

Organizational Commitment in Malaysian Public University: An Evidence via Social Network Analysis

Nur Syahidah Yusoff¹, Maman A. Djauhari², Shamshuritawati Sharif³ & Ebi Shahrin Suleiman⁴

^{1,2,4}Faculty of Science, University Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia

¹Faculty of Industrial Sciences & Technology, Universiti Malaysia Pahang, 26300 Gambang, Pahang, Malaysia

³College of Arts and Sciences, University Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia

⁴Faculty of Management and Human Resource Development, Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia

¹syazul88@yahoo.com, ²maman@utm.my, ³shamshurita@uum.edu.my, ⁴m-sahrin@utm.my

Abstract – This paper deals with social network approach to understand an organizational management problem in Malaysian public university. Four groups of factors, i.e., workplace spirituality, affective commitment, continuance commitment and normative commitment are used to quantify the level of organizational commitment. In total, there are 40 characteristics representing those factors. Based on the approach it is evidence that work are spirituality and effective commitment should be more attention by the university management. Each characteristic is considered as a member of social group and the relationship among them as social relationship.

Index Term – centrality measure; minimum spanning tree; network analysis; network topology, information filtering

I. INTRODUCTION

The growing interest in research on university organizational commitment is mainly due to the competition faced by university. University need people with high involvement, innovation, continuous improvement, and high quality standard in a competitive environment. In order to keep pace with competition, employees' discretionary effort has become essential and thus highlights the importance of university commitment [1].

Like every other organizations, universities or higher education institution are facing competition to meet the demand and pressures to perform. The competitive nature of the business world does have an impact in the education sector. According to Hawawini [2], the demand for higher education in business studies has surged worldwide and this upward trend is expected to continue in the future. The main reason is the demand for business education will increase in tandem with the expanding world economy as well as the faster growth in the developing countries.

The question is how do universities enhance the organizational commitment and brings out the best of their employees. Some organizations adopted the inside-out approach by encouraging values and workplace spirituality among employees [3] and [4]. In addition to that, various organizations are encouraging spirituality in workplace [5]. These initiatives indicate that workplace spirituality if supported by the organization will have positive impact on the organizational outcomes.

In this paper, the performances of factors that determine the level of organizational commitment are studied to find the most influential factors. For that purpose, social network analysis approach will be used.

The rest of the paper is organized as follows. In the next section, we discuss the data preparation followed by the methodology of social network analysis in Section III. Later, in Section IV and V, we discuss the research results and the conclusion of this study, respectively. In the last section some recommendations will close the presentation.

II. DATA PREPARATION

There are 204 academics staffs that have been participated in this survey. Our focus is on the academics staffs from business schools of or management faculties from selected Malaysian public universities.

The questionnaire consists of 40 questions (characteristics). Among them, the first 17 are related to workplace spirituality. All of the questions are adapted based on the workplace spirituality characteristic developed by [10] and [11]. The questionnaire consists of five major components of workplace spirituality namely; team's sense of community; alignment between organizational and individual values; sense of contribution to the community; sense of enjoyment at work and, opportunities for the inner life.

The next eight questions are related to affective commitment, followed by seven questions from continuance commitment and finally another eight questions related to normative commitment. All questions are adapted from [12] and [13].

III. SOCIAL NETWORK ANALYSIS

Social network analysis might start with correlation matrix followed by transforming it into a distance matrix [10]. From distance matrix we construct a minimum spanning tree (MST), by using for example Kruskal's algorithm [11] provided in Matlab version 7.8.0 (R2009a). From MST, we construct the network topology of all factors. To visualize that network, Pajek software [8] and [9] can be used. The interpretation of that network will be delivered by using the centrality measures such as degree centrality, betweenness centrality, closeness centrality and eigenvector centrality.

