

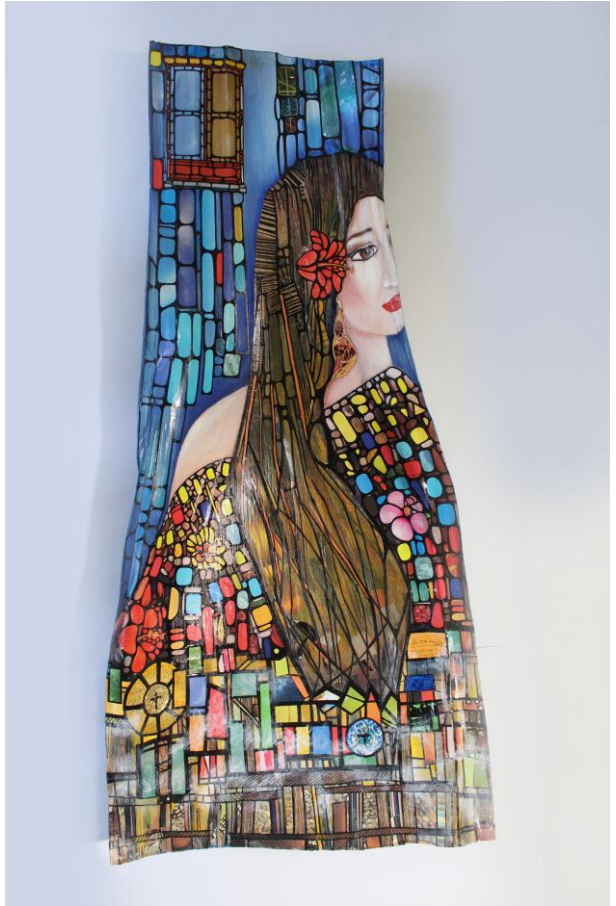
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## **Modern Science and Cosmology (The Implications of the Society's View of God)**

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### **Abstract**

This study aimed to identify the implications of the society's view of God and Religion via qualitative comparative research method. In result, the conflict between religion and science was caused by the fact that cosmology and metaphysics were narrowly understood from their essential meaning. In Indonesian context, science and religion discourses are still dominated by the philosophers and religionists that most of them do not have adequate background in science. In conclusion, science is considered by a modern society as a god who has the authority to determine a truth so it denies the immaterial truth that comes from God.

**Keywords:** Cosmology, Modern Science, View of God.

## Ciencia moderna y cosmología (Las implicaciones de la visión de Dios de la sociedad)

### Resumen

Este estudio tuvo como objetivo identificar las implicaciones de la visión de la sociedad de Dios y la religión a través del método de investigación comparativa cualitativa. En consecuencia, el conflicto entre la religión y la ciencia fue causado por el hecho de que la cosmología y la metafísica se entendían por su significado esencial. En el contexto indonesio, los discursos de la ciencia y la religión todavía están dominados por los filósofos y los religiosos, y la mayoría de ellos no tienen una formación científica adecuada. En conclusión, la ciencia es considerada por una sociedad moderna como un dios que tiene la autoridad para determinar una verdad, por lo que niega la verdad inmaterial que proviene de Dios.

**Palabras clave:** cosmología, ciencia moderna, visión de Dios.

### 1. INTRODUCTION

“In both science and religion, we seek creation myths, stories that give our lives meaning” (Brockelman, 1999: 13). Historically, cosmology is one of the oldest sciences. This can be seen from the mythical legacy of the cosmology of various civilizations, such as the Mesopotamian and Greek cosmologies. Before entering the 20th century, cosmology always had a space for spirituality. When Einstein introduced his general theory of relativity, a new round of cosmology began to open up. Cosmology is not only monopolized by religious

figures and philosophers as before, but has begun to be controlled by scientists in its modern sense. Moreover, cosmology does not merely talk about the movements and changes of various celestial entities, but also tries to uncover the origins of the universe or the starting point of the universe. Cosmology at that time, in the 19th century, until now, has not only been using astronomical methods to open the universal veil, but also the laws of physics. Cosmological terms before the 19th century, such as 'first mover', for example, began to be replaced with mathematical and physical languages, such as 'change' and 'necessity', for example. This kind of cosmology does not depart from the foundation to know God in the wandering of the mysteries of the universe. It is called a new cosmology (Numbers, 2005).

