49 respondents without a pronounced aptitude for leadership were identified.

Based on the obtained data, two study samples were formed (Figure 2).

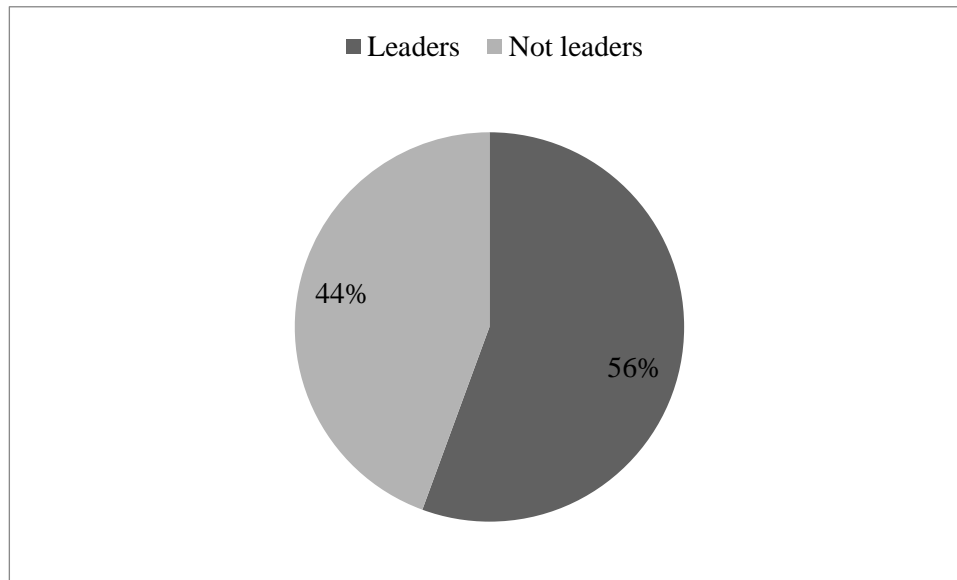


Figure 2: Distribution of respondents in study groups (%)

Based on the results of the distribution, the group of leaders included 119 respondents, including 63 women and 56 men. The group of Not Leaders included 95 respondents, including 46 women and 49 men.

After completing the survey, the results of the respondents were considered for each criterion separately and analysed in terms of statistically significant differences.

The data obtained during the second stage of the study were analysed using the methods of descriptive statistics (table 1), which made it possible to obtain an overview of the specifics of the distribution of data in the study groups.

Table 1
Descriptive statistics

Variables		N	Mean	Std. Deviation	Std. Error Mean
Short	Leaders	119	4,01	0,91	0,08
	Not leaders	95	3,99	0,98	0,10
Long	Leaders	119	2,87	0,64	0,06
	Not leaders	95	2,78	0,60	0,06
Mixed	Leaders	119	4,30	0,75	0,07
	Not leaders	95	3,18	1,00	0,10
Nouns	Leaders	119	3,98	0,87	0,08
	Not leaders	95	4,08	0,87	0,09

Adjectives	Leaders	119	2,76	0,68	0,06
	Not leaders	95	2,65	0,60	0,06
Verbs	Leaders	119	4,24	0,73	0,07
	Not leaders	95	2,94	0,58	0,06
Expressions of feelings	Leaders	119	2,87	0,64	0,06
	Not leaders	95	3,87	0,91	0,09
Call to action	Leaders	119	4,45	0,62	0,06
	Not leaders	95	2,38	0,81	0,08
Motivation for self-development	Leaders	119	4,06	0,81	0,07
	Not leaders	95	4,18	0,74	0,08

Analysis of descriptive statistics indicates that the average scores of different hashtags in the group of leaders range from 2.76 ± 0.68 to 4.45 ± 0.62 points. In evaluating the length of hashtags, they often gave high scores to short (4.01 ± 0.91) hashtags. Verbs (4.24 ± 0.73) were preferred in evaluating parts of speech. Among the types of hashtags, leaders prefer calls to action (4.45 ± 0.62).

