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A Thematic Reflection on Gülru Necipoğlu's Theories in the Topkapi Scroll- Geometry and Ornaments in Islamic Architecture

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Research Article

Abstract

The study conducted by Necipoğlu in the book "Geometry and Ornaments in Islamic Architecture" is widely recognized as an influential work. However, some of her assumptions require re-analysis after approximately three decades. This research aims to re-evaluate her three hypotheses from the book, namely the denial of the connection between Sufism and architecture, the position of architecture in the classification of sciences, and the close relationship between mathematicians and artisans. For this purpose, this research, which is methodically organized based on content analysis and interpretive-historical approaches, obtained its data from historical sources and tried to reanalyze the mentioned assumptions by relying on the actor-network theory. The study concludes that although there is a lack of documentation, the connection between architecture and Sufism cannot be disregarded, and one should believe in some form of relationship between them.; Architecture has been an independent knowledge in the classification of sciences since the 8th A.H., and the relationship between mathematicians and craftsmen should be viewed as mutual, and both have played a significant role in promoting the knowledge of practical geometry in architecture.

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Keywords: Islamic Architecture; Actor-Network Theory; Sufism and Architecture; Geometry.

1. Introduction

Necipoğlu's seminal work, "Topkapi Scroll- Geometry and Ornaments in Islamic Architecture," made a profound impact on the field of Islamic architecture by providing an explicit framework for theories that had previously been left implicit. Its first edition was published in 1995 and immediately garnered acclaim, earning both the Albert Hourani and Spiro Kostov book awards. This study offers a valuable perspective on the history and art of Islamic architecture, informed by the ideology that underpins it. As nearly three decades have passed since its publication, it is now imperative to revisit, elaborate upon, scrutinize, and reassess the theories put forth in the book to continue pushing the boundaries of Islamic architectural scholarship. The field of Islamic architecture is categorized into seven distinct areas (Blair and Bloom,2003; Mojtahedzadeh, 2022), including historiographical, archaeological, cultural context-based, traditionalist, phenomenological with a hermeneutic tendency, and based on religious teachings. Professor Necipoğlu's study falls under the final category, which is influenced by the current post-colonial studies. The distinguishing feature of Islamic architectural studies influenced by the post-colonial movement is their opposition to the Western scholars' high handedly visions about the art of the East.

According to Necipoğlu's hypothesis, architecture is a distinct field of study that is consistently classified under the mechanics (Ĭlm al ĥiyal), in all classifications of sciences encyclopedias (Necipoğlu, 1995: 139). She posits that during the Islamic epoch, there existed a close association between geometry theorists and architecture practitioners (Ibid, part4). Moreover, it has been proposed that there was a weak correlation between social movements like Sufism and architecture during that period (Ibid, part 2). This study aims to conduct a thorough analysis of these three fundamental principles as outlined in her book. To achieve this objective, the study will employ a qualitative approach utilizing a combination of content analysis and historical interpretation. The research will draw on historical documents and evidence as a means of testing the validity of Necipoğlu's assumptions. This research is inspired by Necipoğlu's later ideas (2017), where she considered the effectiveness of actor-network theory in Islamic architecture. However, she did not elaborate on this perspective. To ensure historical accuracy, this study endeavors to examine the presence of this theory and detect any indications of it in the perspectives of Islamic scholars in the late Ilkhanid and Timurid eras. By doing so, the research seeks to illuminate and enhance comprehension of these three issues.

2. Research Background

It is not unusual for innovative concepts and hypotheses to encounter opposition, and this particular study is not exempt from such scrutiny. In truth, the level of criticism directed towards it has been so severe that it has been labeled as a "not intended to be read" publication (Saliba, 1999: 637). Additionally, this article challenges the inconsistent arguments of the author in Arabic to English translations, which have led to general criticism (Ibid, 638- 639). One of the major problems identified in Necipoğlu's research is the lack of sufficient evidence to prove the relationship between craftsmen and mathematicians (Ibid, 641- 642). However, it should be noted that the nature of this relationship has not been determined in this article and the author has not provided any answers. Despite this, there are documents that suggest the mathematicians were aware that their methods were not very useful for craftsmen. For example, there is a recommended

method for craftsmen to find the direction of Qibla (Al- Biruni, 1973: 249-252). Such documents could have been mentioned in this critical paper.