Based on such cosmological historicity, this paper will discuss the problem of the development of new cosmology and highlight its religious implications. Because the authors do not master astronomy, mathematics, and physics, the new scientific cosmology in this paper will be discussed in a simple and popular way. On the other hand, there have been many introductory and advanced writings on the latest excellent cosmology available. The authors are more inclined to highlight the implications of the development of the latest cosmological theory, in terms of the cosmological model based on the Big Bang theory, on its religious implications. Even at the beginning of its development, new cosmology really removed God from the sky map, but since Wilson (2005) discovered Cosmic Microwave Background Radiation (CMBR) which strengthens the Big Bang cosmology model, God begins to be discussed again on the sky map.

Although the effort to put God on the sky map is a debate, at least, there is still a place available for God to have a throne on the map of the sky even though it is very small. Presumably, the debate in 'placing' God on this sky map is the reason of why Karlina Supelli gave the title of her paper *Cosmology: Joking with God* (Karlina, 2006)

Although, dramatically, the scientific understanding of the origin and nature of the universe and the possibilities of future changes in it has only changed in the 20th century, especially after the 1960s, Russell (2003) which signaled the emergence of contemporary dialogue between science and religion, this does not mean that the development of cosmology, as one of the scientific disciplines, does not have important implications for the development and understanding of religion in the past. The development of cosmology helped to shape the understanding of religious adherents, and vice versa, the rays of religion contributed to insight into the development of cosmology. Significant implications of the development of cosmology on religion emerged after the 1960s were caused more by changes in viewing religious development and the absolute ontological separation between the value of the truth of religion and science. In other words, the point of convergence between the truth values of religion and science is not seen as a complementary matter and human efforts in fulfilling their desire for longing for the authenticity of knowledge, but antagonists. What is meant by antagonists is when the values of religion and science experience a point of non-convergence which is removed from the cosmic map, then reinserted, then re-

removed, then reinserted based on the development of the cosmological discipline. Then it was seen as a matter of clash of legitimacy. Russell (2005) If the value of knowledge of science and religion is different, then one of them will be seen as invalid (Barbour: 2000).

It became greater when religious and scientific conflict occurred so Charles Darwin put forward the theory of evolution. Because imperceptibly, the atheist scientific community assumed that Darwin's theory of evolution is considered a grand theory that can elaborate holistically the theory of creation. In other words, since the emergence of the theory, atheist scientists feel that there is no need to discuss with the theory of God as the creator of nature. Ernst Haeckel, as a scientist's representative at the time, said that Darwin's theory of evolution was thought to explain the mystery of the universe, which automatically undermined the construct of divine theory (Weinberg, 1972).

The devastating attacks of Western scientists based on the positivist paradigm, from day to day were getting stronger and increasingly showing academic-constructive impressions. Moreover, the Aufklärung movement in the West became their dream. This positivist trend, the more developed it was, it did not give room at all to other paradigms, and even succeeded in shifting the attention of other paradigms to follow the characteristics of its thinking. Since this time, the pattern of integration had no longer been scientifically constructed. Integration was only limited to the provision of religious

ethical values to science by bringing religious texts closer to the outer aspects only. Thus, modern society had the view that science is what helps their activities and science is the one which has contributed to their lives while denying the spiritual aspects of religion. Not long after, this thought would lead to a tradition of integration model by way of labeling and justification that did not require the presence of scientific work. Uniquely, this model was increasingly dominating. This condition was further aggravated by the scientific attitude of Muslim communities who were quick and easy to feel satisfied. Even more naive, the attitude of satisfaction is said to be because they were able to tame science from its critical attitude by religious ethical values. The work of Muslim scientists in that era until now always runs linearly with this pattern (Mcconnell, 2005).

