

Mathematical Logic Integration Scheme in Ushul Fiqh

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Abstract. This research is aimed to arrange an integration scheme between mathematical logic and ushul fiqh which focuses on the discussion of mafhum mukholafah. This study is designed by using a qualitative design, which conducted by using library research/literature study. It was carried out by collecting materials related to research from books, scientific journals, literature and other publications that were worthy of being used as sources for research studies by describing the data through several expert opinions. The results of this study indicate that there is an integration between mathematical logic and the science of mantiq, especially in the discussion of the inverse of a statement with mafhum mukholafah. However, there is also a gap between them, there are still objects of study in ushul fiqh that cannot be accommodated in mathematical logic.

Keywords Integration; Ushul Fiqh; Mathematical Logic; Mafhum Mukholafah

A. INTRODUCTION

Ushul fiqh is one of the methodologies for taking Islamic law which apart from being based on revelation, also requires logical arguments to formulate the rules for extracting law or legal *istinbat* based on the science of mantiq (Djalil, 2014). In the context of problems in general, especially in the contextual *maqulat* (rational) the existing revelation texts can be referred directly by using several rules of interpretation. However, some problems are not general and constantly changing so this requires the *ijtihad* of some fuqaha to establish a law based on qiyas or analogies of pre-existing legal sources (Asni, 2017; Syarifudin, 2014). For example, at the time of the Prophet Muhammad, there was no social media such as Facebook, Instagram, so *dalil* regarding to backbiting and slander were only limited to verbal backbiting and verbal slander. Meanwhile, in today's era which is marked by the emergence of various technological facilities in the 21st century, problems regarding backbiting, slander etc., have become metaphors for hoaxes, hate speech, cyber bullying etc. It needs to be considered that the text of revelation is not enough to issue a fatwa on a matter. The problems of Muslims today are not only related to halal-haram and *ubudiyah mahdhah* issues, but they are more complex and broader, such as political issues (*siyasah*), law, and other social issues. Because Islam came to spread the grace of the whole world. This is in line with the concept of *wamaa arsalnaaka illa rahmatan lil 'aalamiin*. These aspects require deep *ijtihad* and high intellectual sincerity (Yasid, 2019). The text of revelation has not changed, but cases of Islamic law are constantly evolving along with the dynamics of human development. Thus, legal discovery is needed so that legal survival is always grounded and reaches all dimensions of life and human life (Mahsun, 2016).

Based on history, Greek philosophy pioneered by Aristotle, Plato, and Plotinus had dominated scientific studies in various directions, including studies on ushul fiqh (Djalil, 2014). The involvement of Greek logic in the formulation of the rules of ushul fiqh is undeniable. However, to say that the science of ushul fiqh is entirely an imported product from Ancient Greece is also inaccurate, because ushul fiqh is not purely built from Greek logic, but from the intersection of thoughts (Yasid, 2019). This is done to produce operational laws that are in accordance with the purpose of the revealed text

of revelation, namely for the benefit of the world and the hereafter. Such a noble goal in the science of ushul fiqh is referred to as *maqashid ash-shari'ah* (the purpose of law enforcement).

The science of ushul fiqh is an important part in determining Islamic law, because studies in ushul fiqh are very closely related to the Qur'an and Hadith which are the source of law as well as the main foothold for Muslim (Al Zuhaili, 1986). Therefore, in ushul fiqh, a methodology for taking legal steps has been established (Atabik, 2016). According to (Zahrah, 2014) there are two approaches to extracting the law (*thuruq al-istinbath*) from texts or revealed texts. First, the meaning approach, namely drawing conclusions not directly from the text, but using *qiyas*, *istihsan*, *mashalih mursalah*, *dzara'i*, and so on. Second, the *lafadh* approach, namely its application requires several supporting factors, namely mastery of the meaning and *lafadh* texts. Thus, the discussion of ushul fiqh is often studied more deeply in the section related to *lafadh* and the meaning of the *lafadh*.

