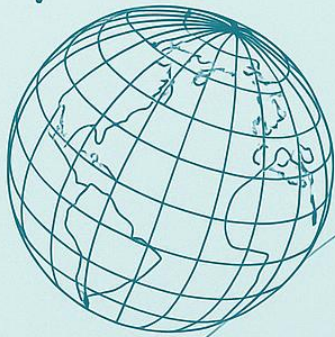


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# Forensic Methods of Detection and Removing Fiber Microparticles from Objects in Detecting Crimes

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**Abstract:** It is known that at the scene of a crime, traces of various objects, materials and particles of substances that are in contact with it always remain. In the article, the determination of the nature of fiber microparticles, their group affiliation and source of origin provides the investigator and researcher with important informative information to clarify the circumstances of the crime. Also, the exceptional importance of fiber microparticles in determining the time and place of the crime was investigated and explained with examples. In addition to studying the most widespread methods of removing textile fiber particles from movable objects in world practice, a number of necessary shortcomings of the method were also studied, and research conducted in this field was studied and examples were shown.

**Keywords:** *crime, forensic, film, tape, woven fibres, robbery, theft, microparticles, objects*

## INTRODUCTION

It is known that at the place of a crime, traces of various objects, materials and particles of substances

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that are in contact with it always remain. The role and importance of fiber microparticles as information carriers of forensic importance in the detection and investigation of serious crimes of greed, greed-violent and violent nature, such as murder, rape, theft, robbery, etc. The determination of the nature of fiber microparticles, their group affiliation and source of origin provides the investigator with important information to clarify the circumstances of the crime (Алиев, 2016). Fiber microparticles are also of exceptional importance in determining the time and place of the crime. In world practice, the most common method of removing woven fiber particles from movable objects is by applying adhesive film. Along with this possible method, a number of necessary shortcomings of this method are noted below:

The complexity of localization of the location of woven fiber particles, contamination of small-area films, the impossibility of processing due to the shape and properties of the object, the small size of the required area, spinning of the film, the lack of sufficient technical durability of the film, etc. As a new method free from all these shortcomings, forensic researchers propose the use of adhesive boards. According to the structure of the mentioned board, it consists of a 100x130-mm polyester film, on the surface of which a 100x100-mm “grid” is previously drawn, which are divided into 10x10-mm squares and marked. The film is attached to the glass plate with a “scotch” type tape. Depending on the size of the plate, four or more tapes can be attached side by side. The film is then covered with a “Double Coated” type tape to form a single area (Грощ, 1908, p. 92).

The adhesive plate is carefully torn off the glass piece and transferred to clean plastic tracing sheets measuring 23x28 cm. Such plates can be used for several contacts with the treated area. Before each new contact, the plate is examined under a laser microscope, if luminescent fibers were used in the study of the fibers, they are examined by laser illumination. The locations of their placement are marked with a felt-tip pen, and the fibers are transferred to the surface of the comparison glass with thin tweezers. This method is universally free from a number of disadvantages of previously used methods. The advantages of the “adhesive plate” method are: The size of the processing area, the possibility of precise localization of the found fibers, the low sorption of ambient fibers to the surface of the board, the main features of the “Double Coated” adhesive tape, etc. Forensic investigation and expert experience show that the formation of textile fiber particles can be found in almost all crimes within the framework of the use of fibrous materials. These inclusions are found in various objects, and the results of the conducted examinations give grounds to state the following opinions (Аверьянова et al, 2017, p. 24).

Woven fiber particles are most often detected when they come into contact with the active movements of the criminal and his clothing. In the series of crimes committed where fibred particles are detected are: murder, rape, harm to health, etc (Huseynov et al, 2025). In this case, the mutual passage of individual particles of woven fibers, even threads, loops, and fabric particles from clothing is observed. Fibers can also remain on the criminal instruments used in the commission of the crime (Aliyev, 2024). A significant amount of fiber inclusions are formed at the crime scene, especially on objects, objects of the material environment, and on the criminal himself during movement. The search and detection of woven fiber particles in any other micro-object has a number of tactical features compared to other traces, the most important of which is their selection by the naked eye (Mahmudov, 2006, pp. 207-214).

The practice of working with microobjects requires compliance with the following general rules: During the inspection of the crime scene, it is not allowed for many people to be present or move in places where fibers are likely to be present. Because when objects are moved or touched, the fibers change their location and can be replaced by someone else. In addition, when outsiders move around the crime scene, fibers from their outer clothing may be left behind. If the presence of outsiders is inevitable or necessary, their places of movement should be specified. Persons searching for particles of woven fibers should be careful not to contaminate the objects being examined and not to erase traces that may remain on the objects (Khalilov & Mirzezade, 2024). For this purpose, it is necessary to use clothes made of white synthetic materials made of smooth fabrics. It is considered advisable to work with medical gloves at the crime scene. If there is no special clothing, you can wear a white cotton robe, because even if white cotton fibers fall on things, it is not difficult to recognize them. This is because white cotton fibers are often encountered in everyday life, in the air and other places. The sleeves of the clothing or robe should be cleaned with a white cotton wet cloth or with the foam part of a sponge. This action is done in order to remove extraneous fiber particles (Крылов, 1980, p. 41-44).

It is necessary to search for particles of woven fibers purposefully. Initially, it is necessary to specify the places where the fibers may be, taking into account the characteristics of the crime and the probable actions of the participants. It is important to distinguish these parts when the integrity of the dust on the objects is broken, when there are damages. In this case, the focus is not on understanding the traces, but on determining the inevitable changes in the conditions of the objects (Karimli & Ozturk, 2025). In this sense, the statements of the victims and witnesses about the conditions before the crime can be of significant help. After all the probable hypotheses are ready, the sequence of their verification should be organized in such a way that there are no obstacles to the verification of the following ones. When searching for particles of textile fibers, it is necessary to determine in a timely manner what types of fibers can be carried by products made of fibrous material from the crime scene and on clothing, and to take samples from these products. To search for particles of textile fibers, it is advisable to start first of all from the place where the criminal enters and exits the apartment. However, special attention should be paid to those items with which the criminal is most likely to come into contact. Also, searching for fibers in the clothing and body of a corpse requires special experience and care, since turning and transporting the corpse inevitably leads to the replacement, loss, and displacement of fibers. Therefore, their search should be carried out directly from the moment of confirmation of death, together with a forensic expert, until the external examination (Aliyev et al, 2025). The search for woven fiber particles is carried out sequentially, starting from the exposed parts of the body and moving to the upper clothing. All found fibers must be protected from damage. Only then can the body be turned over and the clothing removed. When searching for woven fiber particles in open areas, special attention should be paid to the places where the criminal sat, lay, or knelt, as well as not only the bark of trees and plants at the scene of the crime, but also those located along the path of movement. Specially trained service dogs provide the necessary assistance in finding them. Because the direction of the criminal's movement is the objects that are in contact with him. Investigative practice shows that there is a certain dependence between the location of woven fiber particles and the type of crime. Usually, fibers are found on objects that have been in mechanical contact with the objects that formed the trace (Лебедев, 1999, pp. 5-14).

