Gender Issues in Social Networking Site and Driving Factors to Join Virtual Community among Students: Social Network Analysis

Tety Elida[a], Farida[b], Kamaludin[c], Budi Hermana[d]
[a,b,c,d] *Gunadarma University, Jalan Margonda Raya 100, Depok, West Java, Indonesia,*
tety@staff.gunadarma.ac.id

Abstract
Various Social Networking Sites (SNS) are widely used by university students to achieve their own respective goals and motivations not only in communication but also in association or education. This research uses Social Network Analysis (SNA) with the help of Ucinet and NetDraw software. To determine the popularity and factors that encourage the use of SNS, SNA which is equipped with network visualization based on the 2-mode network is applied. The used graph layout type is graph theoretic layout with centrality measures of degree centrality and closeness centrality. The number of respondents was 372 respondents consisting of 190 male and 182 female who filled online questionnaires through Google form for two weeks in December 2018. There was a difference in popularity ranking of SNS viewed from a gender perspective. The popularity ranking of SNS based on degree centrality regardless of gender is Line, Whatsapp, Instagram, Google+, and Facebook. The popularity ranking for female is Whatsapp, Line, Instagram, Google+, and Twitter. The popularity ranking from the male perspective is Line; Whatsapp, Instagram, Facebook, and Google. The types of virtual communities that are most widely followed based on their objectives are lectures groups and alumni groups. Male are subsequently more likely to belong to a special group on hobbies or interests while female are more likely to be in extramural groups/ organizations. The main factors which encourage students to join virtual communities consist of two categories: utilitarian motivation and hedonic motivation. Utilitarian motivation includes usefulness, followed by support and recognition while hedonic motivation includes positive experiences, followed by entertainment, attractiveness, and happiness.

Keywords: gender issue; social networking site; social network analysis; virtual community.

1. Introduction

As a social product, various technologies are not gender neutral (Moghaddam, 2010). There is plenty of literature on feminist issues in technology shows differences in the effects of technology seen from the gender perspective (Jacobsen, 2011). Unequal participation among female and male occurs in the context of the development and implementation of Information and Communication Technology (Oleksy et al., 2012). Gender inequality seems to be one of the most significant inequalities driven by the digital revolution (Moghaddam, 2010). Male and female differ significantly in several dimensions regarding motivation to use internet information, particularly social networking sites and other consumer platforms (Abubakar & Sahin, 2016). This study aims to find and analyze distinction in patterns of social media use and online communities based on gender by using Social Network Analysis.

1.1. Gender Isues Issues in Information Technology

Gender is a social construction which defines different roles among male and female (Mutua et al., 2013). The gender gap is determined by cultural, social and economic factors and differ in and among cultures and countries (Moghaddam, 2010). Female tend to know less about information technology and face a lot of problems in software (Reinen & Plomp, 1997). Social media had been shown to encourage the adoption of gender roles and provide opportunities to "voice" unique ideas of users, including male and female, who may not be comfortable communicating in public places face to face (Webb & Temple (2015). Teenagers play gender roles in presenting themselves on social media based on previous research studies (Oosten, Vandenbosch & Petera (2017).

1.2. Virtual Community

Communities are defined as a set of people who have different background and are connected by social ties, share the same values, and even engage in joining actions in geographical locations or settings (Muniz & O'Guinn, 2001). The term "virtual" had increasingly been used to refer to social phenomena and entities (Proulx & Toth, 2005). Virtual Community is a network that works within individual social networks in certain media

which are not limited to a geographical area or political boundaries (Somani, 2012). Virtual community members may express their opinions and information exchange with other members (Hsu, Wang, & Chih, 2018). They may get support and encouragement in the community as well (Hsu, Chih & Liou, (2016). According to Hashim & Tan (2018), the use of virtual communities is beneficial to increase the intention to share knowledge on an ongoing basis.