The average scores of hashtags in the group of not leaders range from 2.38 ± 0.81 to 4.18 ± 0.74 points. In evaluating the length of hashtags, they often gave high scores to short (3.99 ± 0.98) hashtags. Nouns (4.08 ± 0.87) were preferred in evaluating parts of speech. Among the types of hashtags, not leaders prefer motivation for self-development (4.06 ± 0.81).

To determine statistically significant differences, groups of leaders and not leaders were compared for all indicators (Tables 2, 3, 4).

Table 2
Attitudes of respondents to the length of hashtags

	t-test for Equality of Means					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Short	0,15	212,00	0,88	0,02	0,13	-0,24	0,27
Long	1,01	212,00	0,31	0,09	0,09	-0,08	0,26
Mixed	9,37	212,00	0,00	1,12	0,12	0,89	1,36

The analysis of the comparison of the attitude of leaders and not leaders to hashtags of different lengths shows that respondents from both groups have approximately the same attitude to expressing opinions using short and long hashtags: no significant differences were found for these indicators.

At the same time, a statistically significant difference was identified for the Mixed Hashtags indicator ($T = 9.37$, $p \leq 0.01$). The mean difference between the results in the study groups was 1.12 points, which differs significantly from the differences between the results for the other two indicators (Figure 3).

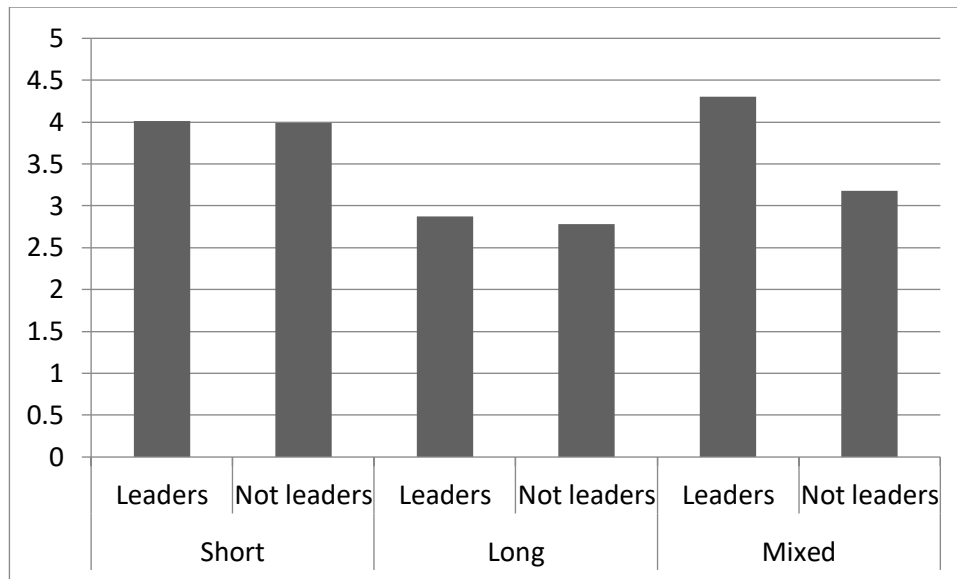


Figure 3: Comparison of mean scores in relation to hashtags of different lengths in study groups

A graphical comparison of average scores clearly indicates that leaders rank mixed hashtags statistically significantly higher, and therefore use them more often in their social media. Mixed hashtags allow them to concretize an opinion using, for example, two words or a word and a number. The use of mixed hashtags increases the likelihood that a post on social media will find its reader, and the opinion will be communicated to the recipient.

Table 3

Attitudes of respondents to the use of different parts of speech as hashtags

	t-test for Equality of Means					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nouns	-0,84	212,00	0,40	-0,10	0,12	-0,34	0,14
Adjectives	1,17	212,00	0,24	0,10	0,09	-0,07	0,28
Verbs	14,10	212,00	0,00	1,30	0,09	1,12	1,48

The analysis of the comparison of the attitude of leaders and not leaders to the use of different parts of speech as hashtags indicates that respondents from both groups have approximately the same attitude to the use of nouns and adjectives: no significant differences were identified.

Statistically significant difference was determined for the Verbs indicator ($T = 14.10$, $p \leq 0.01$). The mean difference between the results in the study groups was 1.3 points, which differs significantly from the differences between the results for the other two indicators (Figure 4).