## LITERATURE REVIEW

Experience shows that more woven fiber particles are found on objects that the perpetrator comes into contact with while at the scene and when leaving it. There are several specific places that are more “suitable” for the placement of woven fiber particles: such inclusions can be found practically in all areas of the victim’s clothing and body. These fibrous materials depend on the mechanism of contact with the products: During the criminal’s struggle with the victim, the fibers of clothing items are more likely to be found on the buttons; during an attack from behind, they are found in the neck, back, and shoulders: If the perpetrator has entered the victim’s pockets, the fibers of his clothing can be found in the lining of the victim’s coat, jacket, pockets, bag, and briefcase. If the victim’s mouth is tied with a bandage, etc., textile fiber particles can be found in the mouth area and between the teeth. The fibers can remain there when the hands are tied (Аверьянова et al, 2017, p. 76). Woven fiber particles are located throughout the surface of the victim's clothing, the body, in which the victim is wrapped in any material. During rape, woven fiber particles from the offender's clothing remain on both the victim's outerwear and underwear, and are often found on the inside of the clothing. On the victim's body, they usually remain on the hands, shoulders, breasts, thighs, and groin. It is characteristic that at this time, fibers from pieces of these items are found in the listed areas of the human body when the victim is lying on these objects (Тоfig, 2024). In practice, it is possible to encounter cases when the victim's clothing was either removed by the offender or lost for some reason. In such cases, the victim's place of residence should be thoroughly examined. Here, it is possible to find woven fiber particles from clothing items that are not there, as well as fiber samples from other products. For example, which can remain as dirt on these items and, therefore, can be on the subject of the crime. Fibers are located on the clothes and body of the criminal in the same way as on the victim. During the struggle with the victim, the criminal, as a rule, remains with the fibers of the victim's clothing (Майлис, 2001, pp. 13-15). During the investigation of crimes involving harm to health, it is necessary to examine the suspect's shoes, in addition to his hands and clothes. If the criminal has carried the victim from one place to another, the fibers of the victim's clothing may remain on the criminal's shoulders, arms, armpits, thighs and knees. When stolen items are transported, fibrous materials form fibrous inclusions in the criminal's clothing. In practice, it has been found that such fibers have been found on the clothing of the suspect in the theft several years later (Behbudov et al, 2024).

During the investigation of a rape incident, it is necessary to first look for woven fiber particles of the victim's clothing on the front and inner sides, folds, buttons, and sleeves. Woven fiber particles of the furniture and bedding of the apartment where the crime was committed are often found in the knee and elbow areas. At the scene of the crime, criminals often sit, stand on furniture, etc. Therefore, woven fiber particles can be found on the back, trousers, shoe uppers, carpet, etc. In addition, fibers from the clothing of people who were in the room can get on the criminal's clothing. Including the owners of the apartment where the theft was committed. In this way, fibers also remain on the clothing and sometimes on the arms of the criminal who used the vehicle in cases of theft or hijacking of a vehicle (Азаренко, 2000, p. 86). It is known from many criminal cases that after the victim is attacked, the criminal wraps the weapon he inflicted the injury with in paper or other fibrous material and leaves it wrapped at the crime scene (Белкин, 2001 p. 25). Often, it is possible to find woven fiber particles from

the criminal's clothing on the surface of the packaging. As mentioned above, woven fiber particles from the criminal's clothing remain at the crime scene. During the search, it is important to pay attention to areas with natural obstacles, such as fences, bushes, trees, and narrow passages. Basically, all obstacles encountered by the criminal while moving, especially their sharp protruding parts, edges, and corners, should be considered as possible carriers of woven fibers and other microobjects. Often around the crime scene, products made of separate fibrous materials or fibrous objects, such as buttons, knives, etc., are found, which the criminal either lost or threw away (Khalilov & Mirzazade, 2025). The use of trained service search dogs can help in searching for these objects. Therefore, fibers from the criminal's clothing and gloves may remain on mechanisms that have been subjected to mechanical damage. In all these cases, sharp, jagged edges, fingernails, parts of locking devices, and rough areas of other damage can be traces. Fibers can remain on broken barriers not only when they are destroyed, but also when they are passed through (Белкин, 1969, pp. 33-37). Fibers from the subject of the crime are more likely to be present at the scene of the crime: In objects that the criminal has touched, lay on, sat on, etc. It is also important to pay special attention to narrow passages between objects of the object environment, destructive, breakable objects, objects on which the criminal was forced to apply physical force. There may be fiber-bearing objects left by the criminal at the scene of the crime. In order to search for them, the statements of witnesses and victims who are well acquainted with the conditions of the place or apartment before the crime are of great importance. In road traffic accidents, fiber-bearing vehicles act as a trace-forming object, and the victim's clothing is an object. The fibers from the victim's clothing or on it found in a vehicle are sometimes important not only in solving the crime, but also in its assessment. For this purpose, when examining vehicles, it is necessary to examine the areas where the fibers of the victim's objects may remain (Sarijanlinskaya, 1999, p. 87). However, it should be taken into account that when cleaning vehicles, cloth, scrap and other materials are used. Therefore, in any specific case, it is necessary to specify the location of the fibers left on the clothing, taking into account the circumstances of this case, the injuries on the vehicle, the body and clothing of the victim. In some cases, during the investigation of traffic accidents, it is considered important to clarify who was behind the wheel based on the incident. This can be determined by the specific location of the fibers. At the time of impact, the largest part of the fibers from the clothing of the person driving the vehicle remains on the steering wheel and other control mechanisms, but fibers may also remain from the clothing of the people in the car. All of the above factors, the analysis of the ways and methods of detecting fibrous materials during the examination of the scene of the accident, and other investigative actions should also be considered important and necessary (Mahmudov, 2003, pp. 25-26). For the detection and removal of woven fibers, simple devices and apparatuses adapted to work with small amounts of substances and materials are used by investigators, experts and forensic technicians. In addition, and especially in cases where fibers are suspected, special adhesive films and tapes are used. When searching for individual fibers and fibers in general, powerful illuminators and magnifiers, optical devices are used. If the color of the fibers is the same or similar to the object on which they are located, colored light filters are used to facilitate the study, which enhance the contrast of the fibers with the carrier objects. The fixation of fibers has procedural and scientific-technical aspects. In the procedural sense, the registration of fibers is the confirmation of the fact of their discovery and removal. This ensures that they are given the status of material evidence (Cəfərquliev, 2002, pp. 4-7]. Procedural

registration is the compilation of a protocol of the investigative action, during which the woven fibers are found and removed. The protocol should reflect the sequence of actions for finding and removing the fibers, the means and methods of storing and packaging the places of their discovery. In addition to fibers and objects, photographs, hand-drawn drawings, and diagrams are attached to the protocol.

## METHODOLOGY

In scientific and technical terms, these are specific manipulations with fixed fibers that accurately reflect their appearance, signs of the place of their discovery, and also ensure the long-term preservation of their important qualities for the confirmation of important signs in the case. The removal of textile fiber particles as a technical method means their separation from the carrier object and removal to a protected environment (Белкин, 2001, pp. 61-63). “Adhesive” film materials are suitable for removing sparsely located fibers. To remove the accumulation of fibers from the carrier objects, it is necessary to use tweezers, needles or other tools. In some works, the authors recommend using vacuum cleaners to remove fiber particles. Experience shows that the use of such devices should be considered unsatisfactory and inefficient. When they are used, a large amount of foreign particles are sucked in, which makes it much more difficult to find woven fibers for subsequent examination. The use of vacuum cleaners should be considered appropriate for removing fibers from large areas of products, from deep, cracks, narrow and inaccessible places. For finding and removing individual fibers, the use of the following technical means should be considered more appropriate and efficient (Аверьянова et al, 2017, p. 87).