1.3. Motivasi Penggunaan Media Sosial

Motivation is one of the driving factors in the use of information systems which consists of two types of motivation namely utilitarian motivation and hedonic motivation (Heijden, 2004). Various motivational factor research in the information system environment, such as Liao, To & Hsu (2013); Chen, Chang & Chen (2017), Aboelmaged (2018), and Lee & Kim (2018). Liao et al. (2013) postulated that utilitarian motivation includes reward, reciprocity, and reputation, while hedonic motivation includes enjoying, helping, and expected relationships. According to Holbrook & Hirschman (1982), hedonic values show subjective experiences such as imagination, feelings, and pleasure. Hedonic values are more subjective and personal which reflects in several values such as freedom, self-expression, and entertainment (Vu & Nielsen, 2018).

1.4. Social Network Analysis

Social Network Analysis (SNA) can be described as a "study of human relationships by means of graph theory" ((Tsvetovat & Kouznetsov, 2011). Social Network Analysis (SNA) is a field of research on the measurement and analysis of evolving relational structures (Butts, 2008). It views social relations in terms of network theory consisting of nodes and ties. Ties are often called edges, links, or connections. Nodes are an individual actor in a network, and bonding is a relationship among actors (Wasserman & Faust, 1994). The network consists of actors who represent individuals, organizations, programs, or other entities (Luke & Harris, 2007). Although SNA held roots in ethnographic and anthropological research, the development of SNA is recently directed at the mathematical nature of social networks by exploiting graph theory and statistical analysis (Bishop & Waring, 2012). Hermita et al. (2019) use SNA to investigate patterns of consumption of TV shows in Indonesia.

2. Method

This research uses Social Network Analysis with Ucinet software tools. Ucinet contains various network analysis tools, such as size centrality, subgroup identification, role analysis, basic graph theory and permutation-based statistical analysis (Apostolato, 2013). Retrieving data employed a questionnaire filled by 372 respondents. The basic question is the frequency of using types of social media and virtual communities, as well as questions about the motivation in using them. The basic question is the frequency of using types of social media and virtual communities, as well as the question about motivation. The frequency data is converted into a binary scale namely 0 and 1 that it may be presented in a matrix form would subsequently be processed with software. Graph visualization used NetDraw software. Netdraw is one of the most widely used software for visualizing social networks and had a strong analytical capacity (Cronin, 2015). The type of graph layout used is graph theoretic layout with its centrality size is degree centrality. Centrality is an index that is very important as it shows which node takes a critical position in one network as a whole (Zhang & Luo, 2017), with the mathematical formula as follows:

$$centrality = \frac{\sum_{j=1}^{n} X_{ij}}{(n-1)(n-2)} (i \neq j)$$

Graphs in Social Network Analysis can be in the form of the 1-mode graph and 2-mode graph. 1-mode graph had nodes in one type, while the 2-mode graph contains a correlation between two types of nodes which tend to refer to as bimodal or multimodal (Tsvetovat & Kouznetsov, 2011). According to Borgatti & Everett (1997), the matrix is two modes if rows and columns index a different set of entities, for instance, lines indicate people while columns are related to organizations. In this study, lines are people, namely respondents, while columns are types of social media or types of virtual communities. The 2-mode graph used in this study shown in Figure 1. S_i is a type of social media or virtual community category, while R_j is the first respondent to 372nd respondents. This study also uses statistical tests to determine the differences in the use of types of social media and virtual communities seen from gender. The statistics used are the correlation of Lambda, Cramer's V, and Contingency Coefficient. The three types of correlation are used to find the relations between two nominal scale variables.

