

## THE IMPACT OF SOCIAL NETWORKS ON GROUP PROCESSES IN COMPANIES IN INNOVATIVE INDUSTRIES

Felicjan BYLOK

Czestochowa University of Technology; Felicjan.bylok@pcz.pl, ORCID: 0000-0001-5305-8634

**Purpose:** In companies, the search for factors which increase competitiveness in the market is crucial to their development. One of these factors is a presence of well-functioning social networks. The aim of this article is firstly to determine the extent to which social networks exist within companies, and secondly to examine the impact of social networks on group processes that support innovation.

**Design/methodology/approach:** The stated objective was achieved through the use of a survey method utilizing the CATI technique. The survey included 575 department managers and employees of companies in innovative industries.

**Findings:** The research revealed relationships between social network indicators and intragroup processes, i.e., mutual support within the team, quality of performance of tasks requiring team cooperation, intra-team communication, and increased innovation within the team, as well as between social network indicators and intergroup processes, e.g., information flow between work teams and cooperation between work teams.

**Research limitations/implications:** The acquired research findings with regard to their quantitative nature (survey research) constitutes the basis for the limited findings.

**Practical implications:** Knowledge of the nature of social networks can help managers to stimulate pro-innovative actions by employees, which will increase the company's competitiveness in the market.

**Originality/value:** In a cognitive sense, the research findings lead to the familiarization with the role of social networks on group processes that support innovation.

**Keywords:** social networks, group processes, knowledge, engagement.

**Category of the paper:** Research article.

### 1. Introduction

In modern companies, the potential for growth lies in interpersonal cooperation within employee groups and the organisation as a whole. The ability to work together, shared values and norms, and trust between organisation members provide the basis for building social capital, which can be defined as the sum of actual and potential benefit available to and derived from an individual's or social unit's network or relationship (Nahapiet, Ghoshal, 1998).

Social capital lays the foundation for interaction and cooperation, thus becoming essential element in the flow of knowledge and information. At its core lie social networks based on mutual cooperation between employees. The more an individual remains in constant contact with others through the network, the more likely they are to develop a 'habit of cooperation' and the better they will understand the group's norms and expectations of them (McLure, Wasko, Faraj, 2005). Although many researchers have studied social networks in companies, most of them have simply focused on the general use of social networks. Only a few have studied the impact of social networks on job performance (Kuegler et al., 2015). However, there is a lack of research on the impact of social networks on organisational processes. Consequently, there is a research gap in the relationship between social networks and intragroup and intergroup processes in companies. The aim of this article is firstly to determine the extent to which social networks exist in companies, and secondly to identify the impact of social networks on group processes that support innovation.

## **2. Social network in organisation – theoretical background**

A social network is a set of links between social actors (individual, groups, organisations, etc.) Actors can be related in many different ways: similarities, such as location, group membership or characteristics, such as gender; social relationships, kinship, roles played or friendship (Brass, 2022). A network consists of a collection of actors or nodes that are linked by ties of a certain type (e.g. friendship). The pattern of ties derives from the structure of the network, and nodes occupy positions within this structure (Borgatti, Halgin, 2011). Nodes can be different actors, i.e., individuals, work units or organisations. The specific content of the relationships occurring between nodes varies, and can be strategic alliances, cooperation, information flow (communication), friendship or camaraderie in the workplace, goods and services (workflow) and influence (advice). Ties in networks are determined, among others, by spatial and temporal proximity and rooting (Kilduff, Brass, 2010), reciprocity (Tasselli, Kilduff, 2018), hierarchical ties (Dahlander, McFarland, 2013), personality, and self-control (Kilduff, Buengerler, 2020).

Social network researchers focus on a variety of research areas, the most common being social relationships, actor embeddedness, structural patterns, and the utility of network connections. In the case of social relationships, sets of actors and relationships that connect or divide them are examined (Freeman, 2004). Another research area includes actors and their embeddedness within networks. Embeddedness is the degree to which relationships between actors take place or the degree to which social ties are renewed and extended by the community rather than by actors from outside the community (Uzzi, Spiro, 2005). Structural patterns, on the other hand, refer to the complexity of social relationships and include existing enduring

grouping patterns, connectivity and centralisation (Wellman, Berkowitz, 1988). The utility of network connections is related to the creation of the conditions for obtaining resources important to the individual and the group (Burt, 1992).