All illuminating devices that emit strong light can be used as light sources. The use of portable mobile “Svet-1000” or similar illuminators used during film and photography gives good results when examining individual objects and their fragments (Garibli, 2025). The use of collagen lamp illuminators for this purpose is very effective. In some cases, in order to find fibers, it is necessary to examine the carrier objects in strong light directed at an angle or in colored light. For this purpose, specialized illuminators used in microscopy with special slots for light filters are useful: OI-19 (lamp 8W, 20W); OI-9m (this illuminator allows you to illuminate a 2.5 times larger area); OI-24 (lamp 12W, 100W). If the search for fibers is carried out in an open area, in a dark room or in a dark house, illuminators with an autonomous source of electrical energy are used (if there is no direct electricity supply) (Белкин, 2001, pp. 59-69). Fire extinguishers, household flashlights, magnifying optical devices: Loupes and microscopes are used to work with microobjects outside the laboratory. Loupes with a large linear field of view can be used to find textile fibers in the human body and other parts. The use of loupes with an illuminator and a tripod can also be considered effective. Loupes with an illuminator allow working in low light: the use of tripod loupes allows the expert or forensic scientist examining the scene to keep his hands free while searching for or removing fibers (Ozturk et al. 2024). The interchangeable loupe produced by the medical industry is very convenient for finding and removing textile fibers in adverse conditions. It is worn on the head. Its power supply is provided by a battery or a direct line through a step-down transformer. The magnifying power of the magnifier in the illuminator is 2 times, but it can be easily replaced with a more powerful one. When searching for woven fibers on large surfaces, the use of binocular stereoscopic microscopes of the MBS-1, MBS-2, “Technika” type is convenient. However,

they are used only for stationary studies. A simple device has been developed at the Institute of Forensic Science of the Ministry of Internal Affairs of the Republic of Poland, with the help of which it is possible to use these microscopes in conditions outside the laboratory for working with microobjects. The device consists of three moving supports, a chrome-plated head for fixing the microscope, and a support for holding the microscope with a tripod. The supports on the tripod are raised at their focal length during work with the microscope (Белкин, 1969, pp. 10-12).

## RESULTS

It is necessary to approach the issues related to the preliminary examination of fiber particles and carrier objects with caution. It is especially important to note that the preliminary examination can never replace procedural actions, work with fiber particles is carried out only within the framework of procedural actions. The results of procedural actions have both evidentiary and operational-tactical significance. The preliminary investigation is not reflected in procedural documents, its results have no evidentiary force, information obtained in a non-procedural form is used only for operational-tactical purposes (Abbasov et al, 2024).

Therefore, when there is a basis for conducting investigative actions, a procedural examination with fiber microparticles is carried out. Since the preliminary examination is distinguished from procedural actions by its legal nature, their combination by law is not intended and is unacceptable. Failure to explain the essence of any operation with fiber particles during investigative actions to witnesses and not to record it in this protocol means a violation of the legislation. If the investigator opens the package and conducts an investigation of objects in a non-procedural manner, this not only nullifies the confirmatory measures, but also means that the fact of finding specific particles on the objects is not assessed. The reasons mentioned above mean a direct violation of procedural rules, such as the failure to pack material evidence in the presence of witnesses (Бразоль, 1997, p. 97). The detection and removal of woven fiber particles is considered an important issue not only for the investigator, but also for the expert. In the event that the investigator cannot detect woven fiber particles separately, all possible carriers are submitted for examination. Therefore, often the clothing of the person suspected of committing the crime and the victim is submitted for examination (Garibli, 2024).

## DISCUSSION

The effectiveness of the expert examination of carrier objects containing fiber particles is largely determined by the correct choice of the methodology for finding and removing microtraces. Currently, porous foam materials, brushes, vacuum cleaners and other means are widely used in expert practice to remove fiber-origin microparticles. In order to promptly remove fiber-origin objects and particles from the crime scene and other areas, a new methodology for conducting examinations is being applied in the Expert Examination. After visual inspection of the material evidence, the fibrous particles on it are removed with the help of transparent, adhesive tape. Then, the adhesive side of the tape is glued together with the microfibers to a transparent polyethylene base or silicate glass slide. In this way, an optically transparent binary layer is obtained. Then, the fibers in these layers are marked in a certain way in reflected light using a microscope “Leica M205C” or MBS type microscopes, which

can magnify the fibers by 12-74 times (Аверьянова et al, 2017, p. 37). The fibrous particles, remaining in the binary layer, are examined in the transmitted light of the microscope in order to determine their origin. The results of the conducted research should be summarized and presented in a table. Experience shows that adhesion agents and solvent liquids do not affect the structure of the fibers. Experts mainly use a transparent polymer base, on which two types of lavsan and triacetate films are glued. The width of these films is 1075 mm, and the thickness is 100, 80 or 12 mm, according to TU 6-18-481-78. By the way, it should be noted that triacetate bases have higher optical properties.

## CONCLUSION

The forensic study of fiber particles is one of the less studied areas compared to other forensic research areas. In this sense, there are enough scientific, theoretical, methodological problems waiting to be solved here. Scientific and technical progress, in turn, creates conditions for the creation and application of new methods, techniques and tools that allow each field of science to be improved and the level of efficiency to be increased. Fiber particles are important carriers of evidentiary and guiding information. They help to clarify a wide variety of facts, including the mutual contact of the clothes of the victim and the suspect, the presence of the person in a certain place, the path taken by the criminal to the place of the crime, and what objects he touched, what he was wearing, his profession, the possible displacement of the corpse, in short, many other issues that are important for the investigation and solving of the crime. Also, the provision of modern technical and forensic tools, the impact of scientific and technical progress on expert methods, allows us to successfully detect, record, capture and study a wide variety of micro-objects, and ultimately, to obtain information that was previously impossible and is important for solving and investigating crimes.

## REFERENCES

- Abbasov, E., Aliyev, E., & Aliyev, H. THE CATEGORY OF INITIAL LETTERS WHICH ARE THE SPECIAL SIGNS OF LINES. *Deutsche internationale Zeitschrift für zeitgenössische Wissenschaft* ••• № 73 2024 VOL., 12.
- Aliyev, E. (2024). Forensic Handwriting Analysis to Determine the Psychophysiological Traits. *International Journal of Religion*, 5(6), 511-530.
- Aliyev, E., Nasirov, Z., Bayramova, V., Abbasov, E., & Aliyev, H. (2025). THE IMPORTANCE OF THE APPLICATION OF SPECIAL KNOWLEDGE IN CONDUCTING FORENSIC EXPERTISE. *German International Journal of Modern Science/Deutsche Internationale Zeitschrift für Zeitgenössische Wissenschaft*, (99).
- Behbudov, G., Abbasov, E., Aliyev, H., Huseynov, T., & Aliyev, E. JURIDICAL SCIENCES. *AGRICULTURAL SCIENCES*, 18.
- Сәфәрқулиев М.Ә. Azərbaycanın cinayət prosesi. B., 2002.