In understanding the meaning of *lafadh*, it is necessary to have instructions (*dilalah*) (Atabik, 2016). *Dilalah* is divided into *dilalah mantuq* (pronounced meaning) and *dilalah mafhum* (implied meaning) (Al Hudhari, 2000; al-Qaththan, 1973). The *ushuliyyin* divide understanding into two main points, namely *mafhum muwafaqah* and *mafhum mukholafah*. This study will present a discussion about *dilalah mafhum*, more specifically in *mafhum mukholafah*. *Mafhum mukholafah* is the implied meaning of a text that is different (opposite) from the text in *lafadh* (Shihab, 2013). *Mafhum mukholafah* can also be interpreted as a condition if there is a law stipulated by the texts, and it contains certain limitations, such as time, quantity, requirements, or objectives, then the law from the texts can be explored from a point of view other than the texts listed (Khalaf, 1996). Based on this view, it can be said that *mafhum mukholafah* is the opposite meaning of the texts that have been written. Meanwhile, in mathematical logic, a statement that is the opposite of the original statement is called an inverse.

In line with the previous explanation regarding *mafhum mukholafah*, it can be said that the inverse is the equivalent form of *mafhum mukholafah*. However, of course it cannot be taken completely because many things in ushul fiqh cannot be fully accommodated by mathematical logic. Based on this explanation, it is necessary to study the integration between mathematical logic and ushul fiqh. This integration concept does not aim to compare the study of mathematical logic with ushul fiqh but this study aims to look at the study of ushul fiqh from mathematical logic and see the relevance of logic implementation in the study of ushul fiqh. This study limits the integration study to the *mafhum mukholafah* and the inverse of mathematical logic, to describe the relationship of the inverse in mathematical logic to the *mafhum mukholafah* in ushul fiqh as an instrumentation in making decisions of a law based on equivalent or equivalent statements (premises). In addition, it is still possible that there is a gap between the two discussions considering that they both stand in quite different domains. This study is intended as an effort to implement scientific studies or general knowledge and religion as mandated by the Directorate General of Islamic Education that PTKIN should be the locomotive for progress in developing the integration of religion and science. It is hoped that the dissemination of this research will further strengthen the integration of religion and science because all knowledge is sourced from God's revelation so that in the future there will be no dichotomy between religion, science, and mathematics.

B. METHODS

This research is designed by using a qualitative design, which conducted by using library research/ literature study. It aims to arrange an integration scheme between mathematical logic and ushul fiqh, in this case focusing on *mafhum mukholafah*. The data collection technique was carried out by reviewing documents and literature relating to mathematical logic, ushul fiqh and *mantiq* science.

C. RESULT & DISCUSSION

Learning about logic means learning about the basic elements of logic, namely propositions or statements. A proposition is a sentence that has a truth value, it can be true or false and both cannot occur. In logic there are two types of propositions, namely atomic propositions (single sentences) and compound propositions (compound sentences). According to Aristotle with his Greek

logic, a proposition is a news sentence that states truth or denial (Purwanto, 2019). This indicates that a statement or proposition can be true or false, but not both. For example "*Prophet Muhammad was a man*", this sentence is true so it can be called a proposition. In *mantiq* science, the term that is commensurate with a proposition or statement is *qadhiyyah*, which is an arrangement of news sentences that can be said to be true if it is in accordance with the evidence and a lie if it is not in accordance with the evidence (Abdulchalik & Mukarromah, 2013).

Under certain conditions, a text, *qadhiyyah*, or proposition can have conditions or limitations. *Mantiq* science calls this limitation as *qayyid*, for example in the word of Allah SWT:

"It is forbidden for you (to eat) carrion, blood, pork, and the meat of animals slaughtered in the name of other than Allah."