Further research has brought to light doubts about the authenticity of the records utilized by Necipoğlu, and the birthplace of geometric designs has come under scrutiny (Allen, 2004). The author asserts that the epistles on practical geometry did not prove to be especially efficacious in the realm of architecture and that the development of these patterns commenced in the late antique era, continuing through the Islamic epoch (Ibid, 12-16). However, the article falls short of providing substantiating proof for this claim and is limited to offering critical commentary on the subject.

Necipoğlu's research presents a significant challenge as she posits that architecture and Sufism are not connected. Scholars who follow traditionalist thought disagree with this claim, citing Necipoğlu's lack of understanding regarding the social origins of mysticism and Sufism, as well as trade union affiliations (Bolkhari, 2016: 537- 453). It is worth noting, however, that these critics have yet to produce any concrete evidence supporting the purported relationship between Sufism and architecture. What sets the current study apart from previous reviews is its effort to align themes and assumptions with historical documents and intends to rectify or adjust assumptions based on a theoretical framework that she has endorsed.

3. Research Methodology

In this study, the methodology employed is thematic analysis, which involves interpreting and organizing aspects of phenomena to summarize, interpret, classify, divide, and reconstruct qualitative data and the repetition of themes in the text is used to identify them (Braun & Clarke, 2006: 75-76). To verify the themes proposed by Necipoğlu, the interpretive-historical method is utilized, because of their historical nature (Grout and Wang, 2012: 31-34). Interpretation requires theoretical foundations, premises, and assumptions to support a convincing argument (Collingwood, 1946: 9-10; Behnoud, 2022: 21). In this study, the actor-network theory is employed as a theoretical basis, so the research methodology is a combination of thematic analysis and interpretive-historical methods. One of the recurring themes in Necipoğlu's research is the relationship between mathematicians and artisans. This study presents a fresh interpretation of this relationship, drawing on historical documents and epistles on practical geometry, as well as the theoretical basis. The classification of sciences, specifically about the position of architecture in the scope of science, is another recurring theme. This research proposes modifications to Necipoğlu's theories by referring to the encyclopaedias of science classification during the Islamic period. Finally, the relationship between Sufism and architecture is analysed. The study explains the nature of this relationship based on historical documents and their interpretation.

4. Theoretical Foundation

The purpose of a theory is to provide a comprehensive set of concepts and regulations that can elucidate a particular subject, ultimately enhancing our comprehension of it (Razjoyan, and Masoudi nejad, 2018: 149). This research utilizes the actor-network theory to achieve this purpose. A branch of semiotics (Law, 1999: 2), this theory takes an ontological approach and is influenced by science and technology studies. It proposes that all knowledge is comprised of social, technical, conceptual, and textual processes, formed by both human and non-human factors such as objects and tools (Dilaveroglu et al., 2021: 44). It's important to note that when applying this theory to historical research, the prevalent ideas of the time being studied must be considered. Otherwise, the

research may be led to anachronism. One of the key tenets of this theory is tracking the actions and actors involved in a network to reveal the nature of the network (law, 2008 a) and how material objects and tools appear in time and space (Law, 2008b). According to the actor-network theory, an actor is not limited to a human with a will (Latour, 1996) but can include any entity with the ability to act, including non-human entities (Latour, 2005). The theory suggests that these actors can make other elements dependent on them, creating a network of interdependent entities (Anvari and Karamollahi, 2018: 39). According to Islamic philosophers' ideas, human movements can be classified as "natural" or "artificial" (Nasir al-Din al-Tūsi, 1977: 149). They attributed artificial movement to human will and the assistance of nature (Qūtb al-Din al-Shirazi, 1990: 1/ 159-161). They also believed that such movements were intended to benefit humans (Tabātabāei, 2004: 237). The general division of movement is based on the mover (the subject of movement) and the agent of movement (Tabātabāei, 1993: 4/46-60). In the case of artificial movement, this means a change or transformation in the materials of nature by a subject or agent to meet primary and secondary human needs (Ibid, 11-12). This process is called art and is considered the best science and the medium of the emergence of truth in existence (Ibn al-ʿArabī, 1999: 6/234). Therefore, in the view of Islamic philosophers, materials, and nature also play a role in the artificial movement, in addition to humans.

