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Entangled or Entwined? Scientific Networks within Turkish Higher Education Studies: A Secondary Data Analysis

Düğümlenmiş mi, İç İçe mi? Türk Yükseköğretim Çalışmaları İçindeki Bilimsel Ağlar: İkincil Veri Analizi

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Abstract

This study delves into the academic production networks inherent in Turkish higher education studies, with a particular focus on the impact of gender inequality. We employed a secondary data analysis approach, utilizing comprehensive data retrieved from the Turkish National Thesis Center database. The research data encompasses a total of 854 doctoral dissertations submitted between the years 1967 and 2020. The methodology is designed to assess the pivotal characteristics of doctoral supervisors, PhD candidates, and committees whilst exploring the roles of several parameters viz. gender, academic title, and multidisciplinary collaboration within these networks. The data analysis includes frequencies and percentages to better identify the trends and patterns. The findings reveal a significant gender imbalance in the Turkish academic landscape. Male academics occupy a rather disproportionately higher number of leadership positions compared to their female counterparts. The networking dynamics appear to work against women and junior faculty, multidisciplinary endeavors are quite rare, unlike the characteristics of the field. Fortunately, the number of female doctoral students is on the rise. Based on the research results, we suggest both cultural and structural arrangements to support women researchers and women's studies such as funding and mentoring. These measures are essential for fostering an environment where all academics, regardless of gender, can thrive and contribute to the advancement of science.

Keywords: Gender Inequality, Higher Education, Interdisciplinary Collaboration, Mentorship, Scientific Production Networks

Özet

Bu araştırma, cinsiyet eşitsizliğinin etkisine odaklanmak suretiyle Türk yükseköğretim çalışmalarındaki içkin akademik üretim ağlarını inceleme altına almaktadır. Araştırmada Türk Ulusal Tez Merkezi veri tabanından alınan kapsamlı verileri kullanan ikincil bir veri analizi yaklaşımı benimsenmiştir. Araştırma verileri, 1967 ile 2020 yılları arasında sunulan toplam 854 doktora tezini kapsamaktadır. Araştırma deseni doktora danışmanlarının, doktora adaylarının ve komitelerin temel özelliklerini değerlendirmek ve söz konusu ağlar içindeki cinsiyet, akademik unvan ve disiplinler arası iş birliği gibi çeşitli parametrelerin rollerini keşfetmeyi hedeflemektedir. Verilerin analizi, eğilimleri ve kalıpları daha iyi belirlemek için frekansların ve yüzdelerin kullanımını içermektedir. Araştırma bulguları, Türk akademi ortamında önemli bir cinsiyet dengesizliğini ortaya koymaktadır. Erkek akademisyenler, kadın meslektaşlarına kıyasla oldukça orantısız bir şekilde daha fazla liderlik pozisyonu işgal etmektedir. Bilimsel üretim ağı dinamikleri kadınlara ve genç öğretim elemanlarının aleyhinde bir durum sergilemekte ve alanın özelliklerinin aksine disiplinler arası çabalar da oldukça nadirdir. Neyse ki, kadın doktora öğrencilerinin sayısı artış eğilimindedir. Araştırma sonuçlarından hareketle, kadın araştırmacıları ve kadın çalışmalarını destekleyecek fonlama ve mentorluk gibi hem kültürel hem de yapısal düzenlemeler önermekteyiz. Bu düzenlemeler, cinsiyete bakılmaksızın tüm akademisyenlerin gelişebileceği ve bilimin ilerlemesine katkıda bulunabileceği bir ortam için elzemdir.

Anahtar Kelimeler: Cinsiyet Eşitsizliği, Yükseköğretim, Disiplinlerarası İş Birliği, Danışmanlık, Bilimsel Üretim Ağları

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Higher education (HE) not only supports individuals' academic and professional development but also contributes to social and economic growth worldwide. In Türkiye, higher education institutions (HEIs) play significant roles in academic and scientific knowledge production as well as dissemination, not only at the national level but also internationally (Aypay, 2015; Küçükcan & Gür, 2009; Telli, 2018). To this very end, scientific production networks serve quite a vital function in targeting the modern HE missions of education, research, and entrepreneurship (Hou et al., 2020; Jansen et al., 2010; Siciliano et al., 2018; Varga et al., 2014). Scientific production networks define the innate and emerging relationships amongst advisors, graduate students, and academic committees while at the same time inquiring into the dynamics of these relationships. Discerning how network structure and dynamics interact within Turkish HE studies is essential for the development of academic and scientific cooperation and the enhancement of productivity.