- Farman, K. Y., & Emin, M. Y. (2024). THE IMPACT OF DETENTION AND ARREST ON THE PRESUMPTION OF INNOCENCE IN THE CONTEXT OF EUROPEAN COURT JUDGMENTS. *World Scientific Reports*, (8).
- Garibli, I. (2024). Reconsideration of Civil Cases in the Courts of the Republic of Azerbaijan under Cassation Procedure. *Acta Globalis Humanitatis Et Linguarum*, 1(1), 173-179.
- Garibli, I. (2025). Claims in Civil Cases Considered by the Courts. *Global Spectrum of Research and Humanities*, 2(2), 113-122.
- Huseynov, T., Khalilov, Y., Aliyev, H., & Abisov, S. (2025). Circumstances that Prevent an Act from Being a Crime. *Porta Universorum*, 1(3), 29-36.
- Karimli, N., & Ozturk, A. (2025). Risks And Advantages of Decriminalization: Balance Aspect in Criminal Law. *Acta Globalis Humanitatis Et Linguarum*, 2(3), 4-8.
- Khalilov, Y., & Mirzazade, Y. (2025). The Presumption of Innocence in the Context of International Legal Instruments on Human Rights. *Acta Globalis Humanitatis et Linguarum*, 2(2), 259-264.
- Kriminalistika / K.Q.Sarıcalinskayanın redaktəsi ilə. Bakı: Hüquq ədəbiyyatı, 1999, 716 s.
- Mahmudov A.M. Əməliyyat-axtarış fəaliyyətinin bəzi xüsusiyyətləri // Məhkəmə ekspertizası, kriminalistika və kriminologiyanın aktual məsələləri. Elmi əsərlər məcmuəsi. Bakı, 2006, №43, s.207-214.
- Mahmudov A.M., Əliyev B.Ə. Kriminalistika: sxemlər, şərtlər, terminlər (tədris-metodik vəsait). Bakı: Qanun, 2003, 188 s.
- Ozturk, A., Behbudov, G., Huseynov, T., & Ismayilov, N. (2024). THE PLACE AND ROLE OF THE HURUFISM MOVEMENT IN GLOBAL IDEAS. *BBC*, 22.
- Tofig, H. (2024). THE COMBAT AGAINST NARCOMANIA AS ENSURING A HEALTHY LIFE IN SOCIETY. *Deutsche internationale Zeitschrift für zeitgenössische Wissenschaft* ... № 73 2024 VOL., 15.
- Аверьянова Т.В., Белкин Р.С., Корухов Ю.Г. Криминалистика. Учебник. М: Инфра-М, Норма, 2017. 928 с.
- Азаренко В.М. Тактические основы взаимодействия участников под-готовки и проведения криминалистической экспертизы по уголовным делам. Автореф. дис. ... канд. юрид. наук. - СПб, 2000. - с. 20.

- Алиев, Э. (2016). Криминалистическое исследование психофизиологических качеств исполнителя рукописного текста и медицинская наука. Науковий вісник Національної академії внутрішніх справ, (2), 338-354.
- Белкин Р.С, Винберг А.И. Криминалистика и доказывание. - М, 1969, 442 с.
- Белкин Р.С. Криминалистика: Проблемы сегодняшнего дня. - М., 2001, 327 с.
- Бразоль Б.Л. Очерки по следственной части. История. Практика. -Пг.,1997, 123 с.
- Гросс Г. Руководство для судебных следователей как система криминалистики. - Спб., 1908, 304 с.
- Крылов И.Ф. В мире криминалистики. - Л., 1980, 478 с.
- Лебедев В.И. Искусство раскрытия преступлений. - СПб., 1999, 203 с.
- Майлис Н.П. Интеграция знаний как закономерность формирования новых научных направлений в судебной экспертизе // Криминалистика. XXI век: Материалы н-п. конф.: В 2-х т. - М., 2001. - Т. 1: Разд. 1-3,-с. 71-75.

# The necessity of constitutional reforms in the context of an electronic society and the legal foundations of the ‘smart constitutionalism’.

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**Abstract.** The accelerating pace of digital transformation and the rise of artificial intelligence have created unprecedented challenges and opportunities for constitutional governance. This article explores the necessity of constitutional reforms in response to the emergence of electronic societies, proposing the concept of “smart constitutionalism” as a legal paradigm that integrates digital realities with classical constitutional principles. Through a comparative analysis of pioneering constitutional developments in countries such as Greece, Mexico, and Chile, the paper examines how digital rights, internet access, and neuro-rights are being embedded into supreme legal frameworks. Special attention is given to Azerbaijan’s progress in digital state-building, data protection, and e-governance, with an emphasis on the need for further constitutional alignment. The article argues that while classical constitutionalism remains foundational, it must be adapted to accommodate cyber sovereignty, digital identity, and the legal implications of algorithmic governance. By tracing the intersections of law, technology, and public administration, the study underscores the urgency of embedding digital rights, cybersecurity, and AI regulation at the constitutional level. Ultimately, the article posits that “smart constitutionalism” should serve both as a safeguard for fundamental rights and as an enabler of transparent, automated, and accountable governance in the digital age.

**Keywords:** *Smart constitution, artificial intelligence law, cyber sovereignty, data protection, digital rights, e-government*

## INTRODUCTION

In recent decades, the rapid evolution of digital technologies has profoundly reshaped modern societies. The integration of artificial intelligence, big data, and internet-based services into various aspects of daily life—ranging from communication and education to healthcare and governance—has led to the emergence of what is now referred to as the digital society. While the global community has

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not yet fully transitioned into a completely digital order, the ongoing and systematic nature of digitalization signals the inevitability of a new socio-legal model that demands reconsideration of foundational legal structures, including constitutions.

This article examines the necessity for constitutional reform in the context of digital transformation, introducing and analyzing the concept of **“smart constitutionalism”** as an emerging legal doctrine. Unlike classical constitutionalism, which arose in the context of industrial and pre-digital societies, smart constitutionalism seeks to integrate digital rights, algorithmic governance, and cyber sovereignty into the supreme law of the land. The discussion draws upon comparative constitutional developments worldwide—particularly in Greece, Mexico, and Chile—while situating the analysis within the legal and political framework of the Republic of Azerbaijan. It argues that adapting constitutional frameworks to the realities of the digital age is essential for protecting individual rights, enhancing state transparency, and ensuring sustainable governance in an increasingly interconnected world.

## **DIGITAL SOCIETY AND THE NEED FOR CONSTITUTIONAL REFORM**

Digitalization has become a defining feature of contemporary civilization, influencing domains such as education, finance, public health, citizenship, and national sovereignty. This transformation, while progressive and largely silent, is redefining traditional institutions and legal categories. New realities brought forth by digital technologies—such as e-government, online identity, and cybersecurity—require constitutional systems to evolve accordingly.

More than three decades have passed since the adoption of the Constitution of the Republic of Azerbaijan, during which time the world has undergone significant technological and social changes. Issues that once occupied the margins of legal discourse, including data protection, algorithmic decision-making, and electronic participation in governance, have now moved to the center of constitutional concern. As noted by Balkin (2020), constitutions in the digital era must not only regulate state power but also safeguard individual rights across both offline and online spaces.

In this light, constitutional reform is not merely a legal preference but a structural necessity. Traditional constitutional constructs—based on the tripartite relationship of the individual, society, and the state—are no longer sufficient. Emerging actors such as artificial intelligence and ecological systems are becoming integral to governance and rights discourse. This development calls for the expansion of constitutional theory to accommodate concepts like **digital human rights, cyber sovereignty, and technological accountability**.

In summary, the challenges of the digital society—its complexity, speed, and global interconnectedness—demand a responsive and future-oriented constitutional approach. Reforming the constitution to reflect digital realities ensures that legal systems remain relevant, rights are protected, and the state remains accountable in both virtual and physical domains.

## **SMART CONSTITUTIONALISM: THEORETICAL FOUNDATIONS**

The concept of *smart constitutionalism* arises as a response to the limitations of classical constitutional models in addressing the legal complexities introduced by digitalization and artificial intelligence. While traditional constitutions have long served to regulate the distribution of state powers, protect individual freedoms, and define the structure of government, they were created in socio-technological contexts vastly different from today's cyber era. The increasing integration of algorithmic governance, digital identity, and automated public services requires a reconceptualization of constitutional frameworks.

Smart constitutionalism does not aim to replace classical constitutionalism outright. Rather, it supplements and adapts its principles to the demands of the digital age. The core objectives—such as protecting individual rights, ensuring state accountability, and maintaining the separation of powers—remain central. However, these goals must now be pursued within an environment characterized by artificial intelligence, big data, and real-time information processing.

In this framework, the constitution is no longer viewed merely as a static legal document but as a dynamic legal instrument capable of integrating emerging rights and technologies. New constitutional domains such as **digital privacy**, **algorithmic transparency**, **neuro-rights**, and **data sovereignty** must be explicitly recognized and regulated.