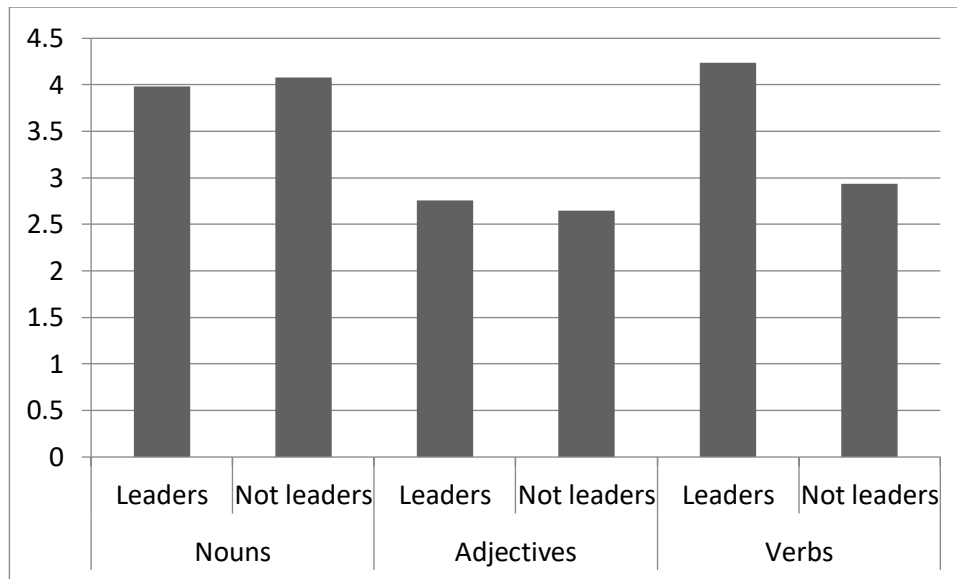


Figure 4: Comparison of average scores in relation to hashtags using different parts of speech in research groups

Graphic analysis of the comparison of average scores in the study groups shows that leaders rank verbs statistically significantly higher, and therefore more often use verbs as hashtags.

The use of verbs performs some sort of mobilizing function. Verbs can be used to reflect your own actions. Such hashtags will serve as an example for followers and inspire them to perform similar actions. Verbs can also be used as a call to perform certain actions. Verbs in hashtags are a very useful tool that allows leaders to unite their followers through joint action.

Table 4

Attitudes of respondents to the use of different types of hashtags

	t-test for Equality of Means					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Expressions of feelings	-9,49	212,00	0,00	-1,01	0,11	-1,22	-0,80
Call to action	21,14	212,00	0,00	2,07	0,10	1,88	2,27
Motivation for self-development	-1,12	212,00	0,26	-0,12	0,11	-0,33	0,09

The analysis of the comparison of the attitude of leaders and not leaders to the use of different types of hashtags indicates that respondents from both groups have approximately the same attitude to the use of hashtags that motivate self-development: no significant differences were identified.

Statistically significant difference was identified for the Expressions of feelings indicator ($T = -9.49$, $p \leq 0.01$). The mean difference between the results in the study groups was -1.01 points (Figure 5).

A statistically significant difference was identified for the Call to action indicator ($T = 21.14$, $p \leq 0.01$). The mean difference between the results in the study groups was 1.88 points (Figure 5).