The verse shows the prohibition of animal meat with *qayyid* being slaughtered by other than in the name of Allah. This means that if the *qayyid* is not present then the animal's meat becomes halal. In the sense of *mantiq* science, sentences that contain *qayyid* or limits are also called *qadhiyah syarthiyyah* or in mathematical logic they are called conditional sentences or implications. A conditional sentence in mathematical logic always consists of two components, namely cause and effect denoted $p \rightarrow q$ where p is cause and q is effect. In *mantiq* science, the cause component is referred to as *muqaddam* while the effect component is referred to as *tali* (Machendrawaty, 2019). In general, the characteristics of *qadhiyyah syarthiyyah* contain conjunctions (*'adat as-syarat*) such as "*if... then ...*".

There are several types of *qadhiyyah syarthiyyah*, the first when viewed from the point of view of the prevalence of ties for *muqaddam*, namely *qadhiyyah syarthiyyah mujabah* and *qadhiyyah syarthiyyah saalibah*. These two types of *qadhiyyah syarthiyyah* are characterized by the positive and negative relationship of the *muqaddam* and the *tali*. The following examples are statements that are included in the *qadhiyyah syarthiyyah mujabah*:

If Ali is diligent, then he passes the test.

If an object develop, then it needs food.

From this example, it appears that the usual relationship between *muqaddam* and *tali* is a positive relationship, meaning that a positive *muqaddam* causes a positive *tali* as well. In mathematical logic, the two components of cause and effect in *qadhiyyah syarthiyyah mujabah* are causal sentences, both of which are true, so the statement is also true. Meanwhile, if the cause component is true and the effect component is false, then the statement is false. examples of *qadhiyyah syarthiyyah saalibah* are as follows:

If Ali is not diligent, then he does not pass the test

It is not true that if an object is not developed, it will need food

From this example, it appears that the relationship between *muqaddam* and *tali* is characterized by the negative of *muqaddam*. In mathematical logic, when the cause statement is false, the effect statement does not need to be considered because both the truth value as a result is false or the implication statement is true. Based on this explanation, *qadhiyyah syarthiyyahh crossah* and *mujabah* can be juxtaposed with a combination of the truth value of the implication statement. As listed in Table 1 below.

Table 1. Implication truth value and Qadhiyyah Syarthiyyah

p	q	$p \rightarrow q$	<i>qadhiyyah syarthiyyah</i>
B	B	B	<i>mujabah</i>
B	S	S	<i>mujabah</i>
S	B	B	<i>salibah</i>
S	S	B	<i>salibah</i>

In addition, from the relationship between *muqaddam* and its *tali*, *qadhiyyah syarthiyyah* can be divided into two, namely *qadhiyyah syarthiyyah muttashilah* and *qadhiyyah syarthiyyah munfasilah*. *Qadhiyyah syarthiyyah muttashilah* is *qadhiyyah syarthiyyah* which *muqaddam* and its strings are related, while *qadhiyyah syarthiyyah munfasilah* is *qadhiyyah syarthiyyah* whose *muqaddam* and *tali* are unrelated and even contradictory (Azka & Nailul, 2012). In terms of discussing *mafhum mukholafah*, the *qadhiyyah syarthiyyah* used is the *qadhiyyah syarthiyyah muttashilah*.

The relationship between *muqaddam* and *tali* in *qadhiyyah syarhiyyah muttashilah* is further divided into several based on the rational aspect of the relationship. If the relationship can be accepted by reason or reason, then it is called *qadhiyyah syarhiyyah luzumiyah*. Meanwhile, if the relationship is just a coincidence then it is called *qadhiyyah syarhiyyah ittifaqiyah*. For example, the sentence "if it is cloudy today, then the rain will come" is an example of *qadhiyyah luzumiyah*, because cloudy and rainy conditions are common attachments and not a coincidence. Unlike the case with the sentence "If I win the competition, then I will treat all my classmates", this sentence is an example of *qadhiyyah ittifaqiyah* because the conditions for winning and treating are coincidental, or in the form of someone's wishes that may change. However, mathematical logic does not pay attention to the prevalence of such relationships. Because true or false a statement in mathematical logic is not seen or measured about the prevalence of the statement, whether it is common, coincidental, or otherwise. In mathematical logic, the truth of a statement is measured by whether or not the statement occurs. This shows a gap as well as confirms that not all logic in the science of mantiq is taken from mathematical logic. There are still things that are not accommodated by mathematical logic, such as the truth value of a relationship between cause and effect.