In general, research on social networks in companies can be divided into two main groups: the impact of networks on labour productivity and the impact on knowledge management activities. The first group includes research on the links between networks and: performance (Suh, Bock, 2015), job satisfaction (Olfat et al., 2019), problem solving at work (Mäntymäkand, Riemer, 2016). In the second group, relevant studies include those focusing on relations between networks and innovation, agility and productivity (Wu et al., 2021), organisational learning (Qi, Chau, 2018) or exploratory innovation (Xiong, Sun, 2023).

Social networks in an organisation can have external and internal dimensions. The former refers to an organisation's networks with its environment, i.e., with customers, suppliers, competitors and other parties (Provan, Fish, Sydow, 2007). In contrast, internal networks, which are built on the basis of social relationships that link employees and managers, take the form of interpersonal networks and group networks. Interpersonal networks are usually built on the similarity of actors, what facilitates communication, increases predictability of behavior and builds trust, and on the proximity that results from face-to-face communication.

Intra-organisational networks can also be formed by employee groups, which are nodes that interact with each other. Between nodes, there can be formal relationships involving ties that mediate the flow of work, exchange of resources, and transfer of personnel, as well as informal relationships occurring between members of different labour groups who will seek advice from staff in other groups or friendly contacts (Kilduff, Tsai, 2003).

Social networks bring many benefits to each employee and the organisation as a whole. Participation in the intra-organisational networks provides its participants with the opportunity to obtain benefits such as power (Riemer et al., 2015), leadership (Balkundi, Kilduff, 2006), employee mobility (Esmaeili, Zantedeschi, 2022), increased productivity (Sparrowe et al., 2001), and learning opportunities (Poell, Van der Krogt, 2010).

Social networks bring benefits to the organisation, what can include the effective onboarding of new employees thanks to their participation in social networks (Deans, 2011), the generation and sourcing of new ideas with work (Mäntymäki, Riemer, 2016), and the generation of collective intelligence (Awal, Bharadwaj, 2014).

### **3. Methods and Sample**

In Poland, social network research in companies is relatively rarely undertaken. By exploring the relationship between social networks and group processes, the author aims to fill a research gap. He formulated the research objective, which was to seek answers to the

following research questions: to what extent are social networks present in companies in the innovation industry? To what extent do social networks influence group processes? A survey method was used in the research. The research tool was a standardised survey questionnaire. A CATI (Computer Assisted Telephone Interview) questionnaire was used to survey employees of companies in innovative industries. The Spearman rank correlation coefficient was used to analyse the results obtained. The survey was nationwide. The operators of the survey were companies employing more than 50 people. Based on a random selection method, a research sample of 575 employees working in innovative industries, i.e., pharmaceuticals (25.2%), energy (23.3%), automotive (26.4%), and IT (25%), was constructed. The employees surveyed were white-collar workers (97.2%) and menial workers (2.8%), with seniority of 4-8 years (10.3%), 9-13 years (23.8%), 14-18 years (33.7), and 19 or more years (32.2%). The random sampling resulted in a representative sample, according to the following parameters: error size  $\alpha$  4%, confidence interval: 95%.

#### **4. Results**

One of the objectives of the study was to identify social networks in companies belonging to innovative industries. The research shows that surveyed employees in these industries most often participate in large networks of more than 20 people (53.4%), followed by medium-sized networks of 11 to 20 people (32.7%). They are least likely to be members of small networks in companies, i.e., up to 10 people (13.9%).