Prior to delving deeper into the related literature, it is imperative to portray the evolutionary nature of HE studies in Türkiye. There seems to be a figure-ground relationship between the expansion of the Turkish HE area and the development of Turkish HE studies as a scientific discipline. Following an aggressive expansion strategy after 2006 (Özoğlu et al., 2016), the Turkish HE area hosts slightly over seven million students enrolled at the first, second, and third circle programs in 129 public and 79 foundation universities with nearly 185 thousand faculty as of mid-March 2025 (Yükseköğretim Kurulu, n.d.). Programs on HE studies have primarily appeared at the second cycle degree. The first master's degree program in *Higher Education Administration* was established at Eskişehir Osmangazi University. Later, additional programs were introduced in *Higher Education Administration* at Hacettepe and İstanbul Universities. Sakarya University established a *Higher Education Studies* Program. Despite the lack of a specialized third circle degree program yet, doctoral programs in departments such as educational administration or educational sciences offer suitable options for those who want to complete a PhD in HE studies in Türkiye.

HE statistics indicate that seven distinct HE studies application and research centers were established by Ankara Sosyal Bilimler, İstanbul Aydın, İstanbul Bilgi, Maltepe, Marmara, Sakarya, and Zonguldak Bülent Ecevit Universities to conduct research in the field of HE, develop policy recommendations and design educational programs. Turkish HEIs also have such support units as academic development, data analytics, and university-industry collaboration which are indirectly related to HE policies (Yükseköğretim Kurulu, n.d.). Higher Education Strategy and Research Association (YÖSAD) and Association for Higher Education Studies (YÖÇAD) are non-governmental organizations in the Turkish HE area (Akbulut et al., 2018). Moreover, HE-focused research is published by four thematic Turkish journals affiliated with non-governmental organizations or the application and research centers (Özdemir & Aypay, 2022). The recognition of HE studies as a fundamental discipline of associate professorship by the Inter-university Board in 2015 (Üniversiteler Arası Kurul, 2021) is particularly important for the institutionalization of Turkish HE studies as a field of scientific study.

Although HE is not an academic discipline worldwide, the study of HE is an interdisciplinary endeavor primarily based on social science theories and methods (Altbach, 2014). Özdemir & Aypay (2022) allege that the HE studies field in Türkiye has evolved with conferences, journals, theses, books, professional organizations, and centers except for academic departments with committed staff. However, this may prove to be the most crucial one. Based on Teichler's (2000: 19-21) typology of HE experts, it could be argued that the Turkish HE field mostly hosts discipline/department-based occasional researchers on HE and reflective practitioners rather than continuous discipline-based HE researchers, scholars based in a HE research institute or unit or applied HE researchers. Thus, a certain level of research capacity has been achieved with low socialization and low institutional capacity.

It is possible to conclude that Turkish HE studies share similar characteristics of a small field of study with heterogeneity, national focus, vague boundaries, and a lack of self-definition as proposed by Teichler (2015). Considering the Turkish case, it can be claimed that doctoral dissertations are among the main spheres of scientific production networks. As such, they contribute to the emergence and maintenance of academic disciplines, reflect the support networks and social capital of doctoral students, and facilitate the formation of academic and scientific communities (Friedrich & Bradt, 2021; Seckin & Varol, 2022; Pilbeam et al., 2013). The size and composition of these networks can vary by gender and discipline. This is particularly important as Lortie (1975), the inventor of the notion of apprenticeship of observation, points out that individuals' perceptions of the teaching profession are formed as a result of years of observing teachers as students before their formal education.

The concept of academic tribes and territories, first proposed by Becher (1989), also draws attention to the fact that the knowledge structures of academic disciplines shape the values and behaviors of academics. The model, which argues that the research methods, publication standards, and career trajectories of academic communities are influenced by this epistemic structure, has been criticized for ignoring differences between subfields within disciplines of hard/soft or pure/applied sciences (Trowler, 2014). The revised version by Becher & Trowler (2001) recognizes that cultures are shaped not only by knowledge structures but also by contextual factors such as gender blindness. The final version by Trowler et al. (2012) acknowledges that disciplines are social practices that interact not only with knowledge

