

Social Networks in Academia for Faculty Recruitment at Habib University

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Abstract. The faculty of any university is its key educational resource and even more so for a recently-established institution, hence, making the recruitment of faculty a key task. Given the weight of personal recommendations in recruitment, along with better academic output among strong interpersonal relations among faculty, this study explores the level of connectedness between the faculty-based social network of Habib University with respect to their prior or current affiliations with other universities. A network is constructed with nodes representing individual faculty members and edges representing a common university they are affiliated with. We use social network analysis techniques to assess the network and our findings show that the network is indeed a well-connected network with only a few isolates. Moreover, the universities are also numerous and are spread across the globe.

Keywords: Social Network Analysis · Academia · Faculty

1 Introduction

The educational background and professional experience of teachers have an undeniable impact on the quality of education offered by an academic institution. In order to understand the kind of quality education offered by Habib University, it is imperative we understand what each faculty member brings to the table through their background and process of recruitment.

Habib University was established 8 years ago, and given that it is quite a newly established institution, it is still making a name for itself in the local and global landscapes. This reputation depends heavily on the quality of graduates it produces, which in turn are a product of the resources made available to them, one of the main resources being its professors, who themselves have been shaped by their own academic and professional background. In this study, we aim to explore the possible network effect in recruiting faculty members at Habib University, as well as the diversity - or lack thereof - amongst such a network.

Given that the university is continuously building its reputation, it can not afford to compromise on the quality of education provided via the recruitment of faculty members. Therefore, it can be hypothesized that the university can be

very selective in such a process and therefore put more weight on personal recommendations by existing faculty or university members than open recruitment. Moreover, academic professors are shown to work better together in collaboration if they already know each other [7] which is crucial for the university at its young stage. From a job-hunting perspective for potential faculty members, personal recommendations are more trustworthy than open job openings for an organization that is new in the market. Hence, we hypothesize that Habib University also values such recommendations and referrals when it comes to its process of recruitment.

For the scope of our study, we will be considering the backgrounds of faculty members in academia currently teaching at Habib University whilst also including all institutions where they had the potential to make any connections. This can be at former universities where they may have been awarded degrees for their undergraduate and postgraduate studies and as well as short programs (such as semester exchange and/or summer programs). We will also be including any universities they may have previously worked with or taught at, no matter how briefly, as that still leaves a potential footprint for forming a connection.

The key research questions we aim to explore are:

1. Can a network be constructed (with non-zero connections between nodes) for faculty members with respect to their association with other universities?
2. Are there any significant communities forming in this network?
3. Is there a network effect in faculty joining Habib University?
4. How globally diverse are the Habib University faculty in terms of their associations with other universities?

We hypothesize that there is a network effect and the faculty network will be close-knit and well-connected due to the personal recommendations and personal involvement of higher-ups in a small and young organization. Moreover, there is a high chance of the network being spread globally.

We hope the study may give insights into possible patterns and/or biases in the recruitment process for new faculty members and allow the university to identify new areas they might wish to target. We also aim to assess the type of education provided to Habib University students with respect to how globally diverse their faculty's backgrounds are. Moreover, the study can give insights into the kind of network Habib University students may have access to through their faculty, as well as information-related social capital [9] they can potentially make use of from the knowledge and experience of these faculty members for future studies and careers. This research also aims to prove whether such a bias of recruiting only faculty members who have been awarded at least one degree from a foreign university exists.

2 Background and Related Work

Social networks in academia have well been established before and literature to credit this theory also exists. One particular research paper aimed to try to

understand how the collaboration (co-authorship) network of scholars connects to scholars' research performance, by creating a theoretical model based on social network theory in this study. The paper employed social network analysis (SNA) metrics for this investigation such as normalized closeness and betweenness centrality, efficiency, and types of degree centrality). The data found in the study revealed a positive correlation between two of the SNA metrics used and professors' research output (i.e. weighted degree centrality and efficiency). Particularly, academics with strong relationships exhibited superior research performance than those with weak ties (e.g. recurrent co-authorships, high weighted degree centrality) (e.g. single co-authorships with many different scholars). The efficiency results indicated that researchers perform better than those with multiple links to the same group of connected co-authors when they maintain a strong co-authorship relationship with just one co-author of a group of linked co-authors (i.e., co-authors that have joined publications). [2] This research paved the way for the implementation of SNA measures to prove whether strong or weak ties exist amongst the collaboration network of scholars.