A. Correlation matrix

We denote X_i is the i -th characteristic under study where $i = 1, 2, \dots, 40$. The correlation matrix among those characteristics, issued from a sample, is a symmetric matrix of size 40×40 where the element in the i -th row and j -th column is,

$$\rho_{ij} = \frac{\langle X_i X_j \rangle - \langle X_i \rangle \langle X_j \rangle}{\sqrt{(\langle X_i^2 \rangle - \langle X_i \rangle^2)(\langle X_j^2 \rangle - \langle X_j \rangle^2)}} \quad (1)$$

representing the correlation coefficient between i -th and j -th characteristics [14]. That correlation coefficient quantifies the degree of linear relationship between i -th and j -th characteristic. By definition, $\rho_{ii} = 1$ for all i and ρ_{ij} can vary from -1 to 1 for all $i \neq j$ where,

$$\rho_{ij} = \begin{cases} 1 & \text{means perfectly positive linear relationship} \\ 0 & \text{means no linear relationship} \\ -1 & \text{means perfectly negative linear relationship} \end{cases}$$

B. Distance matrix

To analyze the network, we transform the correlation coefficient is transformed into a distance by using the following formula [14].

$$d_{ij} = \sqrt{2(1 - \rho_{ij})} \quad (2)$$

It is the Euclidean distance between the i -th and j -th characteristics since it satisfies the following three properties; (i) $d_{ij} \geq 0$ and $d_{ij} = 0 \Leftrightarrow X_i = X_j$, (ii) $d_{ij} = d_{ji}$, and (iii) $d_{ij} \leq d_{ik} + d_{kj}$. The first property tells us that two characteristics that are perfectly correlated (either positive or negative), $|\rho_{ij}| = 1$, will be represented by a single point in Euclidean space ($d_{ij} = 0$). Moreover, $0 \leq d_{ij} \leq 2$.

The second property is symmetric property; the distance between the i -th and j -th characteristics is equal to the distance between the j -th and i -th characteristics. In other words, the correlation between the i -th and j -th characteristics is equal to the correlation between the j -th and i -th characteristics ($\rho_{ij} = \rho_{ji} \Leftrightarrow d_{ij} = d_{ji}$).

The last property is well known as triangular property. From (2), we conclude that, in general, the higher the correlation coefficient the smaller the distance.

By using equation (2), we obtain a distance matrix D of size 40×40 with d_{ij} as the element in the i -th row and j -th column. It is this matrix that we analyze in the rest of the paper.

C. Information Summarization

To visualize, simplify and summarize the important information contained in the network represented by D , we use the notion MST [15] [16]. Then, we determine MST by using Kruskal algorithm [11].

To make the MST more attractively and efficiently useful, we use the Kamada Kawai procedure provided in Pajek [17]. Furthermore, to interpret the MST, centrality measures are used. These measures are very helpful to understand the importance and or influence of each node

relative to the others [18], [19], and [20]. The role of each measure in details and its formula are discussed in [21]. See, for example; [19], [21] and [18] for the details of those degree centrality, [23], [21] and [24] for betweenness centrality, [25], [26], and [27] for closeness centrality, and [21], [28] and [29] for eigenvector centrality.

IV. RESULTS AND DISCUSSION

In order to determine the most influential factors in university commitment, forty characteristics which represent four groups of factors are studied. Those factors are workplace spirituality (WPS), affective commitment (AC), continuance commitment (CC) and normative commitment (NC).

This research focused on the academics staffs from business schools of or management faculties from selected Malaysian public universities.

A. Minimum spanning tree (MST)

MST is a subgraph that connect all the characteristics whose total weight, i.e., total distance is minimal. Fig. 1 shows the corresponding MST of all characteristics. This figure shows the most important relationship among all characteristics in terms of MST.

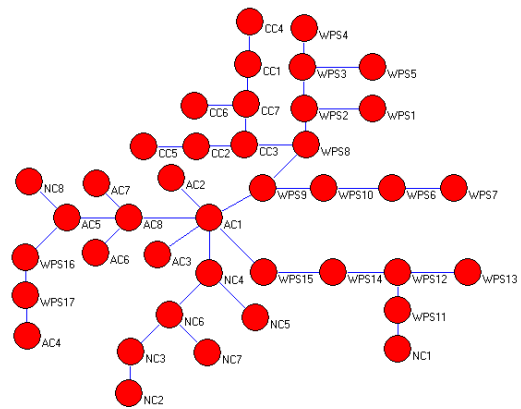


Fig.1. Minimum Spanning Tree

From that figure, it is clear that all four groups of factors are separated. However, two characteristics of WPS which are WPS16 (organization concern on spirituality) and WPS17 (availability of spirituality room) are in AC group. While, two characteristics of NC which are NC1 (workplace change) and NC8 (sensibility to be an organization person) are in WPS and AC groups, respectively.