Crucially, this model also calls for the incorporation of previously non-traditional actors—such as nature and artificial intelligence—into the legal order. The increasing severity of environmental crises and the growing influence of intelligent systems on legal and social decision-making challenge the classical triad of “individual–society–state.” A broader constitutional vision must now include ecological and technological considerations as integral components of governance and legal subjectivity.

Ultimately, smart constitutionalism seeks to ensure that the constitutional order remains effective and legitimate in a digital society. It must anticipate future risks, address asymmetries in digital power, and create flexible legal mechanisms to safeguard both technological innovation and human dignity.

## COMPARATIVE INSIGHTS: GLOBAL EXPERIENCES

Several countries have taken pioneering steps in adapting their constitutional frameworks to the digital era, offering valuable lessons for emerging models of smart constitutionalism.

**Greece** was among the first states to incorporate digital participation into its constitutional text. Article 5A of the revised 2001 Constitution guarantees every citizen the right to participate in the Information Society and obligates the state to facilitate access to digital information. Although the term “internet” is not explicitly mentioned, the broader scope of “Information Society” implicitly includes digital technologies and services.

**Mexico** followed with a groundbreaking amendment in 2013, explicitly recognizing internet access as a constitutional right. Article 6 of the Mexican Constitution affirms the right of every individual to

access information and communication technologies, including broadband internet. The practical legal consequences of this amendment were affirmed in a 2014 ruling by the Mexican Supreme Court, which declared limited mobile internet packages unconstitutional—thereby affirming the enforceability of digital rights through judicial mechanisms.

**Chile** has set a remarkable precedent by introducing *neuro-rights* into its constitutional framework. A 2021 amendment to Article 19 regulates the collection, storage, and use of data derived from human brain activity. Although the provision does not mention artificial intelligence by name, its implications for AI-powered brain-machine interfaces are clear. This move reflects Chile's recognition of cognitive liberty and mental privacy as fundamental rights in the AI era.

These comparative experiences illustrate diverse constitutional strategies for safeguarding digital rights. Some countries, like **China** and **Russia**, approach digital sovereignty by asserting strong national control over cyberspace, including legal mechanisms for filtering, surveillance, and internet autonomy. China's "Great Firewall" and Russia's 2019 "sovereign internet" law exemplify constitutional models that emphasize state-centric digital governance.

In contrast, Western democracies tend to prioritize open internet principles, advocating for global access, free expression, and transparency. The **European Union**, through instruments like the GDPR (2016), has emerged as a leader in the constitutionalization of data protection and privacy standards.

Collectively, these global examples demonstrate that while the methods vary, the momentum toward integrating digital rights and responsibilities into constitutional law is undeniable. They reinforce the view that constitutional frameworks must evolve alongside the digital society to remain legitimate, just, and effective.

## CYBER SOVEREIGNTY AND DATA PROTECTION

In the era of digital transformation, the concept of **cyber sovereignty** has emerged as a critical issue within both constitutional and international legal discourse. Cyber sovereignty refers to a state's right to govern and regulate its digital infrastructure, enforce national laws in cyberspace, and control the flow of information and data within its digital borders. As Kesan and Hayes (2022) define it, cyber sovereignty is “a state's right to govern cyberspace within its borders, asserting legal authority over internet infrastructure and data flows.”

This concept reflects a growing concern among states about the transnational nature of the internet and the increasing power of global technology corporations, which often operate independently of local laws. While some countries, particularly in the West, advocate for an open and borderless internet, others emphasize the importance of national control and digital autonomy. For example, **China** and **Russia** have adopted assertive strategies to establish self-contained internet systems. China's “Great Firewall” restricts access to external platforms, while Russia's 2019 “sovereign internet” law allows for detachment from the global internet in emergencies.

At the same time, large technology platforms such as **Google, Meta, and Amazon** introduce new complexities to sovereignty debates. These corporations control significant portions of global communication and information exchange and often implement content policies that may conflict with national regulations, challenging the authority of states in their own jurisdictions.

Another foundational aspect of cyber sovereignty is **data protection**. As the digital economy relies heavily on the collection, storage, and processing of personal data, the safeguarding of such information has become central to constitutional rights and national security. The **European Union's General Data Protection Regulation (GDPR)**, adopted in 2016, has set a global benchmark for personal data protection, emphasizing consent, transparency, and the right to be forgotten.

Many countries have followed suit, establishing their own data localization laws, which require that citizens' personal data be stored within national borders. This approach aims to protect digital privacy while also limiting foreign surveillance and economic dependency on external servers.

Cyber sovereignty thus represents a delicate balance between **protecting national interests** and **maintaining global digital cooperation**. While excessive control may limit digital freedoms, complete openness may expose states to cybersecurity threats and erosion of legal authority. As such, constitutional reforms in the digital era must engage with cyber sovereignty not as a political choice but as a legal necessity.

## **AZERBAIJAN'S LEGAL DEVELOPMENTS**

The Republic of Azerbaijan has taken significant legal and institutional steps to align its governance structures with the demands of the digital era. These reforms reflect a national commitment to digital transformation, data protection, cybersecurity, and the gradual formation of a smart legal framework.

A landmark development occurred in **2009**, when Azerbaijan amended its Constitution to include the **right to personal data protection**. This right was further elaborated in the **Law on Personal Data** (2010), which established comprehensive regulations regarding the collection, storage, and processing of personal information. As Tzanou (2017) observes, "Data protection is not only a legal necessity but also a fundamental right in digital democracies." Azerbaijan's approach is aligned with evolving global standards, including those set by the GDPR.

In the realm of **cybersecurity**, Azerbaijan acceded to the **Council of Europe's Convention on Cybercrime** (Budapest Convention) in 2008, thus committing to international cooperation in combating cybercrime. Domestically, the establishment of **Computer Emergency Response Teams (CERTs)** has enhanced the state's capacity to respond swiftly to cyber incidents.

Legal instruments such as the **Law on Freedom of Information** also contribute to the digital legal ecosystem by ensuring transparency and access to information in the digital environment.

The state's policy direction reflects a strategic vision. The **Artificial Intelligence Strategy of the Republic of Azerbaijan for 2025–2028**, adopted by presidential decree in March 2025, aims to promote responsible AI development, digital innovation, and smart governance. This strategy is complemented by Azerbaijan's broader **Digital Development Strategy for 2024–2026**, which focuses on expanding e-government services, open data accessibility, and improving digital infrastructure nationwide.

These legal reforms are further supported by practical initiatives such as the “**ASAN Service**” centers and **my.gov.az** portal, which provide public services through a unified digital interface. This model has gained international recognition, including a **United Nations Public Service Award in 2015**, and serves as a benchmark for digital service delivery.

Through this multi-faceted approach, Azerbaijan is progressively laying the constitutional and institutional groundwork for smart governance, while reinforcing its commitment to data security, citizen-centric services, and legal modernization in line with international standards.

## RECOMMENDATIONS FOR LEGAL EDUCATION

As the digital era reshapes legal systems and governance structures, higher education institutions must adapt accordingly by modernizing curricula and developing academic infrastructure that supports digital legal literacy. Law faculties, in particular, bear the responsibility of preparing future legal professionals to navigate the challenges posed by artificial intelligence, data governance, and emerging digital rights.

In Azerbaijan, promising steps have already been taken. For instance, the **Azerbaijan Technical University** established the *Institute of Cybersecurity and Artificial Intelligence* following a 2021 decision by its Scientific Council. Likewise, **Baku State University**, in cooperation with the *International Turkic Academy*, launched the *Department of Artificial Intelligence Ethics* in 2024, addressing the ethical and legal dimensions of AI technologies.

Notably, **Nakhchivan State University** has hosted international conferences on artificial intelligence, most recently a joint event with the Russian Federation's “South” University and the Ministry of Science and Education of the Republic of Azerbaijan. These initiatives reflect an encouraging shift toward interdisciplinary and technologically informed legal education.