The cosmology or creation tradition had long been happening, and in the end in the early 20<sup>th</sup> century. It was always dominated by religious and philosophers and astronomers. This was more about the issue of interpretation domination. Before Einstein came to the surface, the interpretation of the origins of the universe was dominated by religious people, and in general, the society based the creation of the universe on the interpretation of Scripture as it was or was taken for granted, if the term 'literalist' for reading the Scriptures with such a model was too rash acceptable. When Einstein presented the general theory of relativity, physicists and mathematicians began to be sucked into the question of the origins of the universe more deeply. Then it was also complemented by the rapid advancement of the development of telescope devices which were increasingly able to probe the sky

more deeply and detect more and more amazingly. Of course, this does not mean that physicists and mathematicians ignored the question of the nature of the universe. When George Lemaitre independently discovered Einstein's theoretical field equations (general theory of relativity) which showed expansion of space, it could be said that Lemaitre's effort was a milestone in putting physics into cosmology. Karlina (2006) basically, cosmology is observational science instead of experimental. When cosmology not only relies on astronomy but also physics, there is a new cosmological journey which not only relies on observation but also on experimental. By this experimental nature, in the end, cosmology has grown rapidly in a matter of several decades and gave rise to cutting-edge theories, such as the Big Bang. In addition, cosmology can be developed other than by only waiting for an event to occur and then observing it, but by creating and carrying out engineering and simulation (Haseeb, Hassan, & Azam, 2017).

## **2. METHODOLOGY**

Historically, modern cosmology in the context of the epicenter or epistemic community of the West was allegedly initiated by Rene Descartes. In the time of Descartes, in the mid-17<sup>th</sup> century, and perhaps earlier, attention to astronomy focused on the question of the origin of the solar system independent of biblical light. Descartes was a pioneering modern figure in this matter. He expressed his ideas on the origins of the universe in a book entitled *Principia Philosophiae* (Principles of Philosophy [1644]) and a treatise he completed in 1633



but published after his death, namely *Le Monde* (The World). His theory of the nature of the existence of the universe logically followed his identical belief in the provisions of natural laws. For Descartes, natural laws were sufficient to explain natural phenomena. Descartes showed how the system of law was formed in the natural law of God running on a primitive chaos by seeing a vortex as a creative mechanism. Galileo Galilei (1564-1642) then based on the formulation of Copernicus announced his observation that the earth was not the center of the universe. Galileo succeeded in formulating a more mature cosmology formulation pioneered by Copernicus. Besides Galileo, Johannes Kepler also supported the Copernicus's cosmological formulation. Finally, Isaac Newton managed to build his mechanical and gravitational system. In this scientific achievement by Newton, all fields and disciplines of science and reality must or can be explained by Newton's formulation of mechanic-deterministic physics. When the Newtonian laws of mechanistic-deterministic physics do not apply to the realm of sub-atomics, cosmology also has a completely new face. This new cosmology was triggered by the general theory of Einstein's relativity, and in the next period, the findings of the form of quantum physics made cosmology more developed and complex (Muzaffar, 2002).

### **3. RESULT AND DISCUSSION**

#### **3.1. New Cosmology**

The Cosmos is about the smallest hole that a man can hide his head in Chesteron. In fact, along with the development of the cosmology itself, standard cosmology model of Big Bang is not the only model. There are other models, let us say for instance Inflationary Cosmology model, Naive Models (Paradoks Olbers), Model with a Cosmological Constant, The Steady State Model Revisited, Models with a Varying Constant of Gravitation, etc. (Mukhanov, 2005). Due to the limitation of the writer's academic background of science, in this paper, the writer will only discuss the standard model of Big Bang.

### **3.2. Big Bang**

The development of Big Bang theory cannot be separated from the observation of Edwin Hubble regarding the red-shift. In 1929, Hubble formulated a simple relation between the speed of galaxy and its distance:  $v = Hd$ , in which  $v$  is the speed of galaxy moves away;  $H$  is the Hubble Constanta, and  $d$  is the distance of the galaxy. This law is known as the Cosmic Expansion Law. Red-shift is an observation of Hubble about the motion rate of the universe. Depart from this red-shift then the embryo of Big Bang theory begins. That the universe develops is the most possible interpretation to comprehend the red-shift phenomenon in the universe. The red-shift is a sign that the universe is developing. If the universe develops, then there is one point where it becomes the center of the universe development. This point then emerges an idea that the universe has a starting point. Therefore, undoubtedly that almost the whole idea of Big Bang is sincerely

accepted by the religionists. Because, an idea that the universe has a start can be interpreted that this universe begins and the beginning of the universe is a process of creation. In other words, initially universe does not exist but then it is made up.