This theory emphasizes the importance of networks, where networks and actors are two aspects of the same phenomenon (Latour, 1999a: 19). One person cannot build even one house, but two people can build several houses, so the building process is not up to one person and is a collaborative matter (Ibn Khaldūn, 2003: 2/681-683) as it requires the skills of various workers such as architects, engineers, construction workers, artisans and craftsmen (Ibid: 2/807-811). Some scholars separated engineers and Artisans and considered their differences in the potential of inference (Nasir al-Din al-Tūsi, 1977: 288). It means that at least three actors should be involved in construction. A group in the theoretical field (having the potential of inference), they are known as theoretical geometry scholars (Fārābi, 2010: 77) and are probably involved in the supervision of the building or presenting the general plan (Aghayani Chavoshi, in Būzjānī 2010: fifty-six) and some have acquired their knowledge in practice, who are practical geometry experts (Artisans) (Fārābi, ibid.) and acquired their knowledge through continuous practice (Al-Tahanavi, 1996: 2/1097) and are in charge of building construction and are not very knowledgeable about theoretical geometry (Aghayani Chavoshi, ibid.: fifty-seven). This is while achieving perfection in any industry is considered to fill the gap between theory and practice (Fārābi, 1979: 164). Therefore, the intermediary link needs to have a common language with engineers and manufacturers. This intermediary circle is the master artisans (Ghorbani, and Sheikhan, 1992: 32, 47, 85-89; Laleh, 1996: 42, 48; Mojtahedzadeh, 2021: 145) who, as they say, complete the work by following the instructions of the masters of that industry (Nasir al-Din al-Tūsi, Ibid).

But if we imagine that these three groups are activists in the field of architecture, we are wrong. It has happened a lot that, like the Ferdows historical school (in Aleppo), the patrons, the client, and the users have changed the type of execution and even the geometrical principles governing the construction (Tabbaa, 1988: 23-32); So, this group of hidden actors in the field of action. Reflecting on the data of the previous paragraph, we can say: the network is a collection of all actions, actors, methods, documents and images, tools and materials that appear in a certain time and place (Latour, 2014).

Therefore, relying on these opinions, architecture is an artificial movement, that is, it is directed to action; therefore, one dignity of this network is the process of action. Every human action is based on his knowledge and will; as a result, the agent (actor) with any benefit of knowledge in this

industry is considered another dignity of the architectural network. The industrial movement requires the capture and transformation of natural materials; accordingly, the materials, constructions, and tools of the aspect will be considered another form of architecture. Finally, the product of the architectural work is the last aspect that results from the sum of the previous subjects. The interaction of material and non-material forces affects these subjects and forms the theoretical model of the research (Fig.1).