structures but also with institutional and individual factors. Gender is a situated social practice as it is considered through interactions, and it is a process where men and women constantly negotiate the construction of identities in a reciprocal positioning (van den Brink & Benschop, 2011). Poggio (2006, p. 225) specifically argues that: "*gender is constantly redefined and negotiated in the everyday practices through which individuals interact, how men and women 'do gender' and how they contribute to the construction of gender identities by engaging in a process of reciprocal positioning*". Clavero & Galligan (2021) used the concept of epistemic justice to examine gender inequalities in HE along with Bourdieu's forms of capital. The authors consider symbolic capital as the most important capital in the academic field since it is associated with prestige and recognition of research, publications, citations, and positions at universities. Thus, differential power and capital distribution create a hierarchy. Here, the role of gatekeepers and powerful actors is important in perpetuating gender inequalities. To illustrate, leadership gender imbalance is trans-organizational and transnational in the top 50 North American universities, with women underrepresented in senior leadership roles and a lack of progress and sustainability beyond assistant dean positions (Azizi et al., 2021). It is highly interesting to report that female college students from adverse backgrounds have significantly lower leadership aspirations than their male peers, and gender disparities persist even after four years of participation in leadership learning experiences (Wolniak et al., 2023).

According to the Bourdieusian perspective, which has been implemented in diverse areas so far (i.e., Ladwig, 1994; McCormick, 2006), every social and cultural field is defined as a playground with its own rules. Habitus is a kind of instinctive guidance system shaped by the social and cultural environment in which individuals live. To participate in a field, players must have a certain level of capital. Current trends indicate that there are notable gender differences in university STEM (science, technology, engineering, and mathematics) education, with female students more evenly represented in the life sciences (e.g., biology, medicine) but underrepresented in physics (Turnbull et al., 2019). Beginning from undergraduate programs, the gendered structures and cultures in academia are (re)produced, maintained, and legitimized through subtle and complex mechanisms that disadvantage women (Owusu-Kwarteng et al., 2025). They call the expectation that women must work twice as hard to prove themselves reflects symbolic violence, where marginalized groups internalize the dominant ideology in Sub-Saharan Africa. Interestingly, women professors in a UK research-intensive university also navigate varying 'gendered spaces' and play the academic game, recognizing its unfairness but still complicit in perpetuating gendered structures and practices (Fagan & Teasdale, 2020). What's more, gender inequalities in academic innovation and enterprise activities are shaped by individual dispositions, science enterprise experiences, and the wider commercial field beyond the university (Karataş-Özkan & Chell, 2015). Academic culture may still be perceived as male-dominated, with professional abilities, attitudes, and personality being gender-neutral components of the scientific habitus (Rogg, 2001).

The myth of meritocracy that human advancement is exclusively based on individual skills and hard work continues to perpetuate gender inequality. Universities consider themselves as meritocratic institutions and do not support women's careers. Academia works subtly, using class and educational background to camouflage the exclusionary practices based on gender. HEIs privilege some social categories while using merit (Clarke et al., 2024). Female academics complain about the slow progress of their work, lack of support, and not being a part of social networks in scientific research. Both mentoring and interpersonal networks exist in academia. Having a mentor is usually associated with career success. However, networks have also been considered "a group of supporters" important for career success. Studies indicated that women and men do not have equal access to these mentors and networks. Women are at a disadvantage, especially in the advancement of management and career success (Henry et al., 2020; Rothstein & Davey, 1995).

Sometimes policies that are developed to provide gender equality may start producing just opposite results (Tauber, 2020). Therefore, substantive research is simultaneously carried out for gender issues in academia at different levels. At the macro level, researchers investigate gender policies at the societal or international level and this provides a top-down view, resistance to gender equality, and the available tools for achieving it. The micro-level level analysis considers individuals' sufferings based on gender discrimination. Meso-level analysis analyzes hidden as well as contested issues that are related to fairness and equality (Etzkowitz et al., 2020). Nevertheless, it is not so easy to reveal the coincidental, intricate, and/or sophisticated relationships within the apparent and hidden barriers to gender equity in modern academia. According to Winslow & Davis (2016), gender inequity is sustained throughout their academic careers from the outset by entrenched policies and covert biases rather than overt discrimination.

The literature points out that the gender productivity gap in science is mainly supported by men's larger scientific production, but women and men show similar success rates in directly evaluated research, and gender bias persists in fields where women are underrepresented (Astegiano et al., 2019). Nielsen et al. (2017) point out that gender diversity in scientific teams leads to smarter, more creative teams, leading to discoveries and improved research productivity. Although gender-diverse teams produce more novel and highly cited scientific papers,

they remain underrepresented in science (Ghiasi et al., 2015; Yang et al., 2022). Despite the increasing participation of women in academia, collaboration networks still have a gendered profile. Women scientists are more egalitarian in scientific collaborations, with men more likely to collaborate with other men (Arau´jo et al., 2017). What's more, women have fewer publications and hold fewer central positions in the scientific collaboration network than men. Thus, women's limited connectivity in authorship networks negatively impacts their visibility and career progression (Bravo-Hermsdorff et al., 2019).