Big Bang assumes that the universe initially is a hot and compressed energy. In other words, the universe was originally energy but then gradually and evolutionarily developed as it is today. It should be noted that Big Bang is not a start, but the process of universe expansion. Big bang will be misleading if only viewed as the big bang which bears a universe as today. The starting point of the universe is formulated as  $t = 0$  (called as Time Zero), means that  $t$  is time and  $0$  is the start.  $T = 0$  is called as singularity where time does not start yet. It is also called with  $t = 0$ . Big Bang occurs when the time of Planck  $t = 10^{-43}$ . According to the calculation of time, the age of the universe is about 15 up to 18 billion years. At first, Big Bang is the prediction from the solution of Einstein's Equation developed by Willem de Sitter in 1917 and Alexander Friedmann in 1922. From this solution, it is assumed that there are properties of expansion in the universe. Einstein denies his equation solution which predicts that the universe basically expands. In other words, the universe according to Einstein is static, not developed. Before Hubble publishing his observation about red-shift, the universe is still viewed as a static. When Einstein met with Hubble, Einstein just accepts his equation solution and considers the universe as an inconstant thing. The prediction that the universe develops and has a starting point of expansion is not immediately

accepted. In fact, the word of Big Bang itself derision for the theory that the universe is developing.

In the other side, the scientists who do not satisfied with the explanation and hypothesis of Big Bang theory formulate other theory about the universe which called as steady-state theory. Hoyle is one of the exponents who promote this theory although his colleagues in Cambridge Circus have begun to leave the steady-state theory. In steady-state, the universe is viewed as something eternal. The universe does not have starting point and endpoint. Meanwhile, in Big bang theory, the beginning time is assumed. Actually, the term of Big bang is emerged from Hoyle. He use this term not to support this cosmology model but as a derision. In 1948, Ralph Alpher and Robert Herman predicted that when Big Bang occurred, the bang released radiation background. This radiation background exactly is cosmic micro wave background or CMBR, its temperature is predicted about 3 up to 5 K if it is measured at present is 18. In 1964, James Peebles and Robert Dickere-emphasized the prediction if it is true that the universe is created from a bang process in  $t = 0$ , then the residue of the radiation from the bang remain to be found until today.

Accidentally, a year later two scientists named Wilson (2005) found that wave. It is said accidentally because both of them do not understand the prediction of CMBR. When they were repairing the hissing sound from a radio in Telephone laboratory of Bell, New Jersey, to be used in radio astronomy, both scientist could not clean up the hissing from that strong wave. Then, they checked and cleaned up

their transmitter antenna, one of them is from birds' droppings, to ensure that they did not capture strong signal from CMBR. They directed it in all direction, but the CMBR noise remains captured. The hissing of the signal that interferes their radio, in the end, showed the point observation on the graph of CMBR spectrum for the first time. The CMBR data found by Wilson (2005) actually is CMBR intensity measurement in the wavelength of 7.35 cm. After that, next work quickly measured the CMBR intensity in another wavelength. However, this work is almost failed. In 1989, NASA released a satellite named as Cosmic Background Microwave Explorer (COBE). By COBE then the temperature of the radiation background was measured and the result was  $2.726 \pm 0005$  K. The result of the prediction of radiation background temperature by Alpher and Herman was almost similar to the COBE measurement result. By finding the CMBR radiation then the theory of Big Bang is stranger confirmed, and the steady-state theory begins to be left. Until now the Big Bang theory become the standard universe model. However, it does not mean that Big Bang standard model does not have questions and discussions. For these things will be discussed later (Manson, 2005).

If we agree with Big Bang, the process of universe creation is as depicted in the table as table 1.1. When the time is  $t = 0$  universe is still an energy with single force. Because the universe is expanding, so that when the time is  $10^{-43}$  of  $t = 0$ , the universe is still an energy with a diameter of  $10^{-28}$  with  $1096$  g/ml of density and  $1032$  K of heat temperature, it has occurred quantum chaos. From this quantum, chaos emerges the multidisciplinary forces: gravitation and electromagnetic force – weak-strong. Gravitation may emerge at the time because by the expansion of the universe there is a decrease of temperature so that there is a