Data in our current research was collected mainly from the Habib University publicly available database, however, it was necessary to fill gaps through social media platforms such as LinkedIn where it felt necessary. Hence, research on whether, why, and how scholars communicate and disseminate information utilizing social media is necessary to take into account. A study conducted 51 semi-structured interviews with academics in the field of information science and technology [3]. The study proved to be different from previous research, on the basis of trying to identify characteristics that affect scholars' intentions and usage of social media in addition to highlighting the specific social media platforms employed. As the first known study to apply the Unified Theory of Acceptance and Use of Technology (UTAUT) to interpret scholarly use of social media, which allowed for the paper to add to methodological discussions via theory rather than just SNA measures. The paper also highlights how the opportunity to make new contacts in the professional world is the main performance enhancer that academics saw in social media platforms.[3] This may help us in proving that one factor which aids recruiters such as universities in finding out about faculty members is the way they have highlighted themselves on social media. Maintaining current connections, staying current on industry advancements, and marketing one's own work to peers and external communities including industry, practitioners, journalists, and the general public are additional frequent advantages of using social media which were further highlighted in the study [3].

When looking at faculty-based social networks built by a university it is also necessary to understand other factors related to professors. One piece of literature aimed to give rise to modifications and extensions of Peter Blau's analysis of the connection between the social structure of universities and the style of communication among university professors. Blau believed that the development of integrative multidisciplinary social networks within university communities is extremely problematic and contends that the main location of integrative social

networks inside universities is within academic departments. The paper used social network measures such as network density, size, and speciality clusters to reach its conclusions. The research indicates that, at least in the physical sciences, academic departments are not the most appropriate units to describe the pattern of research communication among university faculty, and that the social structures of universities can promote an integrative social network that is multidisciplinary in composition. [4] This paper helped us in also observing whether the level of communication amongst professors leads to more faculty in an institution being recruited based on referrals and recommendations by current faculty.

Furthermore, the literature also credits how a spatial organization in an institution affects its social networks and creativity. By examining the social components of innovation in a particular spatial context, this initiative deepens our understanding of how innovation functions, particularly in highly innovative organizations. Building space is divided and reassembled by the spatial boundaries created by workspace arrangement. Hence, these boundaries establish accessibility and visible relationships that either integrate or separate various behaviours, pursuits, and individuals. In an organization, constructed space shapes patterns of movement, co-presence, co-awareness, and encounter. These interrelationships play a crucial role in the formation of social networks, particularly those networks that are essential to the innovation process. The findings also proved that cross-disciplinary collaboration is an effective organizational strategy which influences co-authorship and successful collaboration. [5] The literature helps us in understanding other factors which lead to collaboration amongst faculty and in turn lead to professors giving recommendations for potential candidates. However, the literature also paves open a new discussion on how spatial organization may also allow for recommendations across different disciplines and departments which in most institutions may lead to faculty being limited and in contact with only members from the same department.

Present literature also credits various other factors which are taken into account during the recruitment of faculty other than just referrals. An article identified the limitations of the prevalent Labour Market Perspective (LMP) in research on teacher recruitment and retention and explained how research that takes into account a social network perspective (SNP) can advance the body of knowledge and the design of approaches to teacher preparation, staffing, and professional development. It further highlighted how social network perspective research revealed complex social factors that shape teachers' workplace experiences and demonstrates how the labour market perspective tends to have a "recruitment-heavy" focus through a discussion of recent literature on teachers' social networks and a case example. The article further explained how academics can examine social workplace issues from both macro and micro viewpoints using the social network perspective. [6]

Lastly, research also serves as an example of how social network theory may be used to investigate interpersonal relationships in the field of education. Instead of concentrating on one-on-one interactions, the study turned its attention

to the interconnected pattern of interpersonal interactions as represented by social networks. The guiding principle of the study was that teacher social networks may facilitate or obstruct the sharing of materials that can be accessed and used to advance educational objectives. This social network perspective helps us better understand how teachers' interpersonal interactions affect a range of student and school outcomes. It also offers suggestions for more rationally focused educational policy tools. [7] Therefore, our study aims to further carry forward the findings proven in this research that collaborations amongst professors lead to a better quality of education provided.

3 Materials and Methods

3.1 Data Collection

Based on the scope of this study, we wished to construct a network connecting Habib University faculty members based on universities they had ever been associated with. Therefore, we acquired a list of current full-time and adjunct faculty members of Habib University. We then used it to scrape their professional profiles on LinkedIn and on the official Habib University website for information on the universities each faculty member had studied or worked at, including undergraduate, postgraduate, and short programs. MS Excel was used for this entire process.