In order to identify relationships between network members, indicators were constructed based on the frequency of interaction between employees and between employees and managers, as well as the closeness of ties between them. Social networks in companies operate on the basis of formal and informal relationships. An analysis of network indicators based on the frequency of relationships between employees and between employees and managers in the surveyed companies indicates that formal relationships are more common than informal ones (Table 1). Indicators of formal relationships were rated highly, including the indicator of the frequency of the employee's contact with other employees with whom the responder worked in the last year (60% of those surveyed rated it high and very high) and the indicator of the frequency of the employee's contact with other employees regarding professional matters (49.2% rated it high and very high).

The cohesiveness of the network is significantly influenced by informal relationships between employees, which allow for tighten mutual connections between network members. The research shows that the frequency of an employee's contact with other employees after work, e.g., going out together to a restaurant or pub, is lower (33% high and very high ratings) than it is for formal relationships.

Managers' participation in social networks within the company strengthens their relationship with their subordinates. The research assumed that indicators of networks made up of employees and managers are: the frequency of contact with managers to whom one can turn for help or advice and with whom one can go out together for an informal lunch, dinner or to the pub. In the first case, 39.7% of respondents rated the relationship highly and very highly, while in the second case, the informal relationship with the manager was rated highly and very highly by 28.2%.

An important characteristic of social networks in a company is the closeness of relations between employees. From the analysis of the results of the closeness of relations between employees, it is clear that there are significant differences (Table 2). The highest ratings were given to the closeness of relations between employees and other managers in the company (64.4% of high and very high ratings) and links between employees in the same work team (62.8% of high and very high ratings). In contrast, the closeness of relations with employees from other teams in the company was rated lowest.

**Table 1.**

*Social network indicators based on frequency of relationships (SNR) and closeness of relations (SNC) between workers and between workers and managers in percentages*

Specification	Frequency assessment				
	1	2	3	4	5
SNR1 With employees with whom you have worked in the past year	0	3.8	36.2	39.5	20.5
SNR2 With employees to whom you have addressed professional matters	0	12	38.8	28.3	20.9
SNR3 With employees after work (going out together for an informal lunch, dinner or to the pub)	5.2	16	45.7	17	16
SNR4 With managers who can be approached for help or advice on professional matters	2.8	6.6	51	28.7	11
SNR5 With the manager after work (going out together for an informal lunch, dinner or to the pub)	7.7	9.0	55.1	20	8.2
SNC1 Closeness of relations with other team members	1.2	4.0	32.0	25.0	37.8
SNC2 Closeness of relations with staff from other teams	2.4	10.6	61.2	16.9	8.9
SNC3 Closeness of relations with a direct manager	1.2	5.4	35.8	39.0	18.6
SNC4 Closeness of relations with other managers in the company	1.2	3.8	30.6	39.0	25.4

Scale: 1 - very low, 2 - low, 3 - medium, 4 - high, 5 - very high.

Source: Author's own study.

Impact of intra- and inter-group processes on the realization of company objectives (Table 2). The surveyed employees rated the intragroup processes in companies in innovative industries highly and very highly (69.4%). Of the intra-team processes, respondents rated communication within the team highest (77.1% of high and very high ratings), what was followed by mutual help within the team (75.8%) and sharing knowledge with other colleagues (73%). The increase in innovation within the team was rated relatively lower (69.4%).

Inter-group processes in companies in innovative industries are rated lower than intra-group processes. These processes were rated high and very high by 32.4% of the employees surveyed. Of these, the highest ratings were given to the flow of information between employee teams or

departments (37.1% high and very high ratings), the flow and creation of knowledge through the cooperation between employees of different teams (34.9%), and cooperation between employee teams or departments in the company (33.4%). In contrast, the lowest ratings were given to the creation of innovations in collaboration with other teams (33.9%) and the speed of execution of tasks requiring collaboration with employees from other teams or departments of the company (27.1%). In conclusion, intergroup processes gained lower ratings when compared with intra-group processes. This indicates that there are significant organisational barriers to the implementation of projects that require the cooperation of employees from different work teams, because cooperation between teams, the flow of knowledge and information between them promotes the creation of new solutions and the improvement of existing ones.