Nevertheless, further efforts are needed to institutionalize subjects such as **Artificial Intelligence Law, Cyber Law, and Internet Governance** as standard components of legal training. Drawing on international models, including Turkey's *Legal Tech Labs* and AI-focused law courses in Europe and North America, Azerbaijani universities should establish similar laboratories and courses that foster practical and theoretical understanding of legal-tech intersections.

Such educational reform will not only enhance students' professional competencies but also contribute to the broader goal of building a legal system that is agile, transparent, and resilient in the face of digital transformation.

## CONCLUSION

The rise of the digital society, driven by artificial intelligence, data economies, and automated governance, necessitates a reevaluation of foundational legal principles—particularly those enshrined in constitutional frameworks. The concept of **smart constitutionalism**, as explored in this article, offers a forward-looking legal paradigm that responds to the complexities of digital transformation while preserving the core values of classical constitutionalism.

Comparative experiences from countries like Greece, Mexico, and Chile demonstrate the feasibility of embedding digital rights, such as internet access and neuro-rights, into constitutional texts. Simultaneously, debates surrounding cyber sovereignty, data localization, and platform accountability underscore the need for balanced approaches that safeguard both state authority and individual freedoms.

Azerbaijan's recent advancements in digital governance—including constitutional amendments, personal data protection laws, cybersecurity strategies, and public service digitalization—position it well to pursue further constitutional innovation. The adoption of national strategies on artificial intelligence and the institutionalization of e-government platforms exemplify the country's commitment to legal modernization.

However, as the article argues, smart constitutionalism should not be seen as a rupture from classical models but rather as an evolutionary step. At this stage, it functions more as a **methodological and regulatory tool** than a fully distinct constitutional order. Its ultimate success will depend on its ability to balance technological progress with human dignity, legal clarity, and democratic accountability.

In conclusion, implementing constitutional reforms that reflect the realities of digital transformation is not a speculative exercise but a legal imperative. The integration of smart technologies into the legal system—supported by updated legal education and informed public policy—will ensure that constitutional governance remains just, responsive, and future-ready in the digital age.

## REFERENCES

- Abbasov, E., Garibli, I., & Ozturk, A. (2025). Conduct of Civil Proceedings in Higher Courts. *Porta Universorum*, 1(3), 254-261.
- Balkin, J. M. (2020). *The Constitution in the Digital Age* (Working Paper). Yale Law School. Retrieved from Yale Law Digital Commons.
- Castillo, T. (2023). Neuro-rights and the constitution: The Chilean experience. *International Journal of Constitutional Law*, 21(1), 55–78.

- Chile. (2021, October 25). *Constitution of Chile*, Article 19 (neuro-rights amendment).
- Constitution of the Republic of Azerbaijan*. (2024). Baku: Qanun Publishing House.
- Council of Europe. (2001). *Convention on Cybercrime (ETS No. 185)*. Strasbourg: Council of Europe.
- European Union. (2016). *General Data Protection Regulation (Regulation (EU) 2016/679)*. *Official Journal of the European Union*, L119, 1–88.
- Farman, Y. K., & Yusif, E. J. (2025). Abortion: In the Context of the Legislation of Foreign Countries and the Republic of Azerbaijan. *Acta Globalis Humanitatis et Linguarum*, 2(1), 4-9.
- Greece. (2001). *Constitution of Greece* (2001 revision), Article 5A.
- Huseynov, T., Khalilov, Y., Aliyev, H., & Abisov, S. (2025). Circumstances that Prevent an Act from Being a Crime. *Porta Universorum*, 1(3), 29-36.
- Kesan, J. P., & Hayes, C. (2022). Cyber sovereignty. *Fordham International Law Journal*, 45(2), 367–422.
- Khalilov, Y. (2024). Concepts about the source of the word “Constitution” and its modern meaning. *Scientific Research and Experimental Development*, (6). Retrieved from <https://ojs.scipub.de/index.php/SRED/article/view/3483>
- Khalilov, Y. F. (2007). *Interpretation of the Preamble and General Provisions of the Constitution of the Republic of Azerbaijan*. Baku: Qanun Publishing.
- Khalilov, Y., & Mirzazade, Y. (2025). The Presumption of Innocence in the Context of International Legal Instruments on Human Rights. *Acta Globalis Humanitatis et Linguarum*, 2(2), 259-264.
- Law of the Republic of Azerbaijan on Freedom of Information. (2005). Baku: Official Gazette of the Republic of Azerbaijan.
- Law of the Republic of Azerbaijan on Personal Data. (2010). Baku: Official Gazette of the Republic of Azerbaijan.
- Mexico. (2013). *Constitución Política de los Estados Unidos Mexicanos*, Article 6.
- Öztürk, A. (2024). Problems with the Right to Legitimacy. *Acta Globalis Humanitatis et Linguarum*, 1(1), 180-186.
- Öztürk, A., & Garibli, I. (2025). The Characteristics of Monarchy as a Form of Government. *Acta Globalis Humanitatis et Linguarum*, 2(2), 117-125.
- Suprema Corte de Justicia de la Nación (Mexico). (2014). *Amparo en revisión 1517/2014*.

- Tzanou, M. (2017). *The Fundamental Right to Data Protection: Normative Value in the Context of Counter-Terrorism Surveillance*. Oxford: Hart Publishing.
- United Nations Human Rights Committee. (2011). *General Comment No. 34: Article 19—Freedoms of opinion and expression* (CCPR/C/GC/34).
- Yunis, K. (2024). CONCEPTS ABOUT THE SOURCE OF THE WORD “CONSTITUTION” AND ITS MODERN MEANING. *Scientific Research and Experimental Development*, (6).
- Yunis, K. (2024). THE PROHIBITION OF THE USE OF ILLEGAL EVIDENCE AT THE LEVEL OF DECISIONS OF THE EUROPEAN COURT AND THE PRESUMPTION OF INNOCENCE. *German International Journal of Modern Science/Deutsche Internationale Zeitschrift für Zeitgenössische Wissenschaft*, (74).
- Yunis, K., Aziz, Q., & Mirhuseyn, S. (2024). THE HISTORY OF THE PRESUMPTION OF INNOCENCE. *Progress in Science*, (6).

# A Review of Neoclassical Economics and its Importance

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**Abstract.** How was the term "neoclassical economics" introduced to economics and what thoughts does it imply? Is the current use of this term consistent with the initial efforts of its founders?

These questions are among the categories that always occupy the minds of economic scholars. Neoclassical economics was first introduced to economics by Veblen, and it referred to the marginalist thoughts that prevailed in the last decades of the nineteenth and early twentieth centuries.

In order to escape from the classical theory of objective value, marginalists resorted to subjective preferences for determining values, hoping that by abandoning objective value, they could establish economics on a more scientific basis.

Although these efforts were initially considered good advances, after a while they became so abstract that they seemed to be anything but a theory about human behavior. In this article, we will take a brief look at the scientific life of neoclassical economics to show how this intellectual tradition was formed, what its most important features were, and what it became over time. We will also show that, contrary to existing perceptions, the early thinkers of this intellectual tradition did not have an anti-historical and anti-institutional outlook.

**Keywords:** *Classical economics, conventional economics, neoclassical economics, marginalism, history of economics.*

## INTRODUCTION

Conventional economics, also known as conventional economics or mainstream economics, is made up of various schools of thought, but the most important one is neoclassical economics, which largely dominates other mainstream paradigms. However, as Tafazzoli (2008) points out, neoclassical economics itself is also known by two names.