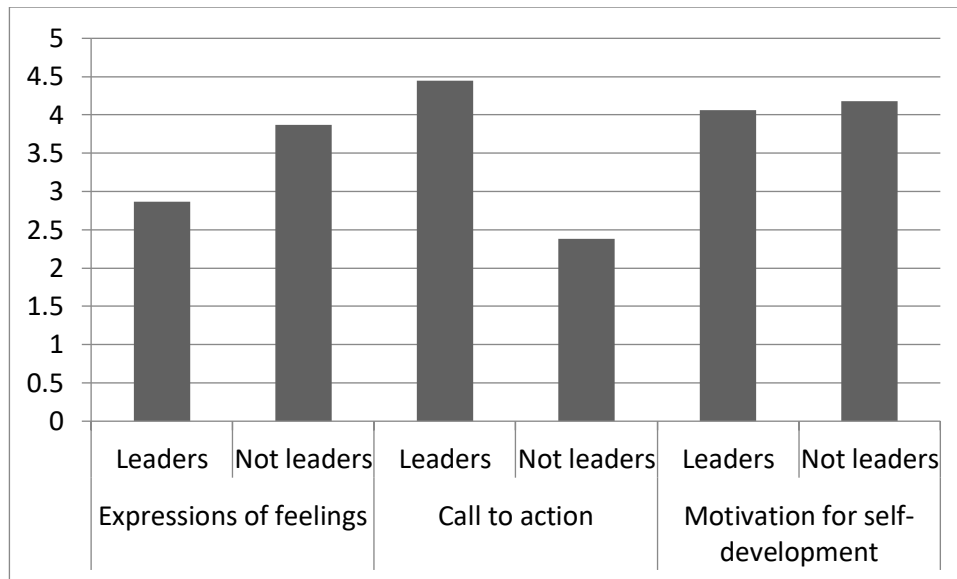


Figure 5: Comparison of average scores in relation to different types of hashtags in research groups

Not leaders are prone to express their feelings and share their experiences using hashtags. In this regard, the hashtag serves the function of search for compassion and empathy. Leaders, on the other hand, assess the likelihood of using such hashtags at a low level, which indicates their unwillingness to look weak or in need of help or support.

Leaders are more likely to use calls to action in their hashtags. In this case, the hashtag performs a motivating, inspiring function, directing followers to perform a certain action and achieve a common goal. Leaders realize that it is not enough for most followers to set a crucial example, it is also important to direct them towards certain actions.

Conclusions

The study has proved the initial hypothesis that the hashtags of leaders on social media are different from the hashtags of not leaders.

In particular, it has been found that leaders prefer mixed hashtags, which are neither too short nor too long and contain specific information that makes it easier to find an audience interested in the message. The use of mixed hashtags can be an indication of greater focus, accuracy and organization of leaders' thinking.

It has also been shown that leaders are more likely to use verbs as hashtags. This part of speech creates unique opportunities to activate followers and inspire them by leaders' own example. The use of verbs can be seen as an illustration of special thinking of leaders, aimed at organizing joint action and movement towards the goal.

It has been identified that leaders statistically significantly more often use calls to action in their hashtags and less often express their emotions. This approach to creating hashtags indicates the need for leaders to show the strengths of their own personalities and inspire others to act to achieve a common goal.

The features of the hashtags used by leaders on social media identified in the study can be used in modern professional selection for a prompt and comprehensive assessment of office seekers.

The following can be identified as promising areas of research: analysis of specific words and expressions in the hashtags of leaders; analysis of the frequency of use of hashtags by leaders on social media; assessment of the prognostic effectiveness of hashtags based on the analysis of professional activities of the individual.

Acknowledgements

The study was conducted on the basis of the National Technical University "Kharkiv Polytechnic Institute". The authors of the article express their gratitude to the administration of the Educational and Scientific Institute of Social and Humanitarian Technologies for the organizational support for the study.