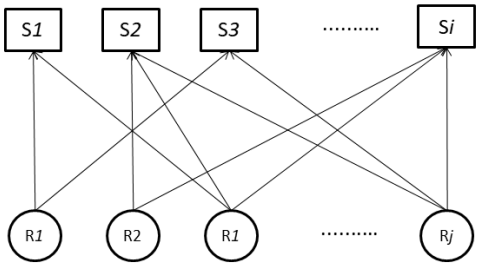

Figure 1. 2-Mode Graph

3. Result and discussion

3.1. Gender Perspective on Uses of Social Media

The composition of respondents from gender is male as many as 190 people (51.1%) and female as many as 182 people (48.9%). Most of the respondents subscribed to the internet at home as many as 233 people (62.6%) and accessed the internet through mobile phones was 345 people (92.7%). The average experience of using social media is 8.11 years. The graph display showing the popularity level of social media usage regardless of gender is shown in Figure 2.

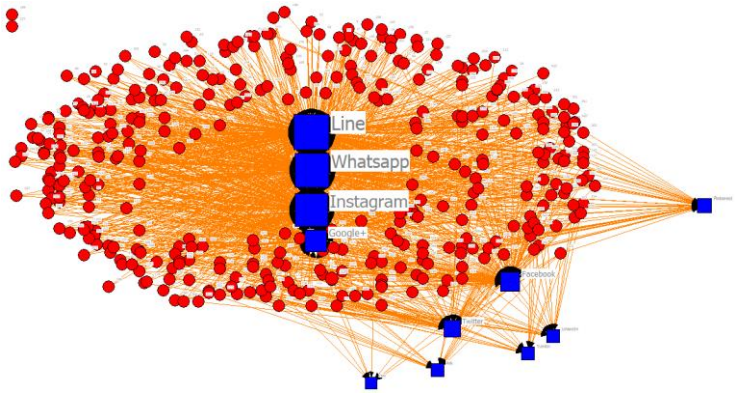

Figure 2. Types of Uses of Social Media

There are three types of social media frequently used by respondents are Line, WhatsApp, and Instagram. The sequence of popularity is based on degree centrality, namely Line = 348, Whatsapp = 338, Instragram = 317, Google+ = 153, and Facebook = 111. These results indicate that Facebook, which is a social media appeared earlier and was relatively the most popular before, was abandoned by the younger generation. It is due to the saturation in using social media as the results of research from Yu et al. (2018) which states that the problem of media saturation is caused by information overload, communication overload, and social overload. The results of mapping the popularity of the use of social media by female shown in Figure 3.