In scientific production networks, multi-disciplinarity promotes interdisciplinary partnerships, facilitates creative problem-solving, and improves the integration of various information (Michinov & Jeanson, 2021). Multidisciplinary research focuses on large-scale problems that cannot be solved by a single discipline (Dalton et al., 2021). Higher levels of multi-disciplinarity in academic research networks can improve performance when supported by relational, cognitive, and structural social capital (Martín-Alcázar et al., 2020). Multidisciplinary collaborative research in HE benefits scholars by networking, sharing workloads, integrating research skills, and supporting teams (Mkwizu, 2024). However, organizational management and incentives are also crucial as simply having a diverse academic environment is not enough to promote research collaborations (Zuo & Zhao, 2018). Moreover, multidisciplinary research requires complex systems with local disorder followed by robust order and system memory, influenced by individual researcher autonomy and research novelty (Dalton et al., 2021).

Multidisciplinary collaboration in doctoral committees offers the potential to enhance the development of early-stage researchers and improve research outcomes. This collaboration involves integrating diverse disciplinary perspectives to address complex research problems, fostering a rich environment for learning and innovation. Brodin & Avery (2020, p. 412) argue that the "*locations and disciplinary profiles of the multidisciplinary environments serve as indicators for the epistemic living space within which early-stage researchers may develop through developmental networks*". What's more, multidisciplinary peer-mentoring groups promote knowledge sharing and emotional support in doctoral education, benefiting both individuals and the organization as a whole (Nokkala et al., 2021). They also promote cross-fertilization of different subfields, benefiting both participants and the scientific field through bidirectional knowledge sharing (Haworth et al., 2023). Multidisciplinary committees are desirable since a multi-disciplinary research network benefits from intellectual exchanges, knowledge transfer, and the development of a collaborative culture (Dimitrova et al., 2014).
In light of what has been presented so far, it can be argued that doctoral theses focusing on Turkish HE are fruitful areas for a more in-depth examination of gendered, titled, and multidisciplinary networking. That's why, these factors seem to interact to shape scientific production networks in the Turkish HE ecosystem and plant the seeds of prospective collaborations. For this purpose, we adopted an unusual way of data collection for educational sciences studies in Türkiye. We accessed and classified publicly available demographic information in doctoral theses obtained from the Turkish National Thesis Center database to reveal the intricate relationships between the gender of students and the gender, academic titles, and fields of specialization of supervisors and thesis monitoring committee members. The results empirically demonstrated what we instinctively knew.

Methodology

The methodology of the present study is presented under the headings of research design, data collection, and data analysis.

Research design

The study examined the Turkish National Thesis Center database provided by the Council of Higher Education to explore the scientific production networks inherent in HE studies in Türkiye. The authors conducted a secondary analysis of 854 doctoral dissertations submitted between the years 1967 and 2020. Secondary analysis is 'any further analysis of an existing dataset which represents interpretations, conclusions or knowledge additional to, or different from, those presented in the first report on (an) inquiry and its results' (Hakim, 1982, p. 1). Put simply, secondary analysis involves the re-use of qualitative or quantitative datasets to answer new questions. It is a widely accepted practice for a wide variety of subject areas in soft and hard sciences like education, librarianship, and nursing.

Answers were sought to the questions of

- What are the overall characteristics of PhD candidates, supervisors, and doctoral dissertation committees?
- What is the role of gender, academic title, and multidisciplinary nature in doctoral networks?

Data collection

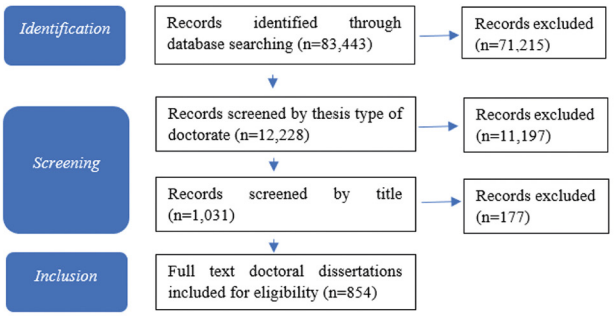
The corpus based on the search terms 'university' and 'universities' in both Turkish and English was primarily used by Özdemir & Aypay (2022). The data collection procedure is illustrated below.