In this case, the subject of discussion is *qadhiyyah syarhiyyah muttashilah luzumiyah*, namely *qadhiyyah syarhiyyah* whose *muqaddam* (cause) and string (effect) are closely related. The discussion on *mafhum mukholafah* requires that the text being studied must be in the form of *qadhiyyah syarhiyyah luzumiyah*. For example, in QS At Talaq verse 6, the meaning is as follows:

"And if they (wives who have been divorced) are pregnant, then give them their livelihood until they give birth."

The verse is an example of *qadhiyyah syarhiyyah luzumiyah*, with *muqaddam* "if the wife who is divorced is pregnant" and the *tali* "husband provides a living". The relationship between *muqaddam* and *tali* in the verse is common and definite, not a coincidence or individual desire. Hence, the verse applies *mafhum mukholafah*, "if the wife who is divorced is not pregnant, then the husband is not obliged to provide a living". Meanwhile, in the following QS An Nur verse 33:

"And do not force your female slaves to commit prostitution, if they themselves want to maintain chastity..."

The verse is a *qadhiyyah syarhiyyah*, but the relationship between *muqaddam* and *tali* is unusual and definite, but based on the wishes of the subject. This can be seen in the sentence "if they themselves want to maintain chastity", the sentence shows individual desires so that it cannot be categorized as *luzumiyah*, but *ittifaqiyah*. This will also seem odd and unusual if it is forced to determine the *mafhum mukholafah*, "you may force your female slaves to commit prostitution, if they do not want to maintain chastity". This sentence clearly contradicts the main goal of *ushul fiqh*, namely *maqashid syar'iyah*.

Mafhum mukholafah is the determination of legal opponents taken from the arguments mentioned in the texts to something that is not mentioned in the texts (Asni, 2017; Mansur, 2019; Podungge, 2016; Syam, 2017; Tumin, 2018). In addition, *mafhum mukholafah* can also be interpreted as the determination of the law mentioned in the texts because there is no limitation (*qayyid*) that limits the validity of the law. This shows that, if the text indicates *halal* law with limitations (*qayyid*), then it can also be understood as a law that forbids if the *qayyid* does not exist (Zahrah, 2014). This shows that in adopting the rule of law using *mafhum mukholafah*, of course there are certain limitations or conditions so that the taking of the law can be carried out, one of which is by considering the existence of *qayyid* in a text.

As explained earlier, a statement that has certain limitations or conditions is called a conditional sentence or an implication sentence. In this case, it is expressed by "if...then..." or "...causes...", and is denoted by $p \rightarrow q$ where p is the cause and q is the effect. In this case, the implication sentence on mathematical logic can be expressed in several equivalent and non-equivalent forms, as shown in Figure 1 below.

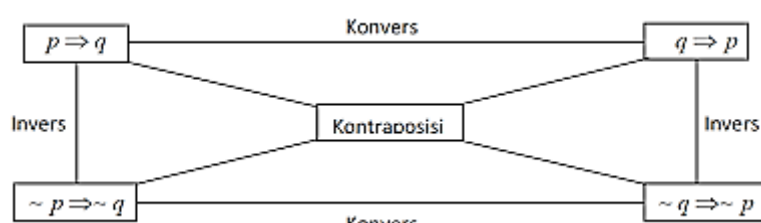


Figure 1. Inverse, Converse, and Contraposition of the statement $p \rightarrow q$

Statements that have the opposite meaning of the original statement are called inverses (Houston, 2009). For example, the statement "*if it is the month of Ramadan, then fasting is obligatory*", the inverse of the statement is "*if it is not the month of Ramadan, then it is not obligatory to fast*". For example in the following verse:

"And if they (wives who have been divorced) are pregnant, then give them their livelihood until they give birth."