**Table 2.**

*Evaluation of intra-group (IGP) and intergroup (INGP) processes in percentages*

Specification	Type of evaluation				
	1	2	3	4	5
IGP1 Sharing knowledge with other colleagues	0	4.0	23.0	33.2	39.8
IGP2 Mutual assistance within the team	0	7.8	16.3	53.9	21.9
IGP3 Communication within the team	0	5.4	17.6	55.5	21.6
IGP4 Employee satisfaction level	0	2.6	25.6	35.7	36.2
IGP5 Reducing opportunism within the team	1.4	2.8	25.9	33.9	36.0
IGP6 Speed in performing tasks that require teamwork	0	6.8	20.3	41.7	31.1
IGP7 Quality of performance of tasks requiring teamwork	0	3.8	24.0	41.0	31.1
IGP8 Increasing innovation in the team	0	5.2	25.4	34.6	34.8
IGP9 Competition between team members	0	9.0	21.4	26.8	42.8
INGP1 Flow of information between work teams or departments	0	23.1	39.8	31.7	5.4
INGP2 Creating innovations in collaboration with other teams	0.9	33.0	36.2	29.4	0.5
INGP3 Flow and creation of knowledge through collaboration between staff from different teams	0.5	33.2	31.5	34.3	0.5
INGP4 Collaboration between work teams or departments within the company	2.6	13.0	51.0	27.0	6.4
INGP5 Speed in carrying out tasks that require collaboration with employees from other teams or departments of the company	2.8	24.3	44.7	26.8	1.4
INGP6 Quality of execution of tasks in cooperation with employees from other teams or departments of the company	2.8	1.6	52.7	27.0	4.0

Scale: 1 - very low, 2 - low, 3 - medium, 4 - high, 5 - very high.

Source: Author's own study.

Social networks influence intra- and inter-group processes that favour task completion. The study found that the size of the network chiefly influences intra-group processes, i.e., the communication within the team ( $r_s = 0.287$ ,  $p = 0.000$ ) and the increase in innovation ( $r_s = 0.234$ ,  $p = 0.000$ ). In the case of intergroup processes, the size of the network influences the collaboration between employee teams or departments in the company ( $r_s = 0.176$ ,  $p = 0.001$ ) and the speed of tasks requiring collaboration with employees from other teams or departments in the company ( $r_s = 0.182$ ,  $p = 0.001$ ). No impact of network size on other organisational processes was observed.

From the perspective of the objectives of research on social networks in companies, it is important to examine the relationship between social network indicators based on the frequency of relations between employees and relations between managers and organisational processes (SNR), and the closeness of relations (SNC) (Table 3). The network indicators SNR1, SNR2 and SNR5 were most strongly correlated with intragroup processes. The SNR1 network index was most strongly correlated with knowledge sharing with other colleagues, mutual help within the team, and speed of tasks requiring team collaboration. The SNR2 indicator, on the other hand, was significantly correlated with mutual assistance within the team, with communication within the team, and with the quality of performance of tasks requiring team collaboration. SNR5 indicator was significantly correlated with an increase in team innovation, the quality of performance of tasks requiring team collaboration and mutual assistance within the team. A weaker relationship was observed for the SNR4 indicator, which was only correlated with sharing knowledge with other colleagues.

Another group of network indicators is based on the closeness of relationships (SNC) between employees and between employees and managers. An examination of the relationship between these indicators and intragroup processes demonstrated that these processes are most significantly influenced by the SNC4 indicator, identifying the closeness of relationships with other managers in the company. First and foremost, it affects communication within the team, mutual assistance within the team, and increased innovation within the team. Subsequently, SNC1 and SNC3 had a significant impact on intra-team processes, with the strongest impact on intra-team communication and mutual assistance within the team. In contrast, no significant relationship was found between the SNC2 indicator and internal processes.

In addition to identifying the relationship between social networks and intergroup processes, one of the aims of the research was to determine the extent to which social networks influence intergroup processes. An analysis of Table 3 shows that the SNR2 indicator significantly influenced the flow of information between staff teams, the collaboration between staff teams, and the speed of tasks requiring collaboration with staff from other teams. On the other hand, the SNR1 indicator significantly influenced the flow of information between staff teams and the speed of tasks requiring collaboration with staff from other teams.