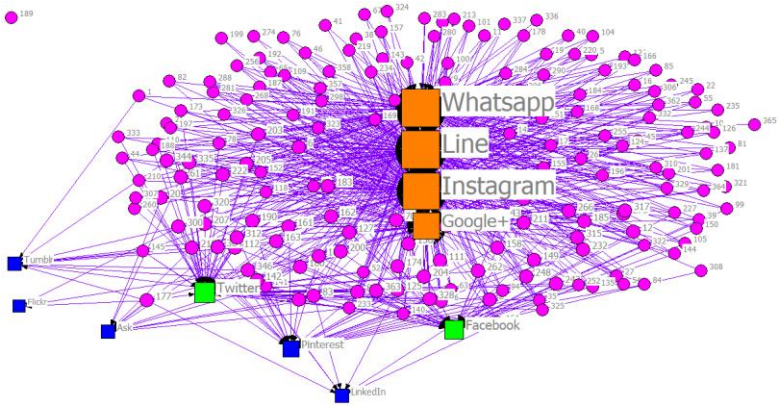

Figure 3. Types of Social Media on Female

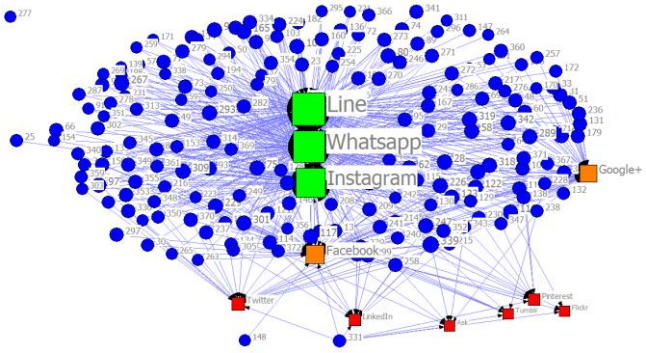

Figure 4. Types of Social Media on Male

The most popular types of social media among female are Whatsapp, followed by Line, and Instagram. The degree of centrality for the top five social media is Whatsapp = 171, Line = 169, Instagram = 165, Google+ = 92, and Twitter = 48. The popularity of social media types is slightly different for male whose mapping results are presented in Figure 4. The popularity ranking from a male perspective is Line = 179; Whatsapp = 167, Instagram = 152, Facebook = 70, and Google + = 61. The most popular social media for male is Line, while female are Whatsapp. The results of the test for differences in the types of social media based on sex are presented in Table 1.

Table 1. The Correlation among Uses of Social Media and Gender Social Media

No.	Type of Social Media	Value (Approx. Significancy)		
		Lambda	Cramer's V	Contingency Coefficient
1.	Whatsapp	0.019 (0.828)	0.105 (0.043)	0.105 (0.043)
2.	Line	0.010 (0.863)	0.028 (0.595)	0.028 (0.595)
3.	Instagram	0.055 (0.465)	0.150 (0.004)	0.148 (0.004)
4.	Facebook	0.072 (0.193)	0.156 (0.003)	0.155 (0.003)
5.	Twitter	0.099 (0.003)	0.181 (0.000)	0.181 (0.000)

Note: The number in parentheses is the significance level

The result of the statistical tests shows that there is no difference in the frequency of social media use among male and female except for twitter. If Cramer's V and Contingency Coefficient statistics was employed, only Twitter does not show a difference, while the other four types of social media show differences.

3.2. Virtual Community by Gender

The two categories of virtual communities which are most widely followed based on their objectives are lecture groups and alumni groups. The differences in patterns of use of virtual communities among male and female presented in Figures 5 and 6.

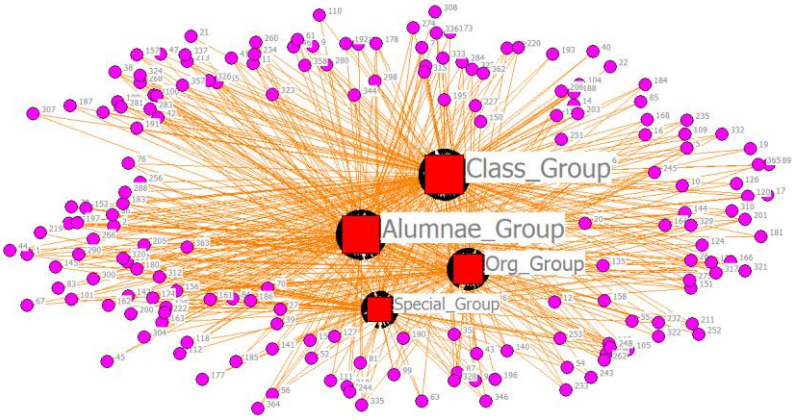

Figure 5. Virtual Community on Female

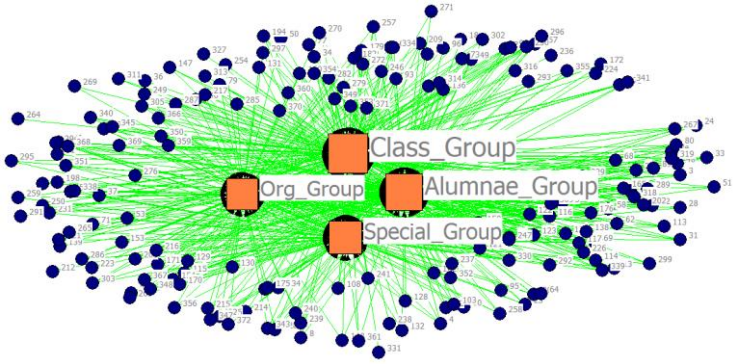

Figure 6. Virtual Community on Male

The popularity ranking of the virtual community on female is the Class group = 179; Alumnae Group = 170; Organization Group = 119; and Special interest Group = 84, while for Male is a Class group = 190; Alumnae Group = 172; Special interest group = 143; Organization Group = 133. The first two types of virtual communities have no differences among female and male, namely class groups and alumni groups. The first two types of virtual communities have no differences among female and male, namely class groups and alumni groups. For the next two types of virtual communities, male are more dominant in the organization group while female are more dominant in the special interest group. The results of the test for differences in the types of social media based on sex are presented in Table 2.

