Evaluation of Organizational Commitment: A Study Using Social Network Analysis

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Abstract: Interest in the impact of commitments on organizational management is increasing due to growing competitiveness among organizations. Conceptualizing and measuring organizational commitment involves multiple aspects. Evaluating these commitments is a continuous effort that requires ongoing monitoring to maintain high standards. This research investigates the factors affecting organizational commitment and utilizes a topological analysis technique to clarify the relationships among these factors and identify those that influence commitment within the case organization. The approach begins by building a network of factors relevant to the conceptual framework and measurement of commitment. Then, an analytical method for these organizational commitment factors is introduced, followed by the presentation of results derived from the network analysis. The study's findings highlight which factors are most crucial in the specific context.

Keywords: Components of organizational commitment factors, Social network analysis, Hierarchical clustering

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1. INTRODUCTION

Many current global issues influence Organizational Commitment (OC), making it an important topic for research. Meyer and Parfyonova (2010) observed a notable paradox in the modern workforce: while organizations increasingly need a dedicated workforce to gain competitive advantages, they often engage in practices like downsizing and mergers that could potentially diminish commitment. This paradox, along with other factors, highlights the complexity of organizational commitment.

Organizational commitment is crucial for fostering strong relationships and enhancing organizational performance (Rylander, 2003). A meta-analysis by Mathieu and Zajac (1990) found that OC significantly affects job performance and withdrawal behaviors, such as job search intentions, turnover, and replacements. OC also shows a positive association with organizational performance metrics (Wright et al., 2005).

Despite extensive literature on organizational management, which often focuses on the implementation of commitments, there is limited evidence of its effectiveness in improving specific types of organizations, such as universities, due to their unique characteristics. The importance of OC in universities has surged due to shifting organizational behaviors and increased competition (Malik et al., 2010; Anttila, 2014).

Universities, as significant institutions in Iran, require staff with high engagement, ongoing improvement, innovation, and adherence to high standards in a competitive environment. Staff commitment has become crucial for keeping up with competition, thus underscoring the value of organizational commitment (Ma et al., 2012).

Like other organizations, universities face competition as they respond to various demands and pressures. The business world's competitive environment also influences the education sector. According to Khan et al. (2014), the global demand for higher education is rising and is expected to continue, driven by the expanding world economy and rapid growth in developing countries.

This research seeks to examine the level of OC among employees in a particular organization. A crucial aspect of this commitment involves employees' perceptions of the organization and the features that make it stand out from alternative employers. For a company to thrive, having committed employees is crucial. If significant resources are invested in hiring the right individuals, retaining them is essential. Understanding commitment and its influential factors is vital, as it affects organizational performance and employee satisfaction (Meyer & Herscovitch, 2001). It is important not only to identify influential factors but also to understand their causal relationships and roles within the system.

This study adopts a network topology approach to examine the relationships among OC factors, comprising 22 items. This approach will help us examine the interactions between factors and their effects on organizational commitment, providing valuable insights into organizational structure. The research employs a correlation network-based approach to analyze the behavior of OC factors in an Iranian university. This technique is widely applied in both network and complex systems analysis, using the Minimal Spanning Tree (MST) to generate a simplified network structure and the Subdominant Ultra-metric to perform hierarchical clustering.

The structure of the paper is as follows: Section 2 presents a literature review on the three dimensions of organizational commitment. Section 3 outlines the data collection process. Section 4 details the methodology for constructing and analyzing the network of OC factors. Section 5 presents and discusses the findings from the topological network analysis. Finally, Section 6 offers concluding remarks along with practical recommendations.

2. THREE COMPONENTS OF COMMITMENTS IN ORGANIZATIONAL MANAGEMENT

The three-component model developed by Allen and Meyer (1990) is a central framework in organizational commitment research, as emphasized by Markovits et al. (2013), as well as Garcia-Gabrera and Garcia-Soto (2012). For over three decades, this model has served as a foundational tool for examining organizational commitment (Cohen, 2007) and is currently recognized as the most widely endorsed theoretical framework in the

field (Herrbach, 2006). It conceptualizes commitment through three core elements: the perceived cost of leaving the organization, emotional attachment to it, and a felt obligation to stay.

The model outlines three distinct forms of commitment: continuance, affective, and normative. Continuance commitment is based on the perceived costs associated with leaving the organization, leading individuals with high levels of this commitment to remain because they feel they have no other choice. Affective commitment involves an employee's emotional attachment to, identification with, and active involvement in the organization. Normative commitment reflects a sense of moral obligation to stay, rooted in the belief that remaining is the right thing to do. This obligation is shaped by organizational socialization as well as personal experiences from family and society (Allen & Meyer, 1990; Markovits et al. 2013). Among the three, normative commitment has received the most scholarly attention (Bergman, 2006).