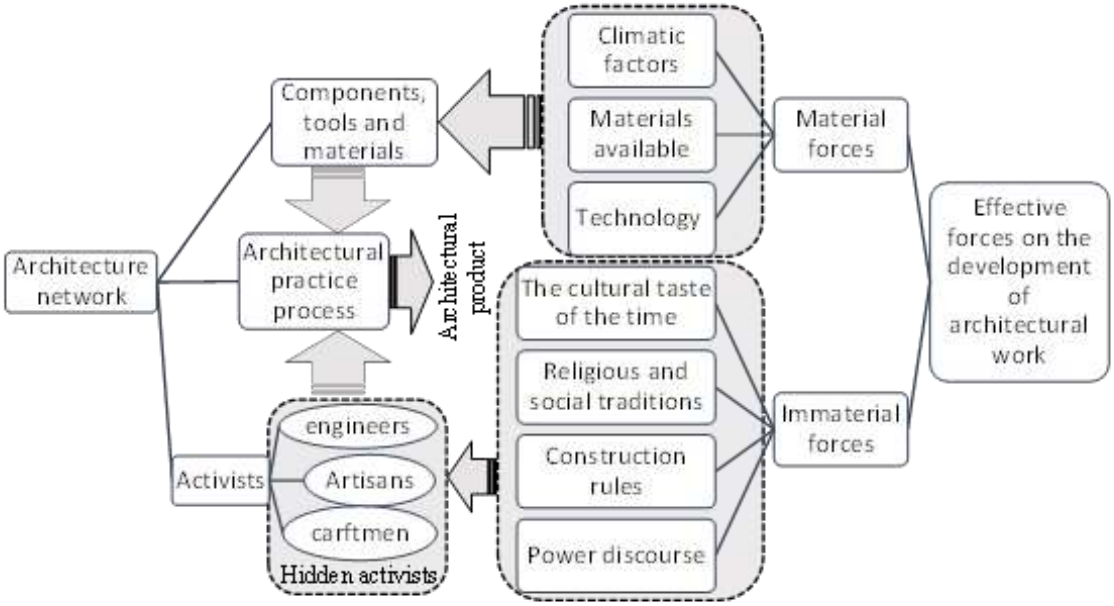

Fig 1 Conceptual model of the material and immaterial forces on actors and architectural works. (Source: Authors)

5. Findings and Discussion

5.1. Analysis of the Relationship between Architecture, Sufism, and Mysticism

In her research, Necipoğlu has rejected the views of traditionalists who assume Islamic architecture is based on mystical and Sufi foundations and consider it to have a timeless nature, due to lack of documentation (Necipoğlu, 1995: 75-83). It seems that her hypothesis needs to be adjusted. It is believed that Sufism was first mentioned in science classification encyclopedias during the 7th A.H (Shams al- Din Amoli, 2002: 2/ 2-128). Some Sufism masters have identified seven stages on the path of the seeker. Each stage has eight conditions, which become increasingly spiritual and difficult as one ascends to higher stages ('Ala' al-Dawla Simnani, 1990: 256-264). Naturally, such difficult conditions can only be achieved by seclusion from the world. This form of mystical behavior can be interpreted as a theoretical mysticism that was established by Ibn al-ʿArabī (1165-1240). Some researchers have believed that it is related to architecture, although there is no evidence to support this claim. As Sufism matured, a popular version of it called " chivalry (Futuwah)" was introduced to penetrate the hearts of the community (Mahjoub, in Va'ez Kashefi, 1971: seventy- seven). Chivalry has been considered a noble science and a branch of Sufism (Va'ez Kashefi, 1971: 5; Shams al- Din Amoli, 2002: 110-128). Its study is not as difficult as the

cases presented earlier. The principles and the ability to acquire chivalry have come in the same form in almost all chivalry edicts (Futuwat nameh) of this age, based on an Imam Ali's hadith (Shams al- Din Amoli, ibid: 115; Va'ez Kashefi, ibid, 27-28; Khan Mohammadi, 1992: 12-13). Such behavior can be considered as a kind of practical mysticism that is not unique to nobility and elites but can also be raised among experts, craftsmen, and guilds. In the east of the Islamic world, the impact of this social culture on guilds is theoretically with chivalry edicts (Futuwat nameh) and public and popular assemblies of some monasteries (Muhammad ibn Monavvar, 2010: 1/67, 270), which is a kind of moral education. From a practical point of view, similarities can be traced in some common ceremonies between guilds and companions of Sufism, such as tying the waist (Shūdd) or promotion to the position of a master (Saeid al- Sheikhli, 1983: 36). Therefore, one should believe in the relationship between a branch of Sufism and a profession such as architecture. Such teachings are effective on religious affairs such as ethics and beliefs and definitely have an effect on the actors the course of architectural action and ultimately the architectural product (Fig. 2).