References

- [1] Al-Awlaqi, M. A., Aamer, A. M., Barahma, M. M., & Battour, M. (2021). The interaction between leadership styles and their followers' human capital: a correspondence analysis approach applied to micro-sized businesses. *Journal of Management Development*.
- [2] Alimo-Metcalf, B., & Alban-Metcalf, R. J. (2001). The development of a new transformational leadership questionnaire. *Journal of occupational and organizational psychology*, 74(1), 1-27.
- [3] Al-Tahitah, A., Muthaliff, M. M. A., Abdulrab, M., & Al-Maamari, Q. A. (2018). Paper Review on the Relationship Between Transformational Leadership and Readiness for Change. *International Journal of Energy Policy and Management*, 3(1), 1-7.
- [4] Bogolyubova, O., Upravitelev, P., Churilova, A., & Ledovaya, Y. (2018). *Expression of Psychological Distress on Instagram Using Hashtags in Russian and English: A Comparative Analysis*. *SAGE Open*, 8(4), 215824401881140. doi:10.1177/2158244018811409
- [5] Bustamante, S., Ehlscheidt, R., Pelzeter, A., Deckmann, A., & Freudenberger, F. (2021). The effect of values on the attractiveness of responsible employers for young job seekers. *Journal of Human Values*, 27(1), 27-48.
- [6] Carleton, E. L., Barling, J., & Trivisonno, M. (2018). Leaders' trait mindfulness and transformational leadership: The mediating roles of leaders' positive affect and leadership self-efficacy. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, 50(3), 185.
- [7] Cho, Y., Shin, M., Billing, T. K., & Bhagat, R. S. (2019). Transformational leadership, transactional leadership, and affective organizational commitment: a closer look at their relationships in two distinct national contexts. *Asian Business & Management*, 18(3), 187-210.
- [8] Cook, A., Meyer, B., Gockel, C., & Zill, A. (2019). Adapting leadership perceptions across tasks: micro-origins of informal leadership transitions. *Small Group Research*, 50(2), 227-265.
- [9] Gandolfi, F., & Stone, S. (2018). Leadership, leadership styles, and servant leadership. *Journal of Management Research*, 18(4), 261-269.
- [10] Geary, C., March, E., & Grieve, R. (2021). Insta-identity: Dark personality traits as predictors of authentic self-presentation on Instagram. *Telematics and Informatics*, 63, 101669.
- [11] Hanafy, A. (2021). Hashtag Campaigning as an Act of Resistance: A Micro-linguistic Analysis of Eleven Twitter Hashtag Campaigns. *□□□□*, 10(1), 9-46.
- [12] Hoxha, A. (2019). Transformational and transactional leadership styles on employee performance. *International Journal of Humanities and Social Science Invention*, 8(11), 46-58.
- [13] Lin, H., Jia, J., Guo, Q., Xue, Y., Huang, J., Cai, L., & Feng, L. (2014, July). Psychological stress detection from cross-media microblog data using deep sparse neural network. In *2014 IEEE International Conference on Multimedia and Expo (ICME)* (pp. 1-6). IEEE.
- [14] Lorica, R., & Valenzuela, P. Employers' Preference on Employability Skills of Business Management and Accounting Graduates. *Journal of Academe and Industry Research*, 2(4), 70-89.
- [15] Pancer, E., & Poole, M. (2016). The popularity and virality of political social media: hashtags, mentions, and links predict likes and retweets of 2016 US presidential nominees' tweets. *Social Influence*, 11(4), 259-270.
- [16] Puni, A., Hilton, S. K., & Quao, B. (2020). The interaction effect of transactional-transformational leadership on employee commitment in a developing country. *Management Research Review*.
- [17] Reynolds, C. R., Altmann, R. A., & Allen, D. N. (2021). The problem of bias in psychological assessment. In *Mastering Modern Psychological Testing* (pp. 573-613). Springer, Cham.

- [18] Rho, E. H. R., & Mazmanian, M. (2020, April). Political hashtags & the lost art of democratic discourse. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (pp. 1-13).
- [19] Seemiller, C. (2018). Enhancing leadership competencies for career readiness. *New directions for student leadership*, 2018(157), 39-53.
- [20] Setiawan, A., Saputra, H. A., & Fridayani, H. D. (2021). Political communication and public sphere democracy (An analysis: The hashtags usage of rejection the omnibus law 2020 on Twitter). *Profetik: Jurnal Komunikasi*, 14(1), 51-59.
- [21] Tariq, U. (2022). Language Analysis and the Role of Facebook Hashtags in Pakistan. *Social Science Computer Review*, 08944393211065866.
- [22] Valenti, A. (2019). Leadership preferences of the millennial generation. *Journal of Business Diversity*, 19(1), 75-84.
- [23] Vlok, A., Ungerer, M., & Malan, J. (2019). Integrative leadership for technology innovation. *International Journal of Technology Management*, 79(3-4), 247-273.
- [24] Webster, A., & Wyatt, S. (2020). *Health, technology and society*. Springer Singapore.
- [25] Zaharee, M., Lipkie, T., Mehlman, S. K., & Neylon, S. K. (2018). Recruitment and Retention of Early-Career Technical Talent: What Young Employees Want from Employers A study of the workplace attributes that attract early-career workers suggests that Millennials may not be so different from earlier generations. *Research-Technology Management*, 61(5), 51-61.