transformation in the energy becomes micro particle. This microparticle contains mass then emerges the gravitation force because it works only on the thing with mass. It is in accordance with the Einstein's equation:  $E = mc^2$ . When the mass is  $10^{-43}$ , quark and lepton particles have not been formed because the weak and strong force or interaction is identical. Furthermore, when the mass is  $10^{-35}$  seconds after  $t = 0$ , the temperature of the universe due to the expansion become 1028 K. With this temperature the new interaction or force emerges, that is strong interaction. At the time, there are three interactions: 1) gravitation; 2) strong interaction; and 3) mixed of weak electromagnetic. Due to the emerged of the strong interaction, the emerged of quark particle that have strong interaction also occur. At the time of  $10^{-10}$  second after  $t = 0$  the temperature of the universe due to the expansion become 1015 K. With this temperature of 1015 K, then the electromagnetic interaction and weak interaction begins to be separated. From here, the lepton particle that has weak interaction emerges. At this time, four forces or interactions agreed by the scientist as the manager and balancer of all universe process emerged completely, those are: 1) gravitation interaction; 2) strong interaction; 3) electromagnetic interaction; and 4) weak interaction (Krauss, 2001).

When the time of  $10^{-6}$  second after  $t = 0$ , the temperature of the universe is about 1013 K. At this time, with a temperature of 1013 K, Quark is able to combine the hadron. What is meant by hadron here is the particle composed by quark. There are two types of hadron namely baryon which composed of three quarks and meson composed of two quarks. Baryon particle consists of two types namely nucleon, the baryon that forms the atom nuclei, and hyperon - the baryon that is not the former of the atom nuclei. Similar to the baryon, there are two types of the nucleus,

namely proton which composed of two quarks u and one quark d, and neutron which composed by one quark u and two quarks d. When the time is there second after  $t = 0$ , the temperature of the universe become 1010 K, proton and neutron combine to form atom nuclei. After that, 500.000 years from  $t = 0$ , the atom is formed. At this time the temperature becomes 104 K, and the atom nuclei may join the electron to form an atom. In other words, the new atom is formed after 500.000 years from  $t = 0$ . Furthermore, the universe is developing as the universe we inhabit now. At present, the fact about the universe is expanding or developing has been the scientific consensus. The illustration of the universe development can be depicted as a rubber sheet where the middle part has mass weight so that the middle part will be expanded follows the mass that expands it (see the picture. 1). More or less, the universe is just like that. As described above, the gravitation force that only works on the thing with mass is just emerged at the time of  $10^{-43}$ , in which at the time is the energy that transforms into microparticles which also in accordance with the Einstein's equation,  $E = mc^2$ .

### **3.3. Contemporary Discussion between New Cosmology and Diversity**

... The universe is all that is, all there ever was and all there ever will be. Carl Sagan (Sagan, 1985). At this moment [as a result of big bang cosmology] it seems as though science will never be able to raise the curtain on the mystery of the curtain on the mystery of creation. For the scientist who has lived by his faith in the power of

reason, the story ends like a bad dream. He has scaled the mountains of ignorance, he is about to conquer the highest peak; as he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries.

Robert When the Big Bang theory triggered at the first time and become stronger, soon many comments from the religionists about God as the creator of the universe has been proven by the scientific fact? Among the scientists themselves, many of them who formulate their faith and divinity based on the scientific data, in this case, the data of cosmology and physic. At the same time, many scientists assume that the event of Big Bang does not have any relation with the creation of the universe by God. In the other side, some of the religionists who are not in hurry to justify the creation of the universe by God with the theory of Big Bang. Golshani (2002) records at least there are six main reactions toward the Big Bang standard model, those are Creation ex nihilo or the creation from nothing; singularity with the cause; singularity without cause; ontological dependence on God; creation continuator continues creation; and natural temporality recognition and at the same time believe on the immortality of physical laws and use them to explain the creation of the universe (Golshani, 2002). The idea of creation ex nihilo is the most popular reaction and hastily declared, whether from the supporters and the critics. Even, Robert Jastrow in his book of God and the Astronomers see that Big Bang is only strengthened the biblical creation doctrine. Creatio ex nihilo become a direct reaction due to the ways in understanding the starting point of the universe itself that is a singularity. For them who



are formulating their faith and who have believed, the singularity is seen as the starting point of God works in universe creation. In the other side, in singularity, the existence of time emerges after it while before it time does not exist yet, there is no time so that the question of what universe is and how the universe is before the singularity become ambiguous at all. Due to that question assume about time, while the time just exists after the singularity, not before it exists, the idea of creation *ex nihilo* not fully get the support from Big Bang.