In the verse mentioned above, the muqaddam is if the wife who has been divorced is pregnant, while the tali is that the husband is obliged to provide a living. So the meaning of the verse is that if the wife (who has been divorced) is not pregnant, then the husband is not obliged to provide a living.

In mathematical logic, the texts contained in the letter can be stated in the implication sentence, as "if the divorced wife is pregnant, then the husband is obliged to provide a living". While the inverse of the statement is "*if the wife is not pregnant, then the husband is not obliged to provide a living*". Thus, *mafhum mukholafah* can be said to be the inverse of the text, as mentioned by (bin Mohd Yunus et al., 2013) that *mafhum mukholafah* is also referred to as the inverse method or the opposite. Figure 2 below explains how *mafhum mukholafah* of a verse is the inverse of the text.

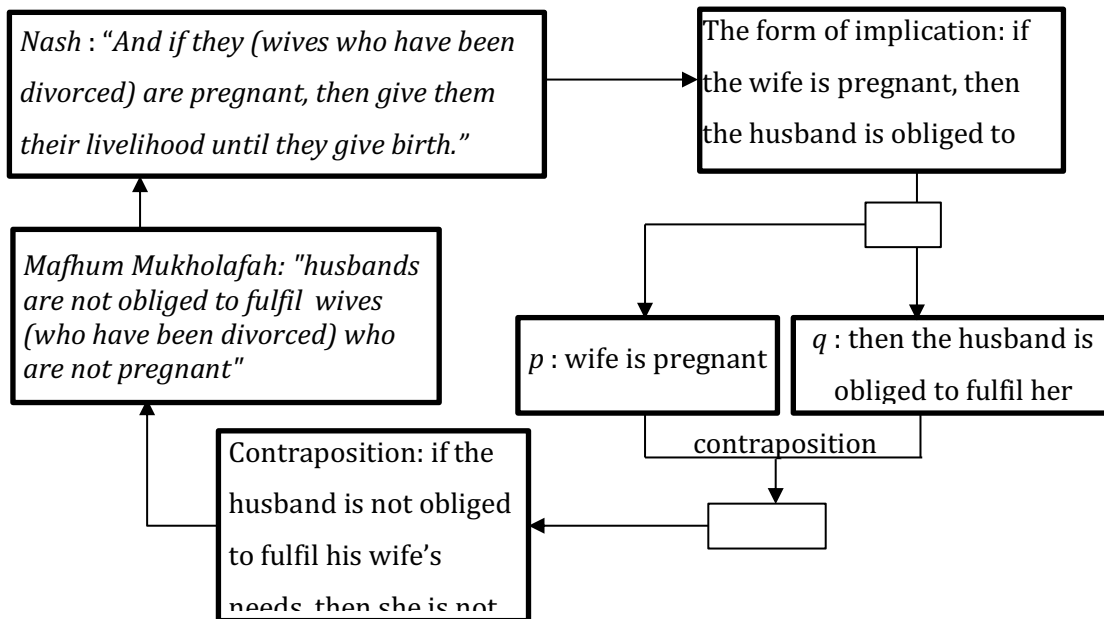


Figure 2. Mafhum Mukholafah and it's inverse

The integration scheme between mantiq science and mathematical logic in the study of ushul fiqh, especially the discussion of inverses *mafhum mukholafah* is shown in Figure 3 below.