Table 2. Discrimination Testing in the Uses of Social Media and Gender

	Type of Group	Value (Approx. Significancy)		
		Lambda	Cramer's V	Contingency Coefficient
1.	Class	0.016 (0.082)	0.092 (0.076)	0.092 (0.076)
2.	Alumnae	0.000	0.053 (0.308)	0.053 (0.308)
3.	Organization	0.020 (0.584)	0.049 (0.341)	0.049 (0.341)
4.	Special Group	0.199 (0.004)	0.298 (0.000)	0.286 (0.000)

Note: The number in parentheses is the significance level

There are three types of virtual communities that do not show differences in the uses from gender, namely class groups, alumni groups, and organization groups. Female tend to take part in special interest groups compared to male respondents. It shows that female tend to join the virtual community outside lecturing or organizational activities. The virtual community may be a community related to a product or community on special interests, such as beauty, fashion, and health.

3.3. The Drivers of the Uses of Virtual Community

The driving factors of the uses of social media are relatively different as well among male and female. Graph as a result of NetDraw software shown in Figure 7. The order of utilitarian motivation factors based on degree centrality is the benefit (226), support (164) and recognition (132), while the sequence for hedonic motivation is a positive experience (195), entertainment (192), interesting (180), and happiness (175). The result set mapping shows that respondents indicate more benefit aspects of the virtual communities on utilitarian motivation, while hedonic motivation does not show distinction relatively among experience, entertainment, interesting, and happiness. If it is based on degree centrality, positive aspects of experience are ranked first compared to entertainment, interesting, and happiness.

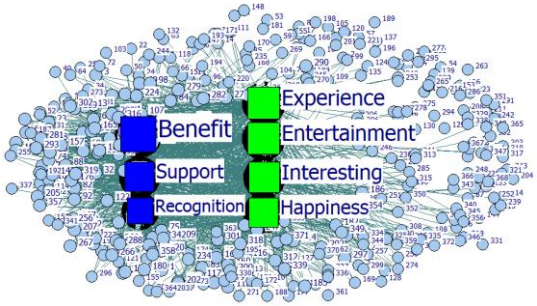

Figure 7. Drivers of Virtual Community

Students who are members of virtual communities still consider the usefulness of functions and entertainment aspects in the uses of virtual communities, as mentioned by Ernst, Pfeiffer & Rothlauf (2013) that the use of social media is influenced by hedonic motivation, utilitarian, or both. When referring to the order centrality scores degree, the virtual community members consider the virtual community benefits more than entertainment motive or pleasure motive as stated by Sledgianowski & Kulviwat (2008) that users tend to seek pleasure in using social media. The usefulness of a virtual community can be linked to information or knowledge obtained by other members through knowledge sharing process. It is in line with the statement from Liao & Chou (2012) that the benefits perceived by members contribute positively to the attitudes and intentions of virtual community members towards knowledge adoption. The knowledge sharing behaviour through a virtual community can be used in the learning process, related to classroom lecturing and online discussions. Tiruwa (2018) postulated that groups or communities formed on Facebook by students help them to exchange information and knowledge about subjects.

4. Conclusion

There are three social media which frequently used by students, namely line, Whatsapp, and Instagram. Basically, there is no difference in social media choices use among male and female. Likewise, the virtual communities which mostly followed by male and female are lectures groups and alumni groups. Female are more likely to join the virtual community outside of lecture or organizational activities. The encouragement of the use of virtual communities is based more on usefulness aspects, including information exchange in the learning process.