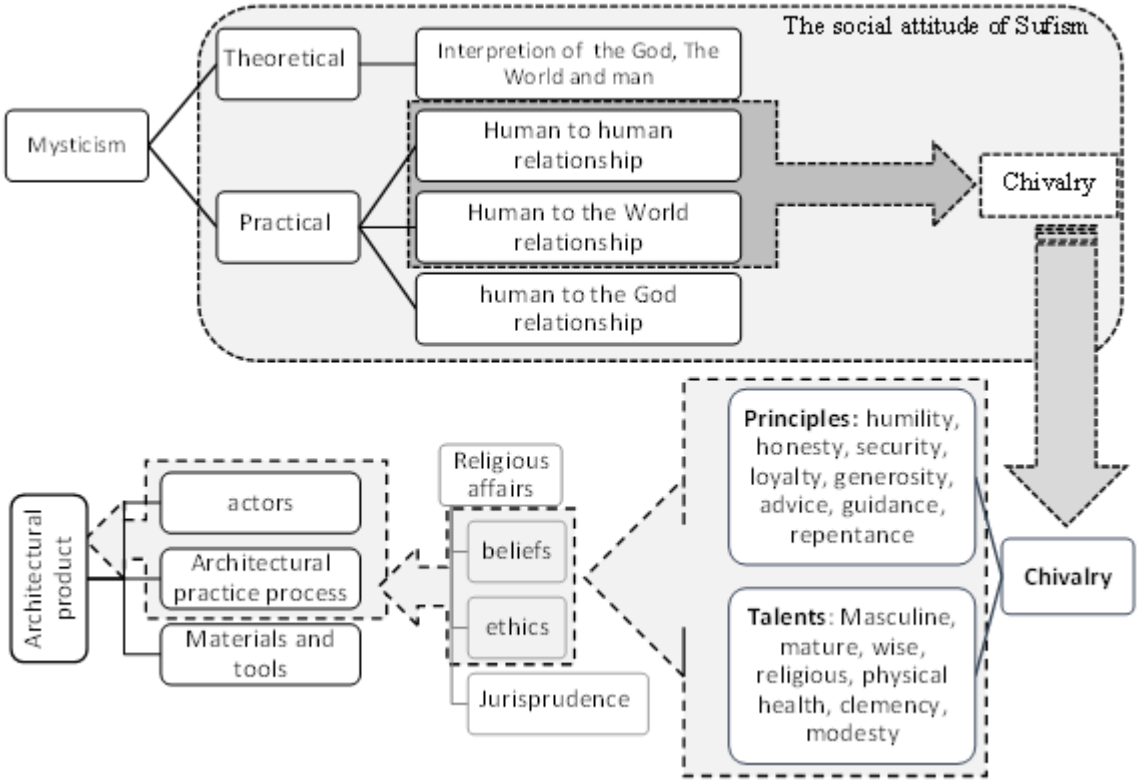

Fig 2 Explanation of the relationship among Sufism, religion and the architectural product. (Source: Authors)

At the same time in the West of the Islamic world, the influence of the Sufism social trend on guilds is different. In the chronicles of the Mamluk period, there are mentions of artisans who attended Sufi meetings and later became scholars and court officials (Ibn Ḥajar al-ʿAsqalānī, 1969: 2/ 321-322, 348, 384). Naturally, the presence of these professionals in the royal system was not without reason and according to luck, but probably the number of study circles in this period, which were mainly managed by Sufis (Al-Maqrīzī, 1997: 4/119; Fernandes, 1997: 110), has been effective in their development, but such an assumption needs a document. One of the authentic texts of this