(Marginalist economics;) Neoclassical economics. Since their analytical focus was mainly on final principles (such as marginal utility, marginal production, and the like), they were called marginalists or

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finalists. On the other hand, because their theories and analyses in many cases led to similar conclusions and results as classical economists, they were called neoclassical.

In fact, the latter was the name that Veblen gave them. But what was marginalist or neoclassical economics? This name and title is something that was assigned to the efforts made in the second half of the nineteenth century to respond to the relationship between exchange value and use value (Campus, 1988).

Of course, we should note that historically, we can point to works that precede these efforts. For example, people like Cournot, Dupuy, and Thonen can be mentioned as pioneers of final analysis. However, the recognized form of marginalism was eventually manifested in the works of people like Jones, Menger, and Walras, and in the history of economic thought these people are considered its founders. Regardless of these issues, the important question that concerns us is what happened in the womb of economic history that the marginalist germ emerged in such a systematic and paradigmatic form, how it was born, and how it grew and developed. This is a very important question and needs to be addressed.

This issue is important in at least two ways. First, there is no doubt that neoclassical economics is currently the most important school of thought in the mainstream of economics and therefore has the greatest dominance over all scientific circles in the world. This issue alone can indicate the need to understand its emergence and how it evolved.

Second, if we want to understand the knowledge that this paradigm offers of social realities and identify its possible shortcomings and weaknesses in this regard, we must still have a precise understanding of it. Undoubtedly, this understanding is possible in the context of a historical analysis. For this purpose, before entering the main topic, we will first review the historical background of the discussion, that is, classical economics.

In fact, addressing the neoclassical paradigm without considering what has happened to the classical school will not provide a precise understanding of the whole issue. Because history testifies that marginalism came into existence after the theoretical and empirical failures of classical economics.

After a brief review of the historical background of the discussion, we will try to examine some aspects of marginalist economics. After that, we will reflect on the types of historical narratives available about this school and try to address some of the neglected aspects of the neoclassical intellectual tradition.

## **CLASSICAL ECONOMICS: ACHIEVEMENTS AND DEFICIENCIES**

From the late 18th century to the mid-19th century, the school of classical economics with its liberal thoughts was at the peak of its credibility, to the point where it can be said, "Economics had overshadowed all social sciences in that era, and social reforms were not impossible without the opinion of economic scholars, and if there were no statistical research in economic sciences, sociology would not have been possible" (Qadiri,19969)

Of course, even philosophy was largely dependent on economics. During this period, and despite some drawbacks, classical economics was able to present itself as a great intellectual building. There

were several specific reasons for this: First, the classics were able to lay the foundation for a new knowledge that, independent of ethics and law, was able to analyze issues related to human relations in a scientific manner.

Second, by modeling themselves on the laws of nature, the classics were able to instill the idea that an economic system based on natural laws could function best, and therefore the government should be prohibited from any interference.

Third, classical economists were able to provide precise and comprehensive definitions of some concepts, raise new topics under topics such as wealth and production, and present interesting classifications of factors of production.

Fourth, the classics showed that in conditions of free competition and without government intervention, the economic system could produce the best results and establish equilibrium. In any case, the concise forms of economic science expressed by classical scholars were in a way that delighted any audience and largely convinced them.

In fact, this vision was so broad that some thought that everything that economics could do had been proposed by classical scholars and that this science could be considered complete. But reality quickly became inconsistent and exposed the fundamental weaknesses of this approach. First of all, and contrary to the classical economists' imagination, the invisible hand and the pursuit of personal interest failed to guarantee collective interest. Therefore, many strata of society struggled with poverty.

Workers in particular were in a very unpleasant situation. This is while the classical theory was based on labor. In other words, they considered value to be the result of labor. That is, if the production of commodity x required two days of labor and the production of commodity y one day, then x was worth twice as much as y. In other words, value was produced by labor.

Marx raised a historical question in this regard that could shake the foundation of economic liberalism. He believed that if labor produces value, then why does the surplus not go to the workers and flow into the pockets of capital? In his opinion, the surplus should go to the workers. And this is an attack on the foundation of the capitalist system (Hamilton, 1987).

Moreover, there was strong evidence that individuals do not guide their actions based on self-interest. In fact, there are many sources of motivation that can be considered as guiding our behavior and conduct. This could well indicate the fact that the image of man presented by the classical school is an incomplete and incorrect image, and of course, when the image drawn of man is incomplete, the theories built on it will also have shortcomings (Qadiry, 1969).

Another fundamental flaw of classical theory was that they considered their theories universal and ignored the institutional and cultural differences existing between societies. In fact, they thought that the clothes sewn by them (the principles and theories presented by them) fit all human societies and that all societies follow the same laws, so we can expect the same consequences.

For example, there was the idea that by removing all existing restrictions on free trade and opening the doors of the economy to the world without any consideration or condition, all societies would

benefit and enjoy prosperity and well-being. However, in England's trade relations with other countries (such as Germany), there was evidence indicating that this classical theory was not correct, to the point that thinkers such as Friedrich List strongly opposed this idea and called for the establishment of protections for German industries.

Similar positions were taken in America against trade with England. Another theoretical problem of the classics is the formulation of cause-and-effect relationships. When the classics argued about cause-and-effect relationships, they did not realize that the cause can often be the effect and at the same time the effect itself can be the cause (Veblen, 1909). This caused some of their laws to encounter a cycle of succession.

For example, in the law of supply and demand, the basis of the argument was that supply and demand determine the price. On the other hand, in explaining supply and demand, it was assumed that they are determined by the price. That is, if we want to know which is the cause and which is the effect, we get caught in a vicious circle. The situation is the same with regard to the cost of production.

The classics claimed that value is determined by the cost of production, regardless of the fact that the producer regulates his production and production costs based on the current price or the price he predicts in the future. This cycle of succession is also visible in the law of income distribution between labor, capital, and landowners.

Because here too, we see that on the one hand, price is determined by the sum of wages, profit, and rent, and on the other hand, each of these is determined by subtracting two other components from price. That is, we are again caught in a kind of cycle. Other shortcomings and weaknesses of the classics include the failure to realize the theory of three, the theory of value, the theory of Ricardo's distribution, and the neutrality of money. In summary, it can be said that classical economics, despite all its authority and influence, faced some pitfalls due to its inherent weaknesses.

Of course, the most important challenge to this approach was the weak performance of the system that promoted it. The liberal capitalist system was something that the classics strongly supported, but this system had failed to provide for the well-being of the individuals in society, and most people either suffered from poverty or had to endure very difficult working conditions. This situation raised the question: "Is the poverty of workers the result of natural law or the result of the wrong regime of economic liberalism?" (Qadiri, 1969)

In fact, in the second half of the nineteenth century, and despite all the theories and laws formulated by classical economists, Western society was still struggling with serious problems and difficulties.

Social welfare was apparently increasing, but poverty was still very widespread. The extremely unequal distribution of wealth and national income had fueled many discontents, although at the same time the general standards of living were increasing.

Trade fluctuations had a very unpleasant effect on the people, so that other members of society were unable to rely solely on their own initiative and abilities to overcome problems. Farmers and farm workers also had their own problems, so that they migrated to the cities in search of better

opportunities, creating poor slums. Therefore, on the one hand, a process of profound structural changes was taking place and intensified.

In this space, the structure of social relations was taking shape in two different ways: social relations related to the factory and social relations related to the community. In fact, within enterprises, especially large enterprises, relations between individuals took the form of hierarchical and bureaucratic relations. This form of relations provided the basis for the first attempts at "personnel management" and the first formal forms of "management science".

On the other hand, in society as a whole, class conflict was deepening surprisingly and was turning into a direct war between political power holders and unions (Screpanti & Zamagni, 2005).