Although widely accepted, the distinction between normative and affective commitment remains a topic of debate (Bergman, 2006). While factor analysis supports treating them as separate constructs, a strong correlation between the two persists. A meta-analysis found a correlation of 0.63, indicating that approximately 40% of the variance in one can be explained by the other (Meyer et al., 2002; Bergman, 2006). In examining both theoretical and empirical studies, Bergman (2006) noted that although normative and affective commitment differ conceptually in how they describe an individual's bond with an organization, their practical separation remains contested.

3. METHOD OF DATA COLLECTION

Data were collected from permanent, non-unionized staff at five public universities in Iran. Approximately 120 employees in administrative, supervisory, and managerial roles participated by completing questionnaires designed according to the framework proposed by Meyer and Allen (1991).

The questionnaire consisted of 22 items designed to evaluate the three main dimensions of organizational commitment: continuance, affective, and normative commitment (refer to Appendix). The first eight items pertained to affective commitment, the next eight to normative commitment, and the final seven to continuance commitment.

Responses related to organizational commitment were gathered using a five-point rating scale, ranging from 1 (complete disagreement) to 5 (complete agreement). This structure enabled participants to indicate the extent of their agreement with each statement, offering a quantifiable assessment of organizational commitment within Iranian public universities. The five-point rating scale, commonly referred to as a Likert or ordinal scale, ranks responses in order of intensity, from lowest to highest. The term 'ordinal' indicates that the items are arranged based on their relative level or importance.

4. TOPOLOGICAL NETWORK ANALYSIS

The study of how commitment factors, which contribute to enhancing organizational quality and management, relate to each other is a significant area of interest. Each factor within organizational commitment (OC) affects and is affected by other factors, creating a complex network of interrelationships.

This section describes the process of applying network analysis to explore the connections among factors and highlight the most influential ones. Traditionally, Pearson's correlation coefficient has been used to measure similarity between vectors (Tan et al., 2004). However, because Likert scale data is ordinal and not interval, Spearman's correlation coefficient is more appropriate for measuring the relationships among these factors. This coefficient evaluates the correlation in an ordinal scale and is suitable for non-parametric methods, as it does not require interval-level measurement (Conover, 1971; Hauke & Kossowski, 2011).

Spearman correlation coefficient, denoted as ρ (rho), is calculated using the formula:

$$\rho_{ij} = 1 - \frac{\sigma T}{p(p^2-1)} \quad (1)$$

$$T = \sum[R(Y_i) - R(Z_i)]^2 \quad (2)$$

where T represents the sum of squared rank differences between two variables, and p is the number of measurements. This coefficient results in a 22×22 matrix, C, which is symmetric and has ones on its diagonal, indicating the strength of the relationships between the factors. This matrix offers a comprehensive perspective on these interconnections, helping to reveal the overall behavior of the system.

To simplify and visualize these relationships, we use a Minimal Spanning Tree (MST) graph. The MST reduces the complex network to a more manageable structure with only 21 connections, offering clearer insights. Constructing an MST involves Kruskal's algorithm in Matlab, which creates a network topology of 22 factors. We use the Pajek software (https://pajek.imfm.si/) to visualize this network. It is a recommended software application that supports various methods and techniques used in network analysis (De Nooy et al., 2005; Batagelj & Mrvar, 2003). This software helps in simplifying and understanding the complex network structure.

The MST's information is further analyzed using centrality measures (Freeman, 1977; Freeman, 1979; Borgatti, 2005), designed to evaluate how important each node is within the network. Centrality measures help identify key nodes and understand their roles within the network (Xu et al., 2009; Espino & Hoyos, 2010; Abbasi & Altmann, 2011). Specifically, eigenvector centrality, introduced by Bonacich (1972), evaluates nodes based on their connections to other influential nodes. It is calculated as:

$$C_e(i) = \frac{1}{\lambda_{max}} \sum_{j=1}^{n} (a_{ij} x_j) \qquad (3)$$

Here, $x = (x_1, x_2, \ldots, x_n)^t$ denotes the eigenvector linked to the greatest eigenvalue λ_{max} of the matrix A. This measure highlights nodes with significant connections to other high-scoring nodes.
In the following section, degree and eigenvector centrality will be applied to determine the most influential nodes in the network, and the outcomes of this topological analysis will be examined.