Microsoft Office software was used to address the research data. Although the preliminary dataset included 44 distinct clusters of knowledge regarding Turkish HE studies, we also had to google the supervisors' place of graduation, and committee members' genders, academic titles, and areas of expertise. We hope to submit invaluable research data that was not available before. The data were cross-checked by the two researchers to prevent missing values or coding

errors. The consensus was high, owing to the use of certain sociocultural variables, Organisation for Economic Co-Operation and Development's [OECD] (1972) definition of multidisciplinary nature, and Biglan's (1973) model.

Data analysis

Figure 1
Identification of Sample



The frequencies and percentages were primarily used to scrutinize the scientific production networks inherent in Turkish HE studies. The distributions by gender and academic title were used to reveal the inherent networks. The inbreeding ratio was estimated by dividing the number of inbred supervisors by the total number of supervisors for the relevant departments. As interdisciplinarity in HE is a much more complicated phenomenon, we scrutinize the multidisciplinary nature of the doctoral dissertation committees. According to OECD (1972; 25-26), the concept of multidisciplinary refers to the juxtaposition of various disciplines in HE, sometimes with no apparent connection between them (*e.g.*, music + mathematics + history). During data analysis, the departments of similar faculties (*e.g.*, educational administration and curriculum and instruction), the relevant departments of divergent faculties (*e.g.*, English language teaching and English literature and language), and methodology departments for the relevant areas of study (*e.g.*, the department of educational measurement and evaluation for educational sciences) have not been accepted as the proof of multidisciplinary nature. Lastly, Biglan's (1973) model was used to classify different academic areas as follows:

Findings

To begin with, Table 1 represents the distribution of dissertations in HE studies in Türkiye by gender and academic title (n=854).

Table 1 indicates that life or non-life soft sciences and pure or applied soft sciences are prominent contributors to Turkish HE studies. While applied, soft, and life educational sciences have a 50% share, applied, soft, non-life economics and finance contribute by 20%, and pure, soft, life psychology, sociology, and political sciences by 10%. The table suggests that Turkish HE studies enjoy the advantages of multidisciplinary endeavors. The remaining ratio implies that the hard sciences have a negligible share. Full professors supervised 65% (n=558) of all dissertations, reflecting the fact that doctoral theses are the highest form of scientific production. There are minor differences regarding supervisors' titles by Biglan's (1973) model. Although a gender balance is observed in pure, hard, life health sciences, male advisors have a commanding lead. However, gender distribution in prospective HE studies in Türkiye is anticipated to diverge in advance as female PhD candidates outweigh males. While the majority is slightly in favor of females in educational sciences, and males in social and life sciences, health sciences maintain the tradition of their supervisors by a mile. That said, the inbreeding ratio of supervisors varies between 34% and 64% except for pure, hard, non-life sciences with insufficient data. Table 2 illustrates the distribution of supervisors based on gender and academic title and the gender of PhD candidates.

All academic positions interested in Turkish HE studies are male-dominated in line with the general trend (63%). Although this proposition is particularly significant for full and associate professors, the representation of female supervisors tends to increase at lower academic ranks. The other side of the coin implies that female PhD candidates might play a greater role soon. That's why, the dataset provides us clues about the rising percentage of female PhD candidates from 47% to 56% for the clusters before 2000, 2001-2005, 2006-2010, 2011-2015, and 2016-2020). Moreover, male advisors supervise males by 56% as females do females by 66%. The statistics imply the gender network between supervisors and PhD candidates. Table 3 introduces the distribution of committee membership based on gender network.

While the committee membership of male supervisors is male-dominant (87%), female supervisors are inclined to

Pure, hard, non-life:	Astronomy, Chemistry, Geology, Math, Physics
Pure, hard, life:	Botany, Entomology, Microbiology, Physiology, Zoology
Applied, hard, non-life:	Ceramic, Civil or Mechanical Engineering, Computer Science,
Applied, hard, life:	Agronomy, Dairy Sciences, Horticulture, Agricultural Economics
Pure, soft, non-life:	English, German, History, Philosophy, Russian, Communications
Pure, soft, life:	Anthropology, Political Science, Psychology, Sociology
Applied, soft, non-life:	Accounting, Finance, Economics
Applied, soft, life:	Edu. Admin. & Supervision, Secondary & Continuing Education, Special Education, Vocational and Technical Education

work with female peers predominantly (65%). This is quite important for the gender network as supervisors are the primary agents for the assembling of doctoral dissertation committees in Turkish academia. There seems to be a tacit reciprocity between the genders without underestimating the role of disciplinary cultures, personal relationships, and individual differences by and after birth. Female supervisors' 34 dissertations excluding male members are the products of 19 distinct departments in 18 universities. Female-excluding 14 dissertations by male supervisors are approved by ten distinct departments in eight universities with no systematic reference to any demographics. Table 4 delivers the distribution of committee membership based on the academic title network.