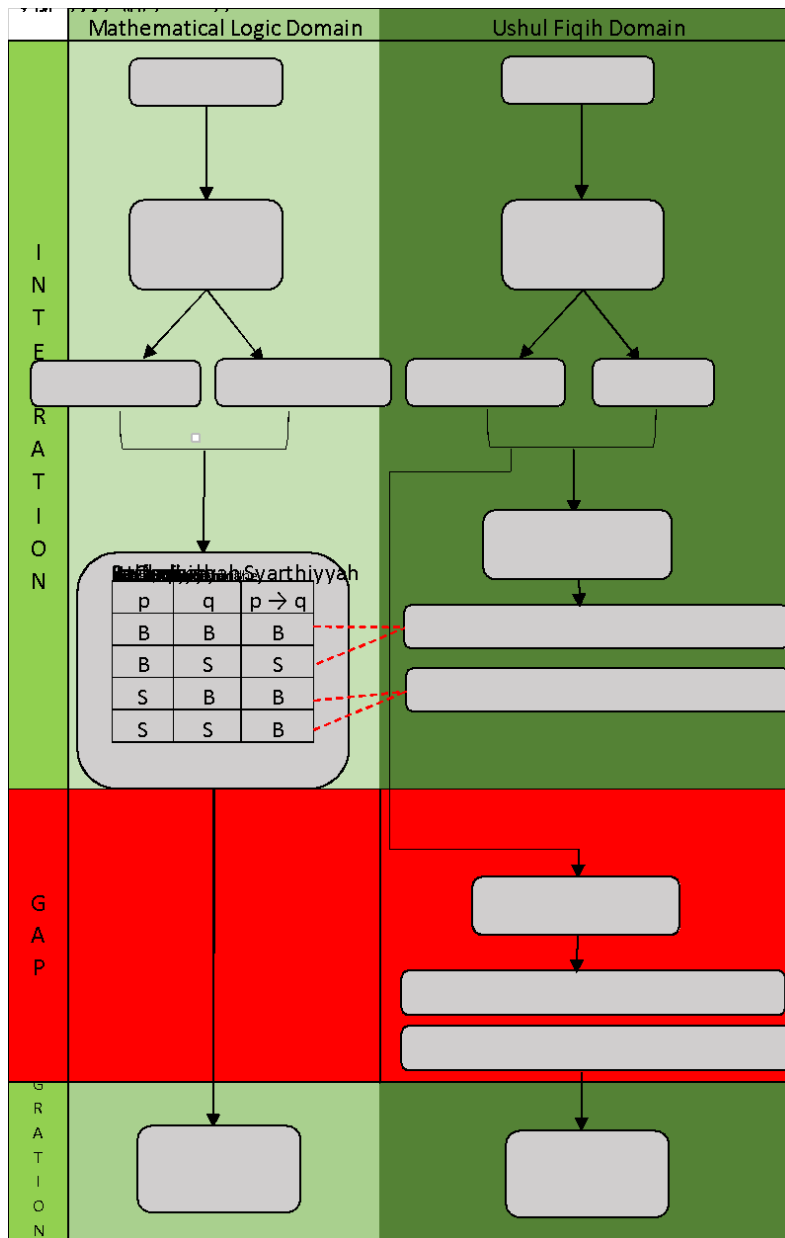


Figure 3. Mathematical Logic Integration Scheme and Ushul Fiqh

D. CONCLUSION

Based on the discussion above, it can be concluded that there is an integration between mathematical logic and the science of mantiq, especially in discussing the inverse of a statement with *mafhum mukholafah*. However, there is a gap in this study. It can be seen that there are still objects of study in ushul fiqh that cannot be accommodated by mathematical logic, but analysis is needed through a mantiq approach.

The results of this study are limited to the integration between mathematical logic and the science of mantiq, especially in discussing the inverse of a statement in the study of Ushul Fiqh. For this reason, it is necessary to carry out further research related to the expansion of studies other than *mafhum mukholafah*, such as converse, contraposition, contradiction and tautology. In addition, there is a need for further research related to the development of an integration scheme between mathematical logic, mantiq science and Al-Qur'an Hadith.