5. RESULTS AND ANALYSIS

The MST is utilized to map the network topology of items, aiming to uncover the network structure of OC dimensions. This study applies Kruskal's algorithm within the MST framework and conducts analysis based on two centrality measures outlined in the previous section. The characteristics of the dimensions are grouped under three categories: Affective Commitment (A), Normative Commitment (N), and Continuance Commitment (C). A detailed list of factors can be found in the Appendix.

Figure 1 illustrates the correlation-based Minimal Spanning Tree (MST) constructed from the 22 items linked to the three OC components, with an emphasis on their connection degrees. The connection degree of a node k corresponds to a_{ij}, the (i,j)-th entry in the adjacency matrix A_{ij}, as previously mentioned. In the MST network, 21 edges are present, creating an incomplete, and weighted graph. Each factor is marked with a symbol and visually coded by color to its dimension classification: Affective Commitment (A-red), Normative Commitment (N-yellow), and Continuance Commitment (C-green).

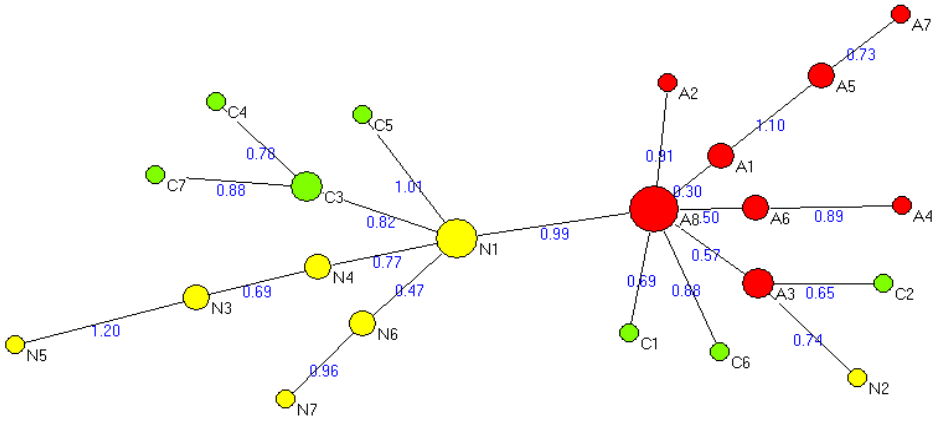

Figure 1. Network Topology of 22 OC Factors by Connection Degree

To clarify the MST, different colors and sizes were utilized to denote the significance rank of each node. For instance, A8 (red node) and N1 (yellow node) are the largest nodes, indicating they have the highest degree of connections. The results for each centrality measure, including degree and eigenvector centrality, are detailed in the sections below.

Degree centrality, which represents the number of direct connections an item has, reflects how much influence each element can exert on others. As illustrated in Figure 1, item A8 (shown as a red node) has the highest degree centrality, with seven connections, making it the most influential item. It connects to all items in the affective commitment category and to two items in the continuance commitment category. Item N1 (yellow node) follows with five connections, while A3 and C3 each have three. In contrast, items with only one connection are considered the least influential.

According to eigenvector centrality, which evaluates an item's importance based on its connections to other well-connected items, A8 again ranks highest, with a score of 0.598. This reinforces its status as a key player in the network. Its strong influence comes from being linked to other central elements, allowing it to effectively shape the flow of information. N1 (yellow node) and A3 (red node) also score highly, indicating their notable roles.

A higher eigenvector centrality score reflects a greater importance within the network, based on the principle that nodes connected to other influential nodes are themselves considered central. Table 1 presents the top three items based on their performance in both centrality metrics.

Table 1. 3 Key Factors and Centrality Measures

Node	Factor	Degree	Eigenvector
A8	Sense belonging to the organization	7	0.598
N1	Sense loyalty and moral obligations	5	0.429
A3	organization produces comfort	3	0.264

Surprisingly, items within a factor are usually connected to each other. However, some items in the continuance commitment factor (green node) and one item in the normative commitment factor (yellow node) are also linked to items in other factors, with the majority of these connections being to items in the affective commitment factor (red node).

5.1 Hierarchical Tree Structure

A hierarchical tree allows us to discern the taxonomical and hierarchical relationships among items in a network. To determine the minimum distances between items, the study employs the single linkage clustering technique, which helps identify key elements in categories A and B that serve as crucial links among the factors. Figure 2 illustrates the hierarchical tree (HT) of the 22 items. In this diagram, vertical lines connecting horizontal lines represent the merging of items, with the height of each vertical line indicating the distance at which the items are grouped. Each item is marked with its symbol. According to Figure 2, A1 and A8 merge at a distance of $d_{ij} = 0.3$ in the right cluster, indicating a strong, close relationship. This suggests that items in the affective commitment factor are highly aggregated. Notably, items from both the affective and normative commitment factors merge, suggesting that items tend to cluster within the same factors, possibly due to shared information. The figure shows two distinct clusters, with A8 being the prominent item in the right cluster and N1 leading the left cluster. Consequently, A8 serves as a key liaison, particularly bridging factors in the N1-dominated cluster. Overall, the position of each item in the network reflects its characteristics and its relationships with other items.