Reference

Aboelmaged, M. G. (2018). Knowledge sharing through enterprise social network (ESN) systems: Motivational drivers and their impact on employees' productivity. Journal of Knowledge Management, 22(2), 362-383. doi: https://doi.org/10.1108/JKM-05-2017-0188.

Abubakar, A. M., & Sahin, M. I. P. (2016). eWOM, eReferral and gender in the virtual community. Marketing Intelligence & Planning, 34(5), 692-710.

Apostolato, I. A. (2013). An overview of Software Applications for Social Network Analysis. International Review of Social Research, 3(3), 71-77.

Bishop, S., & Waring, J. (2012). Discovering healthcare professional-practice networks: The added value of qualitative SNA. Qualitative Research in Organizations and Management: An International Journal, 7(3), 308-322. doi: https://doi.org/10.1108/17465641211279770.

Borgatti, S. P., & Everett, M. G. (1997). Network analysis of 2-mode data. Social Network, 19(1997), 243-269.

Butts, Carter T. (2007). Social network analysis: A methodological introduction. Asian Journal of Social Psychology, 11, 13–41. doi: 10.1111/j.1467-839X.2007.00241.x.

Chen, W. K., Chang, D. S., & Chen, C. C. (2017). The role of utilitarian and hedonic values on users' continued usage and purchase intention in a social commerce environment. Journal of Economics and Management, 13(2), 193-220.

Cronin, Bruce. (2015). Getting Started in Social Network Analysis with NETDRAW. University of Greenwich Business School, Occasional Paper 01/15.

Ernst, C. P. H., Pfeiffer, J., & Rothlauf, F., 2013, Hedonic and Utilitarian Motivations of Social Network Site Adoption. Working Papers in Information Systems and Business Administration, Working Paper 01/2013, Johannes Gutenberg-University Mainz.

Hashim, K. F., & Tan, F. B. (2018). Examining the determinant factors of perceived online community usefulness using the expectancy value model. Journal of Systems and Information Technology, 20(2), 152-167, doi:https://doi.org/10.1108/JSIT-11-2016-0068.

Heijden, v. d. H. (2004). User acceptance of hedonic information systems. MIS Quarterly, 28(4), 695-704.

Hermita, M., Saleh, F., Rahardjo, W., & Hermana, B. (2019). Exploring Consumption Pattern of TV Programme Using Social Network Analysis: What Gen Z Are Viewing, The 1st International Conference on Human-Technology Interactions, Yogyakarta, February 15-16, 2019.

Holbrook, M. B., & Hirschman, E. C. (1982). The Experiential Aspects of Consumption: Consumer Fantasies, Feelings, and Fun. Journal of Consumer Research, 9, 132-140.

Hsu, L.C., Chih, W. H., & Liou, D. K. (2016). Investigating community members' eWOM effects in Facebook fan page. Industrial Management & Data Systems, 116(5), 978-1004, doi: https://doi.org/10.1108/IMDS-07-2015-0313.

Hsu, L. C., Wang, K. Y., & Chih, W. H. (2018). Investigating virtual community participation and promotion from a social influence perspective. Industrial Management & Data Systems, 118(6), 1229-1250, doi: https://doi.org/10.1108/IMDS-10-2017-0477.

Jacobsen, Joyce. (2011). The role of technological change in increasing gender equity with a focus on information and communications technology? Background Paper, World Development Report 2012, Worldbank.

Lee, S., & Kim, D. Y. (2018). The effect of hedonic and utilitarian values on satisfaction and loyalty of Airbnb users. International Journal of Contemporary Hospitality Management, 30(3), 1332-1351. doi: https://doi.org/10.1108/IJCHM-09-2016-0504.