epoch, it is mentioning a school built by Amir Kafur al-Sarghtamshi, and it is said that at the same time religious students, Sufi seekers, and also artisans are engaged in it, and it is emphasized that its purpose is to eliminate the deficiencies of artisans and craftsmen (Al-Sakhāwī, 1992: 6/226). If Sakhāwī had explained more about this, many of the problems that are present today in the discourse on how to educate architects in the past could have been answered. It is evident that professionals had access to schools managed by Sufis, through which they progressed to high positions in government. As a result, the influence of Sufism on guilds, including architecture, can be seen across the Islamic world, both in the East and West, albeit in different forms. Based on the theoretical foundations of the research, the dignity of architecture is not the only product, as the actors involved, the process of action, the components, and the tools used are also part of it. Therefore, the influence of Sufism on the outcome of architecture during this period is related to the moral and ideological education of the people involved, which plays an important role in the process of architectural action, and ultimately contributes to the architectural products.

5.2. Architectural Knowledge Status in the Scope of Islamic Sciences

In the mentioned research, it is explicitly acknowledged that "Islamic encyclopedias consistently classify architecture and the crafts together with mechanics (Ĭlm al ĥiyal) as subcategories of practical geometry" (Necipoğlu, 1995: 139). Providing such an opinion needs more scrutiny. By examining the science classification encyclopedias in the Islamic era, architecture is classified under mechanical science (Ĭlm al ĥiyal) in only one encyclopedias (Table 1). It seems that Necipoğlu means only Farabi's epistle among all encyclopedias of the Islamic period, because no such comment has been presented in the others (Table 1). According to the book "Ihsa' al- Ulum", geometry is classified into theoretical and practical parts. The theoretical aspect deals with the fundamental principles of the subject, while the practical aspect involves the practical application of altering the shape of materials (Farabi, 2010: 77-79). Farabi (870- 950) designates "Ĭlm al-ĥiyal (mechanic)" as one of the seven divisions of mathematical sciences, which aims to provide a framework for applying theoretical knowledge to practical fields and industries (Ibid: 89). He further divides "Ĭlm al-ĥiyal" into two subcategories, namely numerical and geometrical. Notably, Farabi is the first to explicitly include "architectural engineering" as part of the geometrical Hiyal in the classification of sciences. In his analysis, the importance of “Ĭlm al-ĥiyal" for practical industries like construction and carpentry was emphasized (Ibid: 91-92). Farabi made a distinction between the theoretical and practical aspects of architecture, with the engineering component involving methods and the "executive work" comprising the actual construction. Notably, Farabi did not explicitly include executive tasks in the realm of science but rather considered them a prerequisite for practical industries. As such, it can be inferred that the author only considered the theoretical aspect of architecture to fall under the purview of science. From these premises, Necipoğlu posited her hypothesis on the intimate connection between theoretical and practical geometry scientists.

Table 1 Architectural knowledge status in the science classification encyclopaedias

Encyclopedias	Architecture status	Source
Ihsa' al- Ulum	In this encyclopedia, architecture is included under the mechanical science (Ĭlm al ĥiyal).	Fārābi, 2010: 90-92
Mafātīḥ al-ʿUlūm	With only one example, he has introduced the application of Ĭlm-al-ĥiyal in building construction.	Al-Khwārizmī, 1930: 118-141

al-I'lam bi manaqib al-Islam	He does not consider practical industries as science at all and therefore did not categorize them.	Al-'Amiri,1988: 81-87
Jāmi‘ al-‘ulūm	Architecture has been mentioned in the field of intellectual sciences and its purpose is to meet worldly needs.	Fakhr al-Dīn al-Rāzī, 2004: 464-465
Irshād al-Qāsid	He defines architecture as a subcategory of geometrical knowledge under the name of “Uqūd al– Abniah”, and considers *Ĭlm-al-ĥiyal* to be a separate branch.	Ibn-al-Akfānī, 1904: 108
Miftāḥ al-saʿāda	He defines architecture as a subcategory of geometrical knowledge under the name of “Uqūd al – Abniah”, and considers Ĭlm-al-ĥiyal to be a separate branch.	Taşköprüzade, 1985: v.1: 352