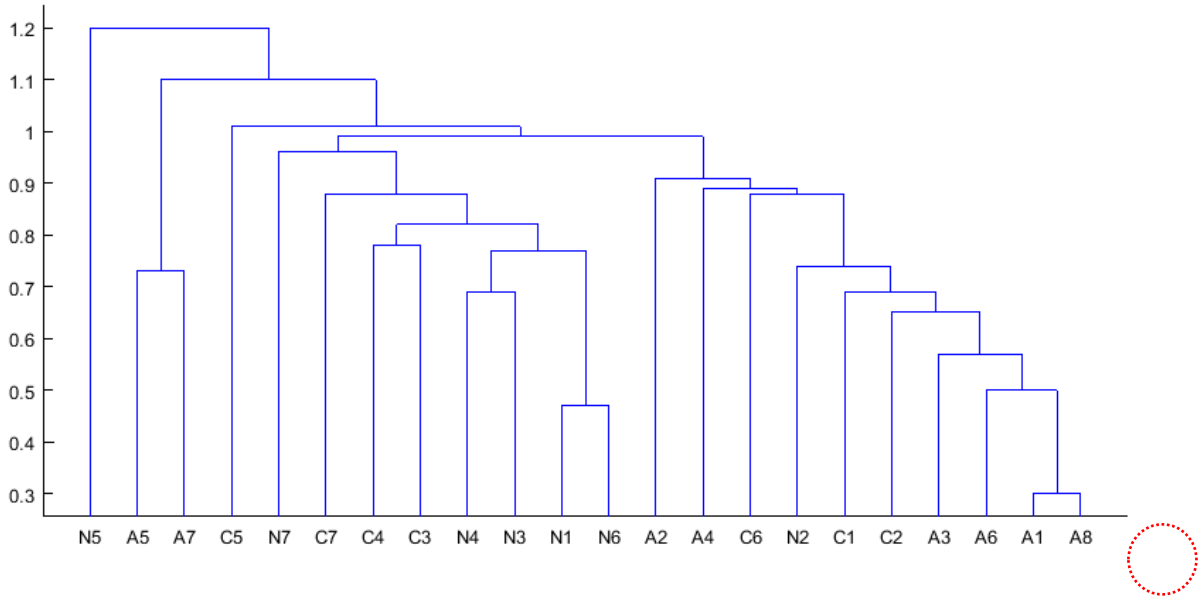

Figure 2. Item Clustering Using a Hierarchical Tree Structure

Figure 3 presents a box plot illustrating the distances between factors based on the MST. This figure effectively uses the box plot to depict the range of distances for each item, providing a clear visual representation. The box itself is defined by the third quartile at the top and the first quartile at the bottom, with the mean positioned as a horizontal divider within the box. The dotted line reflects the mean value across all distances. In the figure, a few items are represented only by a star point, signifying that they have a single connection (refer to the connection degree of each item as depicted in Figure 1), and their distance values are shown along the y-axis. For instance, A2 has a distance of 0.91 and C2 has a distance of 0.65. N5, having the highest distance among the star points, indicates a weaker connection with its associated item, N3. A shorter box plot (such as in C3, N4, and A3) suggests that the item has similar distances to its connected items. Conversely, a taller box plot (like in A1) indicates that the factor has more varied distances relative to other factors.