SNC network indicators were less influenced by intergroup processes. In particular, the impact of the SNC4 indicator on the flow of information between staff teams, the quality of task performance in collaboration with staff from other teams, and collaboration between staff teams was identified. In addition, positive relationships were observed between the SNC1 indicator and the collaboration between work teams within the company and the speed of tasks requiring collaboration with employees from other teams.

In conclusion, the analysis of the relationship between social network indicators and organisational processes showed that social networks have a positive impact primarily on intra-team processes, including mutual aid within a team, the quality of performance of tasks requiring team collaboration, communication within a team, and increased innovation within

the team. To a lesser extent, social networks affect intergroup processes, including the flow of information between work teams and cooperation between work teams or departments within a company.

**Table 3.**

*Spearman's rank correlation coefficient between social network indicators (SNR and SNC) and intragroup (PW) and intergroup (PM) processes*

	SNR1	SNR2	SNR3	SNR4	SNR5	SNC1	SNC2	SNC3	SNC4
IGP1	0,441*	0,044	0,079	0,093**	0,045	0,021	0,031	0,066	0,199*
IGP2	0,338*	0,405*	0,017	0,013	0,250*	0,415*	0,030	0,348*	0,377*
IGP3	0,073	0,254*	0,040	0,003	0,199*	0,416*	0,031	0,360*	0,446*
IGP4	0,054	0,059	0,005	0,007	0,038	0,057	0,011	0,076	0,063
IGP5	0,031	0,040	0,013	0,065	0,029	0,056	0,023	0,055	0,046
IGP6	0,250*	0,021	-0,002	0,011	0,063	0,060	-0,005	0,034	0,071
IGP7	0,178*	0,244*	0,049	0,033	0,241*	0,281*	0,015	0,220*	0,260*
IGP8	0,044	0,208*	0,041	-0,012	0,313*	0,364*	0,020	0,292*	0,288*
IGP9	0,071	0,057	0,014	0,003	0,120*	0,241*	0,034	0,204*	0,262*
INGP1	0,294*	0,294*	-0,002	0,020	-0,034	-0,041	-0,010	0,101**	0,214*
INGP2	0,012	0,012	-0,067	-0,065	-0,008	-0,016	0,009	-0,027	-0,031
INGP3	0,016	0,029	0,025	-0,033	-0,019	-0,065	-0,029	-0,030	-0,066
INGP4	0,046	0,269*	0,005	0,002	0,128**	0,101**	-0,024	0,016	0,138**
INGP5	0,198*	0,083**	0,004	0,044	0,031	0,198**	-0,080	-0,067	-0,182*
INGP6	0,075	0,018	0,053	0,192*	0,009	-0,051	-0,060	-0,071	0,244*

\*  $p < 0,01$ , \*\*  $p < 0,05$ .

Source: own research.

## 5. Discussion and summary

Social networks are an important factor of a company's success in a competitive market. Treating social networks as a resource both on an individual and group level, which an individual acquires by participating in diverse social networks and exchanges for other resources valued by people (Lin 2001) allows one to see its potential impact.

The results of the research carried out provided answers to the research questions posed. The research shows that large and medium-sized social networks are prevalent in companies in innovative industries in Poland. R.S. Burt (2000), in his research on networks in organisations, discovered a correlation that the more employees form a network, the greater its efficiency. More contact between network participants in the company means that the manager will be able to make decisions based on a greater range of information and to adapt them to the expectations of employees.



From a social network analysis perspective, contacts with other employees and with the manager are important. In the research, the frequency of contact between employees was highly rated. The frequency of the employees' relationship with the manager received slightly lower ratings. More frequent contact influences the strength of relationships between employees, resulting in the fact that, by having the same information, employees can eliminate barriers disrupting the flow of information between them.