5.3. Close Association between Geometry Theorists and Architecture Practitioners

There has been no consensus on the interaction between the companions of theoretical geometry, artisans and masons who collectively contributed to the development of Islamic architectural decoration before the Mongol conquests (Bier, 2019: 2). Some scholars, such as Chorbachi (1989), Necipoğlu (1995), and Özdural (2002) claim that this relationship has always existed, while others such as George Saliba (1999), Terry Allen (2004), and Yaser Tabbaa (1988) do not believe in its existence. Necipoğlu provides substantiation for her perspective using two forms of evidence. Firstly, she cites the opening remarks alluded to by Farabi which we elaborated in the preceding section. Secondly, she references Abu al-Wafa' al-Būzjani's (940-998) manuscript on practical geometric principles (Kitāb fima yahtaju ilayhi al-sani’ min ‘ilm al-handasa or al- Nijarah) (Necipoğlu, 1995: Part 4), which declares in its introduction that the text was composed to rectify the inadequacies of artisans. While Buzjani mentions at the outset of this epistle that its intended audience is artisans, he underscores in his other works, such as "Arithmetic for the bureaucrats," that these individuals often disregard scientific counsel. Rather, they tend to adhere to the teachings of their former masters, even if these teachings are flawed (Saliba, 1999: 644). On the other hand, one may question why Buzjani focused on this practical geometry treatise instead of spending time on more important theoretical mathematics epistles if this treatise is not utilized. Some historical reports from the century in which Būzjani lived (4th A.H), recount that scientific assemblies, which were sometimes attended by artisans, were held regularly (Arkoun, 2017: 35). Būzjani himself conveyed in a report in this epistle (al- Nijarah) about his presence in a meeting where he solved a problem for tiling together with artisans (Būzjani, 2011: 114-122). On the other hand, some reports prove that there were schools in this period that were established with financial assistance from the government, and the masters of every industry trained students or discussed and exchanged opinions with other scholars (Ibn Miskawayh, 1998: 481-482). With these interpretations and documents, it can be acknowledged that the interaction of artisans and mathematicians cannot be hidden, nor can it be confirmed.

It seems that a logical conclusion can be reached with the theoretical basis presented in this research. According to the theory of "network actor" and the concept of "artificial movement", none of the architectural elements and the forces affecting it alone can provide the final aspect that is the architectural product, and their goal is reached in interaction with other actors (Fig. 1). Before this, it has been stated about the arrangement of actors in the field of architecture that their difference is in the power of inference that one is considered a simple builder and the other is called an engineer, while both are dependent on each other to achieve the goal (Nasir al-Din al-Tūsi, 1977: 288). Bruno Latour believes that the prerequisite of even the theories of scientists is "action". With this assumption, he somehow considers action as preferable (Latour, 1999 b: 66). Such a point of view

is also current in the thought of Muslim scholars, and Ibn Arabi (560-638 A.H) in the "Fusûsu'l-hikem" strongly emphasizes that " Science arises about beings (objective or abstract)" (Ibn al-ʿArabī, 2008: 87). The simple form of this Proposition means that there must be something that about which, science is created and theorizing around it.

From the sum of the mentioned opinions, it can be analysed that firstly, any activist, whether strong or weak, is capable of making changes in the network; Secondly, according to Pierre Bourdieu in the book "Logic of Practice", the actors of each field are "active agents". The concept of an active agents is based on the claim that every actor has the ability to improvise according to the principles of each network and field without coercion or commitment (Webster, 2018: 51). In the narration that was accounted from Būzjani, the artisans did not accept his opinion (Būzjani, Ibid). It is obvious that these artisans were not at the level of Būzjani in terms of science, but because they are active agents, they have the ability to make changes in their network in relation to the construction culture of the epoch. Therefore, Necipoğlu's opinion can be modified in this way, the interaction between artisans and mathematicians was not one-way, but a two-way interaction, artisans raised issues with mathematicians in scientific meetings, and on the other hand, mathematicians formulated some epistles on practical geometry tried to fill the gap between practice and opinion and promote the knowledge of practical geometry. It appears that using fuzzy logic for inference is more suitable than using the formal logic employed by other scholars (Fig. 3).