B. Centrality measures

To elaborate the above finding more clearly, other information will be presented by using the centrality measures.

Those measures are computed based on the MST in Fig. 1. See [18], [21], and [30].

- (i) Degree centrality of node i is $d_i = \frac{1}{n-1} \sum_{j=1}^n a_{ij}$.
- (ii) Betweenness centrality of node i is b_i , the ratio of the number of path passing through i between two different nodes and the number of all possible paths from j to k for all j and k where $j \neq i$ and $k \neq i$.

- (iii) Closeness centrality of node i , c_i is the ratio of the number of links in the MST ($n-1$) and the number of links in the path from i to j for all $j \neq i$.
- (iv) Eigenvector centrality of node i is, $ev_i = \lambda^{-1} \sum_{j=1}^n a_{ij} e_j$ where $(e_1, e_2, \dots, e_n)^t$ is the eigenvector of A that corresponds to the largest eigenvalue λ .

Based on Table 1, we present the network topology where the size and color of the node represent the score of centrality measure and the rank of importance, respectively in Fig. 2 – Fig. 5.

The colors used in this analysis, ordered decreasingly in terms of the rank of importance: red, blue, yellow, purple and green.

TABLE 1
Centrality Measure

No.	i	d_i	b_i	c_i	ev_i
1	WPS1	0.0256	0	0.1848	-0.0295
2	WPS2	0.0769	0.1930	0.2254	0.0961
3	WPS3	0.0769	0.1012	0.1884	-0.0396
4	WPS4	0.0256	0	0.1592	0.0163
5	WPS5	0.0256	0	0.1592	0.0163
6	WPS6	0.0513	0.0513	0.1960	0.0574
7	WPS7	0.0256	0	0.1646	-0.0176
8	WPS8	0.0769	0.4845	0.2727	-0.1641
9	WPS9	0.0769	0.5493	0.3023	0.3384
10	WPS10	0.0513	0.0999	0.2393	-0.1216
11	WPS11	0.0513	0.0513	0.1566	-0.0193
12	WPS12	0.0769	0.1484	0.1831	0.0549
13	WPS13	0.0256	0	0.1554	-0.0169
14	WPS14	0.0513	0.1889	0.2155	-0.0969
15	WPS15	0.0513	0.2294	0.2583	0.2606
16	WPS16	0.0513	0.0999	0.1848	0.0788
17	WPS17	0.0513	0.0513	0.1579	-0.0277
18	AC1	0.1538	0.7382	0.3171	-0.5352
19	AC2	0.0256	0	0.2422	0.2206
20	AC3	0.0256	0	0.2422	0.2206
21	AC4	0.0256	0	0.1368	0.0114
22	AC5	0.0769	0.1930	0.2203	-0.1635
23	AC6	0.0256	0	0.2108	-0.1186
24	AC7	0.0256	0	0.2108	-0.1186
25	AC8	0.1026	0.3171	0.2653	0.3858
26	CC1	0.0513	0.0513	0.1646	0.0198
27	CC2	0.0513	0.0513	0.1902	-0.0349
28	CC3	0.0769	0.2780	0.2308	0.0993
29	CC4	0.0256	0	0.1418	-0.0061
30	CC5	0.0256	0	0.1605	0.0144
31	CC6	0.0256	0	0.1632	0.0173
32	CC7	0.0769	0.1484	0.1940	-0.0419
33	NC1	0.0256	0	0.1359	0.0080
34	NC2	0.0256	0	0.1518	-0.0193
35	NC3	0.0513	0.0513	0.1781	0.0628
36	NC4	0.0769	0.2348	0.2583	0.3155
37	NC5	0.0256	0	0.2063	-0.0969
38	NC6	0.0769	0.1484	0.2131	-0.1331
39	NC7	0.0256	0	0.1765	0.0549
40	NC8	0.0256	0	0.1814	0.0674

(i) Degree centrality

Degree centrality indicates the connectivity of characteristics (nodes). It provides information on how many number of edges incident upon a given node. It can be used to measure the importance of any particular nodes.