3.2 Network Construction

Once the data had been collected, it was manually turned into an edgelist in MS Excel to represent a bipartite graph, where one group of nodes was for the faculty members, and the other was for the universities. The edgelist had a total of 236 data points, with 83 unique faculty members. The names of faculty members were coded to preserve anonymity. A measure taken to pre-process the data for meaningful insights was to replace the universities attended with the name of the country they were in, for those outside of Pakistan. However, for those in the US, the name of the state was written instead. This was done to modify the granularity of the data, and avoid the entire network consisting of one or two clusters, which may have occurred for popular regions such as Pakistan and the United States. Modifying the granularity in this way helped avoid networks like those in Figure 1 which we were getting prior to the process. Instead, we were able to work towards Figure 2 which is a lot more insightful. We also referred to other related works [9, 11, 10] for insights on better visualizing and analysing our networks.

The bipartite edgelist was turned into a unipartite network, where the nodes represented individual faculty members and the edges represented universities common to them. This was an undirected graph.

4 Results

4.1 Visualisation and Key Insights

The constructed network in edgelist form was visualised as a graph in R Studio, with the help of the `igraph` library. Figure 2 is the final visualisation after modifying it for better visualisation. This was done by experimenting with layout, node colours, node size (which reflects degree), labels (which were coded for anonymity and shorter labels), and label font sizes.

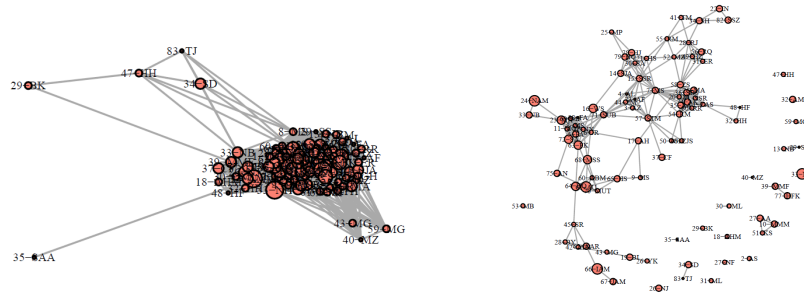


Fig. 1. Visualising faculty network where each node represents a faculty member and each edge represents a common university attended or worked at. The two versions illustrate the impact of granularity in visualising the networks, where the figure on the left is at the country level, and the one on the right is at the university level.

Once the network was constructed and visualised, it was analysed using Social Network Analysis metrics, which are summarized in Table 1.

Table 1. Network measures calculated for the faculty network (Figure 2)

| Measure | Network in Figure 2 |
|----------------------------------|---------------------|
| # Nodes | 93 |
| Max Degree | 29 |
| Mean Degree | 11.2 |
| Min Degree | 0 |
| # Nodes Max Degree | 1 |
| # Isolated Nodes | 1 |
| # Nodes Degree > Mean Degree | 39 |
| Edge Density | 0.122 |
| Avg. Clustering Coefficient (CC) | 0.656 |
| # Nodes with CC < Avg. CC | 41 |
| # Communities | 18 |
| Average Path Length | 2.79 |

Table 1 indicates that a faculty-based network does exist and that it is globally spread. The total number of faculty members taken into account is 93 professors currently teaching at Habib University. The maximum number of connections a professor has is 29 and the minimum number of connections is 0 which indicates nodes that exist on the periphery and are isolated. On average 42 per cent of the faculty member has a university common with 11 others. The average clustering coefficient being 0.656 represents which can be seen as close to 1 indicates that the nodes are highly interconnected with one another. There are approximately 18 communities or clusters formed in this network, indicating that there are many professors who have either attended or worked at the same university, therefore, proving that potential connections could have been made among the professors.

For analysis, our focus was on degree centrality, as the degree of a node indicates how many faculty members they share a university with. Additionally, we also visualized a graph with the nodes and edges reversed in Figure 5, for insights on how the universities are spread globally in the network, as well as a visual summary of how many universities and regions there are.

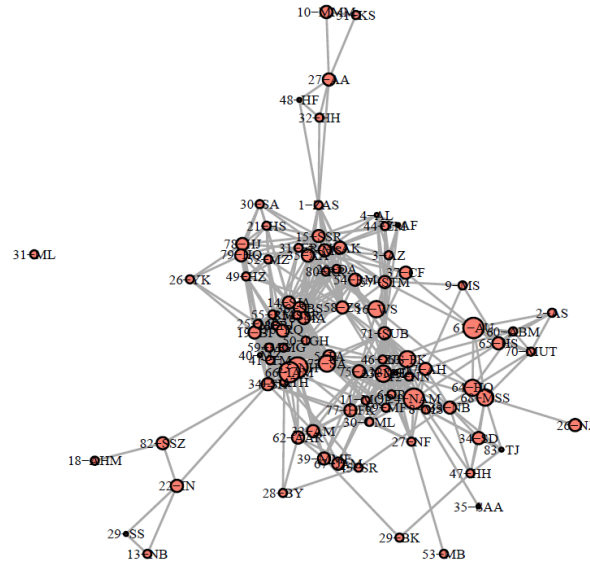


Fig. 2. The network constructed with different granularity, with edges as a combination of countries (outside of Pakistan), states (USA), and universities (Pakistan).