Liao, C., To, P. L., & Hsu, F. C. (2013). Exploring knowledge sharing in virtual communities. Online Information Review, 37(6), 891-909. doi: https://doi.org/10.1108/OIR-11-2012-0196.

Liao, S., & Chou, E., 2012, Intention to adopt knowledge through virtual communities: posters vs lurkers. Online Information Review, 36(3), 442-461, doi: https:// doi.org/10.1108/14684521211241440.

Luke, D. A., & Harris, J. K. (2007). Network analysis in public health: history, methods, and applications. Annual Review of Public Health, 28, 69-93. Doi: 10.1146/annurev.publhealth.28.021406.144132.

Moghaddam, G. G. 2010. Information technology and gender gap: toward a global view. The Electronic Library, 28(5), 722-733, doi: 10.1108/02640471011081997.

Muniz, A.M. Jr and O'Guinn, T.C. (2001). Brand community. Journal of Consumer Research, 27(1), 412-32.

Mutua, M.N., Kimathi, K. P. G., & Kitung'u, K. M. (2013). Gender Issues in Information Technology. International Journal of Mechanical Engineering Research & Applications, 1(3), 1-7.

Oleksy, W., Just, E., & Kling, K. Z. (2012). Gender issues in information and communication technologies (ICTs). Journal of Information, Communication and Ethics in Society, 10(2), 107-120, doi: https://doi.org/10.1108/14779961211227010.

Oosten, J. M. F., Vandenbosch, L., & Peter, J. (2017). Gender roles on social networking sites: Investigating reciprocal relationships between Dutch adolescents' hypermasculinity and hyperfemininity and sexy online selfpresentations. Journal of Children and Media, 11(2), 147-166. doi: 10.1080/17482798.2017.1304970.

Proulx, S. & Toth, G. L. (2005). Mapping the Virtual in Social Sciences: On the Category of "Virtual Community". The Journal of Community Informatics, 2(1), 42-52.

Reinen, I. J., & Plomp, T. (1997). Information Technology and Gender Equality: A Contradiction in Terminis? Computers Education, 28(2), 65-78.

Sledgianowski, D. & Kulviwat, S., 2008, Social network sites: antecedents of user adoption and usage. Proceedings of the Fourteenth Americas Conference on Information Systems, Toronto, ON, Canada August 14th-17th 2008.

Somani, C. (2012). Virtual Community: The New Hope for E-Commerce. Indian Journal of Computer Science and Engineering, 3(1), 20-23.

Tiruwa, A., Yadav, R., & Suri, P. K., 2018, Modelling Facebook usage for collaborative learning in higher education. Journal of Applied Research in Higher Education, 10(3), 357-379, doi: https://doi.org/10.1108/JARHE-08-2017-0088.

Tsvetovat, M., & Kouznetsov, A. (2011). Social Network Analysis for Startups: Finding connections on the social web. O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472.

Vu, H. N. D., & Nielsen, M. R. (2018). Understanding utilitarian and hedonic values determining the demand for rhino horn in Vietnam. Human Dimensions of Wildlife, 1-16, doi: 10.1080/10871209.2018.1449038.

Wasserman, S. and Faust, K. (1994). Social Network Analysis: Methods and Applications. Cambridge University Press, Cambridge.

Webb, L. M., & Temple, N. (2015). Social media and gender issues. In book: Handbook of Research on the Societal Impact of Digital Media, 638-669. doi: DOI: 10.4018/978-1-4666-8310-5.ch025.

Yu, L., Cao, X., Liu, Z., & Wang, J. (2018). Excessive social media use at work: Exploring the effects of social media overload on job performance. Information Technology & People, 31(6), 1091-1112, doi: https://doi.org/10.1108/ITP-10-2016-0237.

Zhang, J. & Luo, Y. (2017). Degree Centrality, Betweenness Centrality, and Closeness Centrality in Social Network. Advances in Intelligent Systems Research, volume 132, Proceeding of Second International Conference on Modelling, Simulation, and Applied Mathematics, page. 300-303.