What is important in social networks, is the proximity of links between employees. In companies belonging to innovative industries, the closeness of relationships between employees in the same work team and between employees and other managers in the company was rated highest. In contrast, the closeness of relations with staff from other teams in the company was rated lowest. This means that employees are locked within their own network, making it difficult to share knowledge and limiting the possibility of intergroup projects.

Group processes that foster innovation are important in companies belonging to innovative industries. The research shows that in companies in the innovation sector, intra-group processes are rated higher than inter-group processes. Intra-group processes related to knowledge sharing, intra-team communication, and mutual assistance are key to complete tasks successfully. On the other hand, among the intergroup processes, the highest ratings were given to the flow of information between employee teams, the flow and creation of knowledge through collaboration between employees of different teams, and the collaboration between employee teams or departments within the company.

When analysing the relationship between social network indicators and group processes, it is important to point out the differences between the two. Social networks primarily have a positive impact on intra-team processes, including mutual support within the team, the quality of performance of tasks requiring team collaboration, communication between team members, and increased innovation within the team. To a lesser extent, social networks have an impact on intergroup processes, with the strongest impact on the flow of information between work teams and cooperation between work teams or departments within a company.

Knowledge of the nature of social networks can help managers to stimulate pro-innovative actions by employees, which will increase the company's competitiveness in the market. They should, therefore, focus more attention on shaping these networks. By getting to know their operating structure, it is possible to make the best use of the potential inherent in them for the benefit of the organisation.

## References

1. Awal, G.K., Bharadwaj, K.K. (2014). Team formation in social networks based on collective intelligence – an evolutionary approach. *Applied Intelligence*, Vol. 41, No. 2, 627-648. doi.org/10.1007/s10489-014-0528-y
2. Borgatti, S.P., Halgin, D.S. (2011). On Network Theory. *Organization Science*, Vol. 22, No. 5, 1168-1181. doi.org/10.1007/978-1-4419-5513-5\_2
3. Brass, J.D. (2022). New Developments in Social Network Analysis, *Annual Review of Organizational Psychology and Organizational Behavior*, Vol. 9, No. 1, 225-246. doi.org/10.1146/annurev-orgpsych-012420-090628
4. Burt, R.S. (2000). The Network structure of social capital. *Research in Organizational Behavior*, Vol. 22, 345-423. doi.org/10.1016/S0191-3085(00)22009-1
5. Burt R.S. (1992). *Structural holes: The social structure of competition*. Cambridge: Harvard University Press.
6. Dahlander, L., McFarland, DA. (2013). Ties that last: tie formation and persistence in research collaborations over time. *Administrative Science Quarterly*, Vol. 58, No. 1, 69-110. doi.org/10.1177/0001839212474
7. Deans, P.C. (2011). The impact of social media on C-level roles. *MIS Quarterly Executive*, Vol. 10, No. 4, 6.
8. Esmaeili, M., Zantedeschi, D. (2022). Enterprise Social Networking Platform and Employees Job Mobility. *ICIS 2022 Proceedings*, 10. Retrieved from: <https://aisel.aisnet.org/icis2022/social/social/10>, 20.01.2024.
9. Freeman, L.C. (2004). *The development of social network analysis: A study in the sociology of science*. Vancouver: Empirical Press.
10. Kilduff, M., Brass, D.J. (2010). Organizational social network research: Core ideas and key debates, *Academy of Management Annals*, Vol. 4, No. 1, 317-357. doi/10.1080/19416520.2010.494827
11. Kilduff, M., Tsai, W. (2003). *Social networks and organizations*. Thousand Oaks: Sage.
12. Kilduff, M., Buengerler, C. (2020). Self-monitoring: a personality theory for network research. In: DJ. Brass, S.P. Borgatti (eds.), *Social Networks at Work* (pp. 155-177). New York: Routledge.
13. Kuegler, M., Smolnik, S., Kane, G. (2015). What's in IT for employees? Understanding the relationship between use and performance in enterprise social software. *Journal of Strategic Information Systems*, Vol. 24, No. 2, 90-112. doi.org/10.1016/j.jsis.2015.04.001
14. Lin, N. (2001). *Social capital. A theory of social structure and Action. Structural Analysis in the Social Science*. Cambridge: Cambridge University Press.