REFERENCES

- Abdul Chalik, C., & Mukarromah, O. (2013). *Ilmu Mantiq Undang-Undang Berpikir Valid*. Pt Grafindo Persada.
- Al Hudhari, M. (2000). *Ushul Fiqh*. Al-Maktabah Al-Taufiqiyah.
- Al-Qaththan, M. K. (1973). *Mabahits Fi Ulum Al Qur'an*. Mansyurat Al-'Asr Al-Hadits.
- Al Zuhaili, W. (1986). *Ushul Al-Fiqh Al-Islami*. Dar Al-Fikr.
- Asni, F. A. H. M. (2017). Al-Syatibi Methodology Analysis In The Unification Of Usul Al-Fiqh Methods. *International Journal Of Academic Research In Business And Social Sciences*, 7(7), Pages 260-268. <https://doi.org/10.6007/Ijarbss/V7-I7/3093>
- Atabik, A. (2016). Peranan Manthuh Dan Mafhum Dalam Menetapkan Hukum Dari Al-Qur'an Dan Sunnah. *Yudisia : Jurnal Pemikiran Hukum Dan Hukum Islam*, 6(1), Article 1. <https://doi.org/10.21043/Yudisia.V6i1.1478>
- Azka, D., & Nailul, H. (2012). *Sulam Al Munawraq Kajian Dan Penjelasan Ilmu Mantiq*. Santri Salaf Press.
- Bin Mohd Yunus, A., Bin Man, S., Binti Mohamad, M., & Bin Wan Chik, W. M. Y. (2013). An Analysis Of Fiqh Al-Waqi (An Understanding Of Contemporary Problems) On The Ruling Of Compulsory Boycott Of Kfc (Malaysia).
- Djalil, D. H. A. B. (2014). *Ilmu Ushul Fiqih: 1 & 2*. Kencana Prenadamedia Group.
- Houston, K. (2009). *How To Think Like A Mathematician*. Cambridge University Press.
- Khalaf, A. W. (1996). *Ilmu Ushul Fiqh*. Bandung: Gema Risalah Press.
- Machendrawaty, N. (2019). *Ilmu Mantik Pintu Utama Berpikir Logis*. Cv Mimbar Pustaka.
- Mahsun, M. M. (2016). Argumen A Portiori (Mafhum Muwafaqah) Dan Argumen A Contrario (Mafhum Mukhalafah) (Sebuah Studi Perbandingan Hukum Islam Dengan Hukum Positif). *El-Wasathiya: Jurnal Studi Agama*, 4(1), Article 1.
- Mansur, M. (2019). Perempuan Dalam Ruang Publik Islam (Studi Metode Istisbat Hukum Dalam Buku Ahkamul Fuqaha). *Economic: Journal Of Economic And Islamic Law*, 9(2), Article 2. <http://ejournal.kopertais4.or.id/tapalkuda/index.php/economic/article/view/3635>
- Podungge, R. (2016). Mengembangkan Hukum Tuhan: Otoritas Tuhan Dan Peran Nalar Manusia Dalam Penemuan Hukum Islam. *Al-Mizan*, 12(1), Article 1.
- Purwanto, M. R. (2019). *Ilmu Mantiq*. Uii Press.
- Shihab, M. Q. (2013). *Kaidah Tafsir*. Lentera Hati Group.
- Syam, R. B. (2017). Persetujuan Anak Gadis Sebagai Syarat Sah Perkawinan Dalam Pandangan Ibn Qayyim Al-Jawziyyah [Skripsi, Iain Syekh Nurjati Cirebon]. <http://repository.syekhnurjati.ac.id>
- Syarifudin, P. D. H. A. (2014). *Ushul Fiqih Jilid Ii*. Prenada Media.
- Tumin, T. (2018). Pendapat Ulama Tentang Hukum Berhujjah Dengan Mafhum Mukhalafah. *Syarah: Jurnal Hukum Islam Dan Ekonomi*, 7(1), Article 1. <https://ejurnal.iainlhokseumawe.ac.id/index.php/syarah/article/view/187>
- Yasid, A. (2019). *Logika Ushul Fiqh*. Yogyakarta: Ircisod.
- Zahrah, M. A. (2014). *Ushul Fiqih* (Ma'shum, Trans.). Pustaka Firdaus. <https://laser.umm.ac.id/catalog-detail-copy/050003566/>