Another implicit network seems to be inherent in the committee membership based on the titles of supervisors for Turkish HE studies. Although full professors dominate, this trend diminishes for associate and assistant professors, whose networking profiles are more similar to one another. Thus, it is highly expected that full professors, associate professors, and assistant professors are the salient committee of supervisors with similar titles by 63%, 12%, and 13% respectively. Additionally, about one-fourth of committees include balanced distribution scenarios for all titles of supervisors. As can be understood, the three pillars (PhD candidates, supervisors, and committee members) of doctoral dissertations are interconnected with each other depending on the variables of gender and academic title. We also probed the multidisciplinary nature of the committee and reported the findings in the Table 5.

Interdisciplinarity is not of top priority for Turkish HE studies as more than two-thirds of dissertations exclude multidisciplinary committee members in addition to missing data for about another 15%. Male supervisors integrate one multidisciplinary committee by 12,4%, and two by 4,1%, and females have quite similar ratios by 10,9% and 2,2%. While supervisors titled by full, associate, and assistant professors have invited one multidisciplinary committee by 11,6%, 13,8%, and 11,8%, the estimates for two committees are 3,4%, 3,1%, and 4,0% respectively. Three or four multidisciplinary committee members have a negligible share, which is quite remarkable considering the interdisciplinary nature of HE studies globally.

Conclusion and Discussion

Based on an examination of 854 doctoral dissertations submitted between 1967 and 2020, soft sciences were found to be the leading contributors to Turkish HE studies. Two-thirds of the theses were supervised by full professors. Although male advisors constitute the majority, the number of female doctoral students is on the rise. While full professors predominantly cooperate with their peers as committee members, assistant professors and associate professors show a more balanced distribution. Most doctoral committees remain monodisciplinary as the proportion of multidisciplinary members is quite low. As a result, our study reveals scientific production networks in Turkish HE studies shaped by gender, academic title, and disciplinary factors, which are partially boosted by inbreeding mechanisms.

The statistics indicate that students enrolled at first, second, and third circle programs in Türkiye are outnumbered by females except for master's degrees, and women constitute 52% of the total (n=7.081.289). There is also a relatively balanced distribution of Turkish faculty by gender. Male faculty make up 53% of the total (184.885). While men predominate the titles of full professor, associate professor, and assistant professor, the titles of lecturer and research assistant are outweighed by females (Yükseköğretim Kurulu, n.d.). The rate of Turkish female academics is above the average of European and OECD countries (European Commission, 2021; OECD, 2023; Yükseköğretim Kurulu, 2024). Female academics are predominantly found in language and literature, health sciences, and social sciences, whereas male academics dominate engineering, mathematics, and physical sciences (Yenilmez, 2016). Despite significant progress in women's education during Türkiye's modern past, it is still difficult to claim that full gender equality has been achieved (Durakbaşa & Karapehlivan, 2018). Although men and women start their academic careers in equal numbers, the percentage of female professors drops to 30%, indicating a 'leaky pipeline' effect where women face challenges in advancing their careers (Adak, 2018).

Female academics in Türkiye appear to be numerically equally represented in the academic world, but they feel that they cannot break away from traditional gender roles, are overwhelmed by stereotyping bias, and are less visible than their male colleagues in both professional and managerial spheres (Altınoluk, 2017; Başarır & Sarı, 2015; Günlük Şenesen, 2009; Öztan & Doğan, 2015). To illustrate, Göktürk (2022) reveals that the editorial representation of female researchers in academic journals in the field of education is also limited. What's more, young female academics feel disadvantaged in advisor-advisee relationships and academic promotion processes due to their gender (Eldemir, 2021). Göktürk & Tülübaş (2021) also pointed out the vertical segregation in the Turkish HE. Kentmen-Cin et al. (2024) analyzed gender-based distribution across different periods and locations, the statistical significance of gender-based mentor-mentee pairings, and the dissertation topics. Their findings revealed a predominance of male students and advisors, especially among senior faculty in the field of IR. It has even been found that women have dropped out of their graduate education for similar reasons (Ağgül et al., 2024). While it is pinpointed that women's representation in academia should be enhanced, gender is still one of the least addressed research topics related to Turkish faculty (Özdemir et al., 2021).