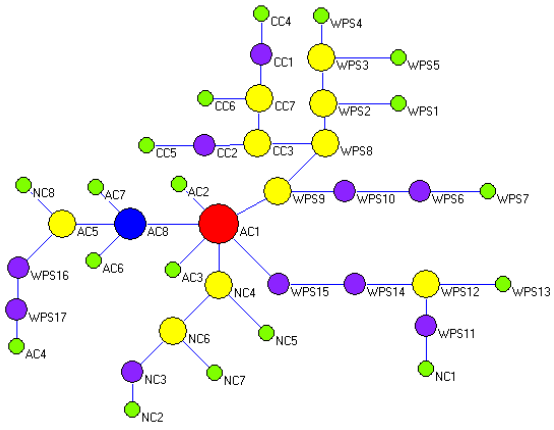


Fig. 2. Degree centrality

As we can see from this figure, based on degree centrality, AC1 (comfortability of organization) has the highest connection in the network, i.e., 6. Followed by AC8 (sense of belonging) with 4 connections and WPS2 (spirit of community), WPS3 (supportive colleagues), WPS8 (respect inner life), WPS9 (organization concern in peace/harmony), WPS12 (close connection between work activity and social activity), AC5 (feel at home), CC3 (strong attachment to organization), CC7 (advantage of the organization), NC4 (sense of loyalty and moral obligation) and NC6 (loyalty to the organization) with 3 connections. The rest are of 1 and 2 connections only.

(ii) Betweenness centrality

Betweenness centrality reflects the number of times a node appears on the shortest path between any nodes. It measures the potential of a node has for control of information flow in the network. Thus, this measure can be interpreted as the potentiality of node to coordinate the others.

See Fig. 3, in terms of betweenness centrality, the most important characteristic in the network is AC1 (comfortability of organization), followed by, in order of importance: WPS9 (organization concern in peace/harmony), WPS8 (respect inner life), AC8 (sense of belonging) and CC3 (strong attachment to organization). This means that if those characteristics are well managed, then the others will be influenced.

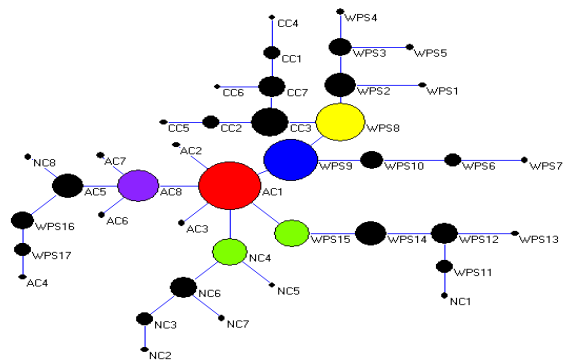


Fig. 3. Betweenness centrality

(iii) Closeness centrality

Closeness centrality measures how close a node is to all other nodes. It can also be regarded as a measure of how long it will take the information to spread from a given node

to others in the network. So, it can spread information very productively through the network.

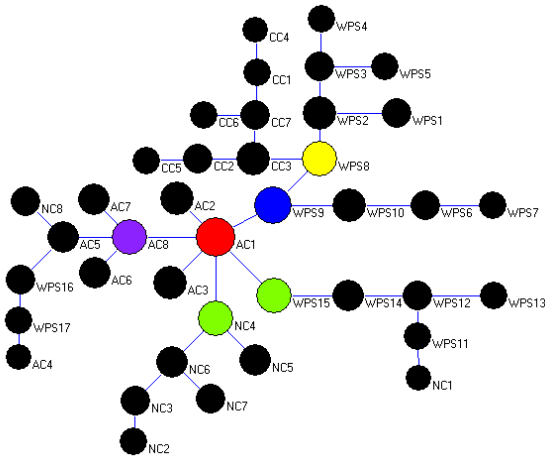


Fig. 4. Closeness centrality

Based on closeness centrality in Fig. 4, AC1 (comfortability of organization) has an excellent position compared to the others, i.e., it can spread the information very productively through the network compared to the others. It is followed by, up to 5 nodes, WPS9 (organization concern in peace/harmony), WPS8 (respect inner life), AC8 (sense of belonging), WPS15 (enjoyable workplace) and NC4 (sense of loyalty and moral obligation).