15. Mäntymäki, M., Riemer, K. (2016). Enterprise social networking: a knowledge management perspective. *International Journal of Information Management*, Vol. 36, No. 6, 1042-1052. doi.org/10.1016/j.ijinfomgt.2016.06.009
16. McLure, Wasko, M., Faraj, S. (2005). Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice. *MIS Quarterly*, Vol. 29, No. 1, 35-57. doi.org/10.2307/25148667
17. Nahapiet, J, Ghoshal, S. (1998). Social Capital, Intellectual Capital and the organizational Advantage. *Academy of Management Review*, Vol. 23, No. 2, 242-266. doi.org/10.5465/amr.1998.533225
18. Olfat, M., Tabarsa, G.A., Ahmadi, S., Shokouhyar, S. (2019), Disclosing the bright side of SNs in the workplace: a comparison between ESNs and public SNs in benefiting the organizations. *Journal of Enterprise Information Management*, Vol. 32, No. 3, 390-412. <https://doi.org/10.1108/JEIM-10-2018-0215>
19. Poell, R.F., Van der Krogt, F.J. (2010). Individual Learning Paths of Employees in the Context of Social Networks. In: S. Billett (Eds.), *Learning Through Practice. Professional and Practice-based Learning*, Vol. 1 (pp. 1-40). Dordrecht: Springer. doi.org/10.1007/978-90-481-3939-2\_11
20. Provan, K., Fish, A., Sydow, J. (2007). Interorganizational networks at the network level: A review of the empirical literature on whole networks. *Journal of Management*, Vol. 33, No. 6, 479-516. doi.org/10.1177/014920630730255
21. Qi, C., Chau, P.Y.K. (2018). Will enterprise social networking systems promote knowledge management and organizational learning? An empirical study. *Journal of Organizational Computing & Electronic Commerce*, Vol. 28, No. 1, 31-57. doi.org/10.1080/10919392.2018.1407081
22. Riemer, K., Stieglitz, S., Meske, C. (2015). From Top to Bottom. Investigating the changing role of hierarchy in enterprise social networks. *Business & Information Systems Engineering (BISE)*, Vol. 57, 197-212. doi.org/10.1007/s12599-015-0375-3
23. Sparrowe, R.T., Liden, R.C., Wayne, S.T., Kraimer, M.L. (2001). Social network and the performance of individuals and group. *Academy of Management Journal*, Vol. 44, No. 2, 316-326. doi.org/10.5465/3069458
24. Suh, A., Bock, G.W. (2015). *The impact of enterprise social media on task performance in dispersed teams*. 48th Hawaii International Conference on System Sciences, Kauai, HI, USA, pp. 1909-1918. doi: 10.1109/HICSS.2015.229.
25. Tasselli, S., Kilduff, M. (2018). When brokerage between friendship cliques endangers trust: A personality–network fit perspective. *Academy of Management Journal*, Vol. 61, No. 3, 802-825. doi.org/10.5465/amj.2015.0856
26. Uzzi, B., Spiro, J. (2005). Collaboration and creativity: The small world problem. *American Journal of Sociology*, Vol. 111, No. 2, 447-507. doi/ 10.1086/432782

27. Wellman, B., Berkowitz, S.D. (1988). Structural analysis: From method and metaphor to theory and substance. In: B. Wellman, S.D. Berkowitz (eds.), *Social structures: A network approach* (pp. 19-60). New York: Cambridge University Press.
28. Wu, C., Zhang, Y., Huang, S., Yuan, Q. (2021). Does enterprise social media usage make the employee more productive? A meta-analysis. *Telematics and Informatics*, Vol. 60, No. 2, 101578. doi.org/10.1016/j.tele.2021.101578
29. Xiong, J., Sun, D. (2023). What role does enterprise social network play? A study on enterprise social network use, knowledge acquisition and innovation performance. *Journal of Enterprise Information Management*, Vol. 36, No. 1, 31-57. doi:10.1108/JEIM-04-2021-0168.