In Big Bang, the universe is developing until now. Therefore, there is a process of creation of universe continuously (*creatio continua*). If it is true, it gets the theological prove; basically, God is in a busy situation, He always creates. The critics of *creatio continua* of God in-universe by merely based on the Big Bang confirm that our life as at present is only the accident factor. In 15 billion years ago, the universe, including us, is only the hot and compressed energy that then explode and eventually develop. Beside six popular comments mentioned by Golshani (2002), there is an idea that not less popular and important, that is the design argument or natural tuned. That this universe is developing by the calculation and mathematical determination as well as the accurate physical law, certainly there is a tuned in this developing event of cosmic. If the explosion (bang) was in 10<sup>-43</sup> second faster or later than 10<sup>-100</sup> second, then the universe will be not created as it is, but will be shrinking or failed to develop or abort (Davies, 2005). What and how is the term of creation understood in the context of God? Is God's creation only once or continuously? Then, is the beginning predicted in singularity can be understood as

the beginning of creation? Can the science answer the creation problem? In other words, is it true that science can penetrate the timeless & space-less, that is before the singularity? Is this universe only the dimensional container? How about the imaginary dimension and non-physical dimension? How about the Tajalli and emanation concepts of God regarding the existence of the entities of non-God if we use it to read the new cosmological development? Is it right that the science development, exact science and religion discourse, always pointed to the proof of God's existence? And, can the new cosmology explain all of the thing if eventually, the scientific agreement says that the life in the line of cosmic expansion only the accidental factor? Presumably, there is an ambiguity in the science and religion discourse. When science is connected to the religion always directed to the proof of God's existence. In fact, the development of science before modern science in its definition at present shifts and displaces all forms of traditional science. Meanwhile, the pre-modern science argues that science is the effort of disclosing God's work in the universe, not only the proof of God. In the other side, in the science and religion discourses, religion is put as a subordinate thing. The religion's opinion concerning the reality is always tested by the scientifically proof, but it is not occurred in vice versa. When the science breaks the Religion's opinion concerning a reality, hastily the religionists justify the interpretation in order not to be called as out of date religion. However, when the science is contradictory with the religion, science thinks that it is necessary to be an inconvenience to adjust itself with the epistemic community of religion. In this case, there are two domains that stand alone and not cover each other.

Departs from this fact, in the future, it seems that we require to formulate the ways of the relation between science and religion. Typology of the relation between science and religion belong to (Barbour, 2000). Haught (2000), basically still contains this inequality. Although it should be admitted that the typology of Barbour (2000) is an important contribution. However, typology of Barbour (2000) is not enough when this typology is used to read the Islamic science, let us say as developed by Seyyed Hossein Nasr, Mulyadhi Kartanegara, and Husain Heriyanto. Islamic science according to these three people will be into the conflict typology Barbourian. As we know, the Islamic science is not as naive as it is.

#### **4. CONCLUSIONS**

In the Indonesian context, science and religion discourses are still dominated by the philosophers and religionists that most of them do not have an adequate background in science. In the end, it made the science and religion discourses become desolate. Among the Indonesian scientists, the discussion of religion that departs from the scientific achievements is a few, just a few people one of them is Karlina Supelli. Therefore, we also cannot find adequate and exceed literature in the discussion between cosmology and religions. Institutionally, which seriously discuss this problem can be counted by finger one of them is CRCS-UGM, ICAS. In ITB itself, the subject of science and religion is not taught systematically yet. In UIN, most of the UIN exist, the epistemology problem between science and religion

remain be viewed as the separated thing. However, either CRCS or ICAS begin to do the relation of science and religion seriously, still only limited to the philosophic and metaphysic aspects. For the practical side of science itself is far to be considered. It also makes the understanding of science among the non-scientists is limited; rely on the development of science from the scientists themselves. It makes the non-scientists seen as reactionary and apologetic. Just like the problem of this new cosmology.

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## **opción**

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