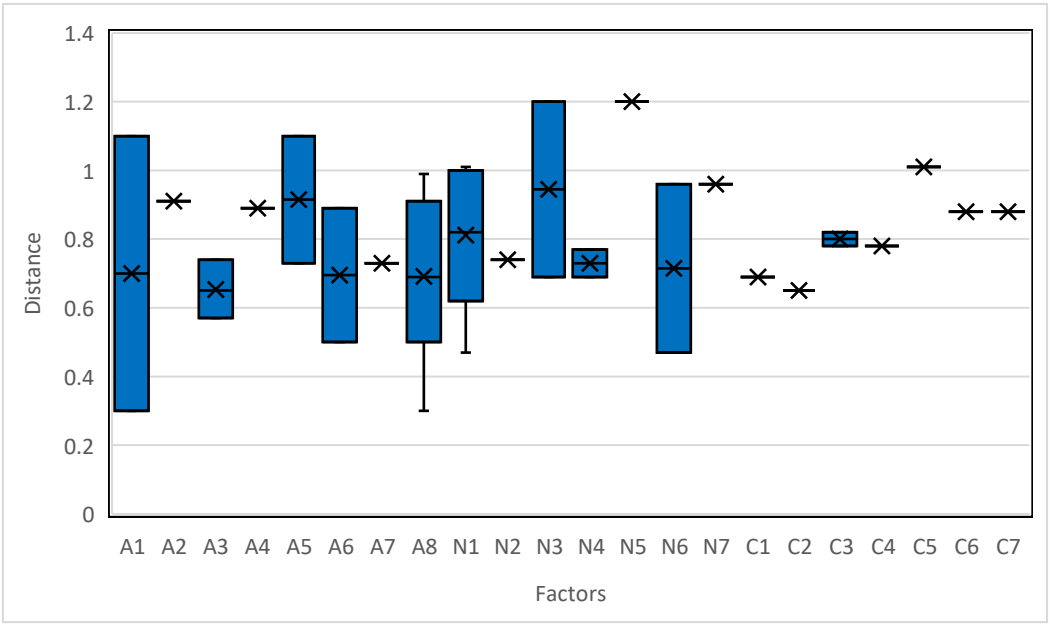

Figure 3. Box Plot of Distances Between Items

6. CONCLUSION

This study sheds light on the factors influencing organizational commitment in public universities. It is crucial for these institutions to recognize which factors hold the greatest importance in their specific setting. Since this research relies on a relatively small sample, its conclusions should not be broadly applied to all organizations. As noted earlier, organizational commitment is a complex phenomenon. The findings reveal that although organizational factors matter, they are not the sole determinants. The study emphasizes that both the nature and characteristics of these influencing factors play a significant role in shaping commitment. In the end, fostering organizational commitment effectively depends on the combined efforts of the organization and its employees.

The purpose of this study is to examine organizational commitment behavior within public universities in Iran and to determine the factors affecting its three key components. To determine the most impactful dimensions, the study used Spearman correlation coefficients to evaluate the similarity among factors related to these components. A network was then constructed to visualize interactions among the factors, and a topological influence map was created using the Minimal Spanning Tree (MST). Centrality measures from the network analysis were employed to gauge the importance and influence of each factor. The study found that the most influential factor in organizational commitment within Iranian universities is A8 (Sense of belonging). Additionally, two factors—N1 (Sense of loyalty and moral obligation) and A3 (Comfortability of the organization)—scored highly in both degree and eigenvector centrality measures. Supporting A8 is expected to positively impact organizational outcomes due to its high scores in these measures. Thus, A8, N1, and A3 should be prioritized as key factors in improving organizational commitment in Iranian universities.

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Appendix

#	Symbol	
Affective Commitments		
1	A1	I perceive the challenges faced by this organization as my own.
2	A2	I take pleasure in sharing information about my organization with external parties.
3	A3	I would be highly satisfied to dedicate my entire professional career to this organization.
4	A4	I believe it would be difficult to develop the same level of attachment to another organization as I have to this one.
5	A5	I feel integrated into my organization, as though I were part of a family.
6	A6	I experience a strong emotional bond with this organization.
7	A7	This organization holds considerable personal significance for me.
8	A8	I feel a profound sense of belonging within my organization.
Normative Commitments		
1	N1	A key reason I remain with this organization is my belief in loyalty and a moral responsibility to stay.
2	N2	I am of the view that individuals nowadays switch employers too frequently.
3	N3	I do not hold the belief that one must always remain loyal to their organization.
4	N4	In my opinion, transitioning between organizations is not inherently unethical.
5	N5	If I received a better job offer elsewhere, I would feel morally conflicted about leaving my current organization.
6	N6	I was instilled with the belief that loyalty to a single organization is valuable.
7	N7	I think the past was more favorable when individuals tended to stay with one employer throughout their careers.
Continues Commitments		
1	C1	My continued employment with this organization is driven by both necessity and personal preference.
2	C2	Even if I wished to leave, doing so at this moment would be very difficult for me.
3	C3	Departing from this organization would cause significant disruption in my life.
4	C4	Leaving the organization now would not entail a considerable cost.
5	C5	I am concerned about the potential consequences of leaving my position without having secured alternative employment.
6	C6	I believe I have limited options available, making it difficult to consider leaving.
7	C7	One of the major drawbacks of leaving this organization is the lack of accessible alternatives.