Most of the graduate theses in the field of HE were supervised by male academics (Özdemir & Aypay, 2022)

and full professors (Tepe, 2018) What's more, the interdisciplinary working culture in Turkish academia could not be institutionalized yet as only 67 interdisciplinary theses were produced between 2000-2022 (Özcan et al., 2023). Approximately one-third of the graduate students could not have the chance to choose their advisors (Alpaydın, 2014) who are the foremost agents in forming thesis monitoring committees (Akbulut et al., 2013). It is striking that women and low-titled academics are potential mobbing victims in the Turkish scientific atmosphere (Çögenli & Asunakutlu, 2016). Considering personal relationships and social networks among academics directly affect career and promotion (Oyman Bozkurt, 2017), the networking dynamics appear to work against women and low-titled faculty. On the contrary, female academics contribute positively to academic success, especially in Turkish foundation universities with a high proportion of female academics having higher academic performance (Tekindal et al., 2024).

These trends collectively indicate the continued existence of disciplinary divisions, gender-based differences in academic fields, and an unequal distribution of resources. Such disparities may influence fair access to mentorship, career advancement for faculty, and the overall diversity in academic knowledge production. First, possible gender homophily in academic mentorship indicates persistent imbalances in academic hierarchies, particularly at senior levels, despite a relatively balanced gender distribution among doctoral students. Second, supervisor's gender influences committee gender composition, with male supervisors showing a stronger tendency toward gender-homophilic networks in academic decision-making. This tendency for homophily in committee formation likely contributes to maintaining existing gender disparities in academic representation and influence. Third, full professors hold a significant concentration of power, which reduces opportunities for junior and female faculty to gain experience in thesis administration and decision-making. This limitation may hinder their career progression and reinforce traditional academic hierarchies. Fourth, these patterns could restrict diversity in academic perspectives and decision-making, potentially affecting institutional innovation, inclusivity, and the fair distribution of administrative responsibilities. Lastly, while these trends are present across genders, they appear more prominent among senior faculty. Full professors tend to participate in fewer multidisciplinary committees compared to assistant professors, suggesting that junior faculty may be more open to interdisciplinary collaboration. However, their limited leadership roles in committees reduce the overall institutional impact of this openness.

Overall, these results highlight structural barriers that hinder interdisciplinary collaboration, despite frequent emphasis on its importance at both national and institutional levels. Departments often function independently, which may restrict innovation that typically arises from the interaction of different disciplines. For students under the supervision of these committees, this could result in limited exposure to diverse research methods and theoretical perspectives, potentially narrowing the breadth and impact of their work. To address these issues, institutions may need to implement reforms that actively encourage meaningful cross-disciplinary participation in academic governance. The following recommendations of the recent *Workshop on Improving Doctoral Education* organized by the Council of Higher Education– the main regulatory mechanism in Turkish HE – indicate that the policymakers are aware of the preceding narrative (Yükseköğretim Kurulu, 2022):

- Advisor changes should be made easier and students should be given more decision-making rights.
- Thesis advisory processes should be made transparent and a central monitoring system should be established.
- Thesis monitoring committees should be operated more effectively.
- Multidisciplinary studies should be encouraged in doctoral programs and industry-university collaborations should be strengthened.

Recommendations

Significant progress has been made in the representation of women in Turkish academia. Nevertheless, climatic rather than structural factors contribute to the emergence of academic tribes and territories. One apparent example is the proportion of women in academic management positions (Hoştut, 2020; Kısa et al., 2023; Sezgin & Haykır Hobikoğlu, 2022). Women can be leaders, but their path is more complicated than men's. It is possible to overcome this maze by being aware of the obstacles and acting flexibly and strategically (Eagly & Carli, 2007). Considering the potential limitations it may cause, imposing quotas at managerial levels may increase women's representation and multidisciplinary collaborations. We can also suggest the need to develop institutional policies that will support women researchers and women's studies through funding (Aksay & Yalçın, 2023) and mentoring (Gardiner et al., 2007). Unfortunately, women's studies centers in Türkiye have not even been actively operated so far (Savaş et al., 2018). For this, the issue be regarded as an important agenda by the policymakers. This is essential not only for academia but also for ensuring gender equality in society. That's why, Turkish universities have undertaken the mission of contributing to local and national development (Özdemir et al., 2024). One major obstacle is the multiple roles making it difficult to maintain a work-life balance. This is exactly where structural arrangements are needed. Since the retention of women in academia is also a cultural issue, one should not be in a hurry to get quick results.
While the descriptive approach adopted in this study offers valuable insights into the structural patterns of doctoral-

level scientific production networks in Turkish HE, it is important to note that further methodological expansion could enhance future research. Specifically, social network analysis (SNA) presents a robust analytical framework for modeling the relational dynamics between actors such as PhD candidates, supervisors, and committee members. SNA enables the identification of tie strength, centrality, and positional influence through node-edge structures, offering a more nuanced understanding of academic collaboration and hierarchy. Although the current dataset lacks the detailed relational information required for SNA (e.g., interaction frequency, bidirectionality, network density), the findings of this study may serve as a foundational precursor for such analyses. Therefore, future research employing primary data collection focused on interpersonal academic ties would benefit greatly from integrating SNA methods to further uncover the hidden architectures of scientific networks within Turkish HE studies.