(iv) Eigenvector centrality

Eigenvector centrality measures the strength of involvement of each node to each major subgroup of the nodes. Hence, a node that is connected to many nodes who are themselves well-connected is assigned a high score by this measure.

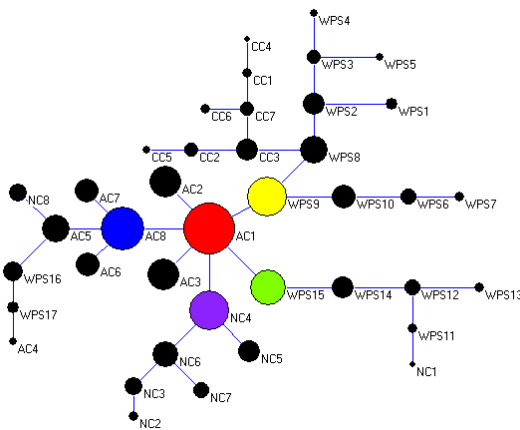


Fig. 5. Eigenvector centrality

According to eigenvector centrality, AC1 (comfortability of organization) acts as the most influential characteristics to the others in the network. It has strong relationship with the following four influential characteristics, ordered decreasingly in terms of eigenvector score: AC8 (sense of belonging), WPS9 (organization concern in peace/harmony), NC4 (sense of loyalty and moral obligation) and WPS15 (enjoyable workplace).

V. CONCLUSION

According to MST in Fig. 1, we learn that all four groups of factors which are WPS, AC, CC and NC are separated to each others. However, WPS16 (organization concern on

spirituality), WPS17 (availability of spirituality room), NC1 (workplace changing) and NC8 (sensibility to be an organization person) are separated from their groups. WPS16 (organization concern on spirituality), WPS17 (availability of spirituality room) and NC8 (sensibility to be an organization person) are directly related to AC group, while, NC1 (workplace changing) is directly related to WPS group.

According to the four centrality measures, the following characteristics occur among the five highest scores at least for one measure: WPS2 (spirit of community), WPS3 (supportive colleagues), WPS8 (respect inner life), WPS9 (organization concern in peace/harmony), WPS12 (close connection between work activity and social activity), WPS15 (enjoyable workplace), AC1 (comfortability of organization), AC5 (feel at home), AC8 (sense of belonging), CC3 (strong attachment to organization), CC7 (advantage of the organization), NC4 (sense of loyalty and moral obligation) and NC6 (loyalty to the organization). The highest number of occurrence is WPS9 (organization concern in peace/harmony), AC1 (comfortability of organization) and AC8 (sense of belonging) (4 times) followed by WPS8 (respect inner life) (3 times) and CC3 (strong attachment to organization) and NC4 (sense of loyalty and moral obligation) (2 times).

Therefore, based on those findings, we can conclude that the most influential factors are WPS and AC. This agrees with [3], [4] and [5] that workplace spirituality (WPS) if supported by the organization will have positive impact on the organizational outcomes. However, in terms of characteristics, the most influential characteristic is AC1 (comfortability of organization) since it has the highest score in those four centrality measures.

VI. RECOMMENDATION

The above results lead to more specific conclusion that in order to increase the level of organizational commitment in Malaysian public universities, workplace spirituality (WPS) and affective commitment (AC) should be given more attentions.

VII. FUTURE WORK

In this paper, MST obtained is unique, see Djauhari [31] for the further discussion regarding the uniqueness of MST. For the future work, if MST is not unique, it is suggested to use the forest of all MSTs which is more robust [32].

According to Sharif & Djauhari [33], degree centrality does not reflect to the strength of each particular node. Therefore, due to that limitation, for the future work, it is suggested to use “average of weights” as another measure. This new measure proposed by Sharif & Djauhari [33].

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Nur Syahidah Yusoff was born in Kelantan, Malaysia, in 1988. She is currently a PhD student at Universiti Teknologi Malaysia (UTM), Malaysia. Her bachelor degree in Industrial Mathematics was obtained from UTM in 2009. She is interested in multivariate analysis.