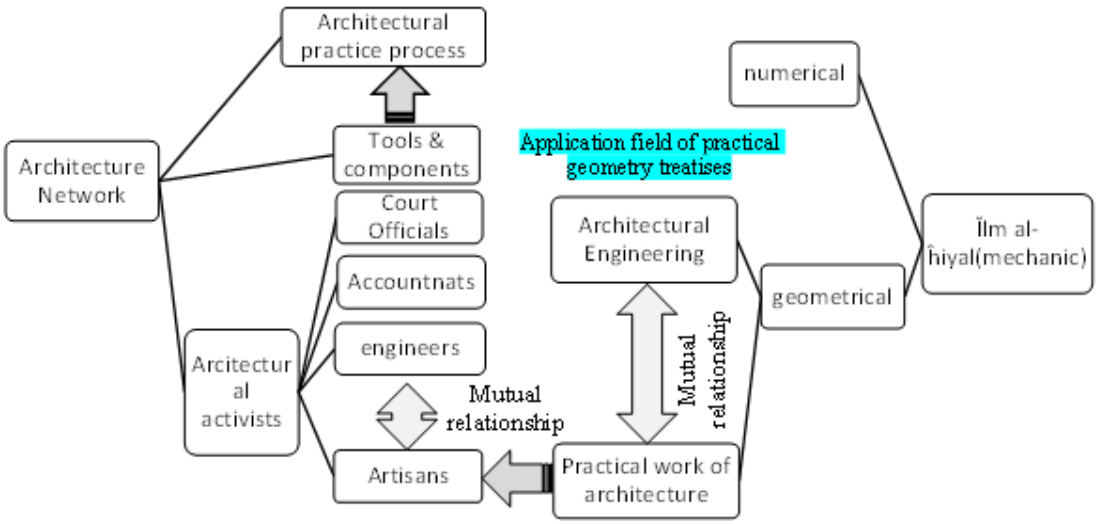

Fig 3 Explaining the relationship between industrialists and other architectural activists and users of practical geometry treatises (Source: Authors)

6. Conclusion

The present study aims to reanalyse three hypotheses put forward by Necipoğlu in her seminal research. The study employs historical sources and a theoretical basis that aligns with the thoughts of Islamic period scholars to scrutinize these assumptions. One of Necipoğlu's hypotheses pertains to the ratio of intellectual currents, such as mysticism and Sufism, which she denied due to

insufficient resources. However, the study demonstrates that Sufism has been influential on guilds, such as architecture, in the East and West of the Islamic world, albeit in different ways. In the West, craftsmen received direct education in schools that were certified by Sufism, while in the East, chivalry edicts (Futuwat nameh), public meetings, and imitation of the ritual were prevalent among guilds. This finding refutes the assumption that there was no affinity between Sufism and guilds. The second assumption made by Necipoğlu concerns the position of architecture in the field of Islamic sciences, which she considered a subset of mechanics (Ĭlm al-ĥiyal). However, an examination of other encyclopaedias reveals that only Farabi believed in this division. From the eighth century onwards, architecture was classified as "ʿUqūd al– Abniah" under mathematics and geometry and became an autonomous subject. Therefore, this hypothesis requires modification. The third assumption made by Necipoğlu pertains to the relationship between artisans and mathematicians. This assumption requires a change in the logic of the conclusion. According to the documents presented in this research, every activist in the field of architecture with any amount of knowledge in the Islamic period could change their network. Therefore, the one-way relationship between mathematicians and craftsmen should be transformed into a two-way relationship, and sufficient credit must be given to all activists. Both artisans and mathematicians have been instrumental in bridging the gap between theoretical science and practical science, and both have contributed to the promotion of practical geometry in architecture. In conclusion, each of the hypotheses presented by Necipoğlu can be an opportunity for other researchers to investigate them more deeply.

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