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Table 1
Distribution of Dissertations by Biglan's Model

Inbreeding ratio of supervisors (%)	Academic areas by Biglan's model	Supervisors' title			Supervisors' gender			PhD candidates' gender			Total (n)
		Full professor	Associate professor	Assistant professor	Male	Female	Unknown	Male	Female	Unknown	
0	Pure, hard, non-life	-	-	1	1	-	-	1	-	-	1
44	Pure, hard, life	45	21	4	22	48		14	56	-	70
61	Applied, hard, non-life	10	7	6	13	10	-	6	17	-	23
54	Applied, hard, life	10	1	2	12	-	1	11	2	-	13
64	Pure, soft, non-life	37	12	9	40	17	1	29	27	2	58
39	Pure, soft, life	70	16	16	66	36	-	49	50	3	102
34	Applied, soft, non-life	122	28	11	110	50	1	86	72	3	161
41	Applied, soft, life	264	111	51	267	159	-	211	213	2	426
	Total	**558**	**196**	**100**	**531**	**320**	**3**	**407**	**437**	**10**	**854**

Table 2
Distribution of Supervisors and PhD Candidates

Supervisors' Gender	Supervisors' Academic Title			Phd Candidates' Gender			Total
	Full Professor	Associate Professor	Assistant Professor	Male	Female	Unable to Determine	
Male	350	124	57	298	226	7	531
Female	206	72	42	107	210	3	320
Unknown	2	0	1	2	1	0	3
Total	**558**	**196**	**100**	**407**	**437**	**10**	**854**

Table 3
Distribution of Committee Membership Based on Gender Network*

Supervisor gender		Number of male committee members					Total
		4	3	2	1	None	
Male	N	160	129	84	44	14	431
	%	37	30	20	10	3	100
Female	N	34	59	65	60	51	269
	%	13	22	24	22	19	100

* 119 dissertations did not provide information about the committee appointment process. Also, 32 of them including three or seven committee members and three of them whose genders could not be determined were excluded.

Table 4
Distribution of Committee Membership Based on the Academic Title Network*

Committee Membership		Supervisors' Title					
		Full Professor		Associate Professor		Assistant Professor	
		n	%	n	%	N	%
Full Professor [A]	4a	44	63	7	54	2	49
	3a+b	70		13		5	
	3a+c	45		9		3	
	2a+b+c	50		26		13	
	2a+2b	60		26		9	
	2a+2c	20		6		5	
Associate Professor [B]	a+3b	25	11	8	12	2	9
	4b	7		4		1	
	3b+c	16		8		3	
Assistant Professor [C]	a+3c	13	4	3	7	5	13
	b+3c	5		6		4	
	4c	1		2		1	
Balanced**	a+2b+c	53	22	18	27	1	29
	a+b+2c	37		20		15	
	2b+2c	11		6		6	
	Total	**457**	**100**	**162**	**100**	**75**	**100**

** 119 dissertations did not provide information about the committee appointment process. Also, 32 of them including three or seven committee members, three of them genders of which could not be decided, and 6 of them including at least one member holding a PhD without academic title were excluded.*
*** Balanced scenarios are 2a+b+c, a+b+2c, 2a+2c for associate professors and 2a+b+c, a+2b+c and 2a+2b for assistant professors respectively.*

Table 5
Distribution of Multidisciplinary Committee Members Based on Supervisors' Gender and Academic Title

Variables		Number of Multidisciplinary Committee Members						Total
		1	2	3	4	None	Not known	
Supervisors' Gender	Male	66	22	2	0	363	78	531
	Female	35	7	1	1	234	42	320
	Unable to Determine	0	0	0	0	1	2	3
Supervisors' Title	Full Professor	65	19	1	0	386	87	558
	Associate Professor	27	6	1	0	141	21	196
	Assistant Professor	9	4	1	1	71	14	100
	Total	**101**	**29**	**3**	**1**	**598**	**122**	**854**