Another step taken to better understand the network was to perform community detection on it. For this, the `igraph` function `cluster_walktrap()` was used which performs short random walks to detect communities. Figure 3 shows

the network with these communities highlighted, and we see that there are at least 5 - 6 major communities in the network.

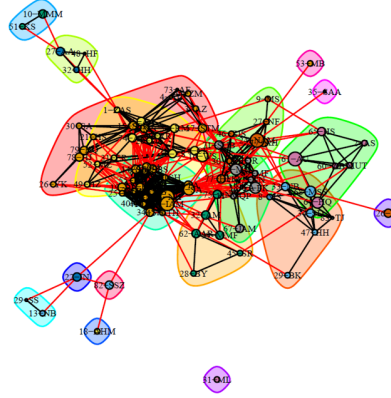


Fig. 3. Faculty network with communities highlighted.

While we did not come across benchmark models to compare our network against, we can compare it to the standard Erdos-Renyi (E-R) network [1]. One characteristic of the E-R network is the small world effect it displays, which is true for our network as well. We infer this as the APL is less than $\ln(n)$ which is 4.53 in this case. The E-R network also lacks clusters due to its random nature, unlike our network which has strongly connected clusters (Figure 3). Moreover, the E-R network has a Gaussian degree distribution whereas our network has a right-skewed distribution as shown in Figure 4.

4.2 Discussion

Looking at the network above, we can deduce that there are few instructors who studied at universities where no other professor at Habib had studied. We also see that there are communities being created indicating there are a few professors who attended the same university, whether it was for their undergraduate or post-graduate studies. It was found that the maximum number of connections a professor has is 29 with only one professor with a degree of 0. The average degree is close to 11 shows that there is some kind of overlap in terms of the universities the professors attended. This could be due to several reasons. Firstly, the university's ranking plays a huge role in the selection of the institute. Some universities are also known and ranked higher for certainly taught majors as compared to others. It can be observed that professors from for instance a Computer Science (CS) background can be seen to have attended the same set of universities either for undergraduate or postgraduate studies such as NED or Karachi University

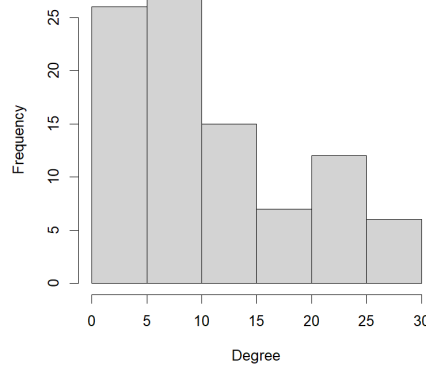


Fig. 4. Degree distribution in the faculty network (Figure 2).

which were popular choices for undergraduate studies for professors teaching CS at Habib University.

It is interesting to note that out of the 93 nodes that are part of the network, 39 of them have more than 11 connections with fellow instructors. We also notice that there are some highly dense parts of the network and by categorising the communities in them, it can be seen that the dense areas are communities which form to be 5 of them. In fact, it can also be observed that there are overlaps in the communities and most of them are quite close to each other showing how even outside of the university, these professors tend to have a strong community with good connections which could either help them with a job, co-authorship, teaching at a university, endorsement to different places etc. The average clustering coefficient (0.66) indicates since it is closer to 1, the professors are quite connected to each other, hence, leading to dense communities being formed. Lastly, another interesting finding is that out of the 93 nodes, 41 of them have a clustering coefficient less than the average number, stating that although they might have connections, not all their connecting instructors are connected to their other connections.

4.3 Outlook: Challenges and Limitations

The study only focuses on current teaching faculty and not previous ones. Since Habib University has a typically smaller number of enrollment rate for students their faculty is also fairly small, hence, the small data set used in the study. The data was collected manually and through cross-referencing on respective social media platforms, therefore, human errors may be present in the final data set in the form of spelling errors in the names of faculty and different abbreviations for names. Due to the multiple sources for collecting information on faculty in

faculty members in place of study was the United Kingdom. Future directions which can be taken from this study are to answer questions such as whether actual interactions take place between faculty as shown in the connections they have made in the network graphs. Another aspect that could be looked at in the future is the factors that led the faculty to choose the institutes they chose and the factors that led them to choose to teach at Habib University. Furthermore, a larger data set may show a greater number of communities and clusters being created which may be at a larger scale than the ones shown to prove the hypotheses in this study.

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