Different countries were also experiencing different rates of growth, but this growth was accompanied in different places by increasing concentration of capital, the spread of alliances, mergers and the formation of cartels. This process was reinforced by the enormous changes taking place in production techniques, which in turn led to significant increases in the size of factories (especially in the communications, transport, steel and iron industries).

In addition, the organizational form of the limited liability company was establishing itself and becoming the exclusive means of equipping and controlling the huge volume of capital needed for growth. In addition, the uneven development of countries had given rise to relentless international competition. This competition was in all areas, from prices and technology to the organizational form of enterprises and the national economic system.

But on the other hand, all kinds of economic problems and hardships emerging, problems that seem to be signs of the first crisis of the capitalist system. The situation was such that many believed that they were facing a "Great Depression".

This situation led to many protests' classical economics, both theoretically and practically. "The first attack on the classical school was made by Sismondi, who presented a touching balance sheet of the performance of liberalism and painted a terrifying picture of the poverty and suffering of the workers and the poor masses of the time that economic liberalism had caused" (Qadiri, 1969). This revolt, on the one hand, fueled socialist movements and, on the other hand, caused nationalist movements against the economic liberalism of classical schools. In fact, in these circumstances, three approaches were proposed to overcome social problems, all of which were ten points of departure from the precepts and rules of classical economics.

These approaches were: socialism; the union system; and the belief in government intervention to improve conditions by establishing economic regulations, resolving existing problems in the proper use of resources, and eliminating inequalities in the distribution of income.

All of these ideas and the thinkers who supported them challenged the intellectual foundations of classical economics in some ways and severely criticized its foundations (of course, the peak of these criticisms can be seen in Karl Marx's Capital.)

However, conservatives are always quick to turn to ideas that support the status quo. In fact, after a group of thinkers showed that the ideas of the classical school could not provide an accurate and reliable explanation of the realities of the world, some economists attempted to overcome these shortcomings by presenting a new intellectual framework. This new framework of thought is what was first called marginalist (marginalist) and later became more famous as neoclassical economics.

The marginalists disagreed with all three of the above answers. Based on their seemingly neutral and heavenly theories, they themselves concluded that: although the theories of value and distribution of classical economists were not precise enough, their policy views, based on the absence of government intervention, were accurate and correct.

In fact, the marginalists advocated distribution and allocation through the market, opposed government intervention, denounced socialism, and tried to show that labor unions were either ineffective or harmful.

To defend these beliefs, the marginalists set about establishing a flexible scientific paradigm that still has staunch defenders after a century and a half. The following are some of the dimensions. We will discuss this influential paradigm in the history of economic thought.

### **Marginalism (Finalism)**

The most important and prominent systematic efforts and paradigms of the marginalist type were made independently by three economic thinkers in a short period of time. Historically, first, William Stanley Jones published a book titled "Theory of Political Economy" in 1871, just a few years after the publication of Marx's Capital, which can be considered the beginning of the final unitary school.

After him, Menger and Walras published theories that were similar in method and content to Jones' research. Since they emphasized the final units in their analyses, their approach became known as finalist or marginalist. By emphasizing concepts such as utility, and hypotheses such as the rationality of individuals' behavior, which is equal to maximizing utility, these thinkers were able to create a fundamental turn in economics and developed the theory of value. From around work to around utility.

Their efforts were able to reduce the venom of attacks by people like Marx to some extent and provide a relatively safe haven for economics. Of course, one of the important points about the marginalist school is that, despite the change in the method and content of the theories presented by it, the results it produced were largely the same as those reached by the classical school.

In fact, it seems that this is why Veblen called them neoclassical. In any case, it was not long before marginalist ideas and thoughts met with success in scientific fields and attracted the attention of thinkers of the time. According to what is stated in economic history, the initial ideas of Jones, Menger and Walras were later developed by Alfred Marshall, Francis Edgeworth, Irving Fisher, John Bates Clark, Wilfredo Pareto, Friedrich von Wieser and Eugen von Böhm-Bawerk and some other thinkers of the time. It was expanded and expanded (Grant, 2007 & Brue; Zamagni, 2005 & Screpanti; Tafazzoli 2008).

In fact, and to be more precise, the neoclassical school can be considered the result of the initial efforts of the marginalists and this group of economists (i.e. Marshall and his colleagues).

Of course, the most prominent role in this is that of Marshall. One of the most important efforts of this school and its creators was to base their economic theories on an important principle: humans are in search of more pleasure with less pain.

This vision, which is synonymous with presenting a one-dimensional, calculating, and completely soulless image of humans, gave a new shape to economic analyses in the form of optimization principles and with the help of a mathematical cloak. This attitude, in the context of theoretical efforts made within the framework of the theory of materialism, was able to become an analytical tool. It seems to create a powerful force for the economy, to the point that some economists considered it "the foundation of the entire edifice of economics" (Walras, 1900).

This analytical tool is the condition of equality between prices and marginal utility, which is considered as a condition of rational behavior of consumers and is still relied on as the most important principle in the formulation of economic formulas after a hundred years.

This finding of economists implied an important issue, namely, that, assuming a certain amount of goods produced, relative prices are determined entirely by marginal utility (Campus, 1988).

With the help of this new analytical tool and using geometric diagrams and mathematical techniques, the final school tried to transform economics into a more precise social science. The emphasis on utility and related concepts gave demand and its conditions a prominent place in their analyses, and they considered them as one of the factors determining the prices of final goods and factors of production.

In addition, the school emphasized the factors that shape individual decisions, an issue of great importance in a world where these decisions are important in determining the course of economic activity. The finitists explicitly stated the fundamental assumptions that underpinned their economic analyses, in contrast to the practice of classical economists, who left the status of these assumptions vague. The methodological controversies that the finitists initiated led to the separation of objective, determinable principles from those based on value judgments and philosophical insights.

The partial equilibrium analytical method used by the members of the Nahiyyun school enabled them to use abstract methods to analyze the complexities of the real world. This analytical method, in which one variable is changed while the others are held constant, allows researchers to dissect complex phenomena in one step at a time. Thus, the extremely complex problems and issues of society, involving numerous variables, are reduced to a systematic and extremely simple form.

Of course, the finitists tried to approach more realistic states and situations by introducing further variables in their analyses, although what their understanding of reality was and what facts they gave importance to can be a matter of much reflection (Stanfield, 1999). In fact, they emphasized those facts that could be mathematically modeled and those facts that could not be expressed in terms of

these abstractions were excluded from study. This fact was one of the most important components of Veblen's attacks on neoclassical economics (Veblen, 1898 & 1909).

Another characteristic of microeconomics was their focus on individual economic units (small parts of the economy), which they considered to be one of the advantages and benefits of their approach. It is believed that the microeconomic approach of microeconomics complemented the existing macroeconomic approach to economics (which could have overlooked many issues by considering the economy as a large whole). For example:

- 1: It is possible for certain groups of people to become extremely poor while the average per capita income of a society has increased.
2. The business cycle is very important for the profitability of a large automobile company, but for a simple grocery store, the business cycle is much less important than the opening of a rival store down the street.
3. Macroeconomics tells us that investment in some forms of human capital (such as higher education) yields higher returns. Compared to investing in physical capital; however, a banker may be reluctant to lend to individuals for higher education unless the government guarantees the loan. Accordingly, the microeconomic approach ultimately assumed a very important place in economic theory.

When discussing a scientific school, one of the most complex issues is to outline the most important characteristics of that school. This is by no means an easy task, because each school is made up of the opinions and ideas of a group of thinkers who sometimes have fundamental differences with each other. Nevertheless, commonalities can be found in some categories. In the history of economic thought, a number of issues are mentioned as the most important ideas of the finalist school, some of which can be summarized as follows. (Brue & Grant, 2007:172) .

1. Focus on the margins finalists. (In other words, this school focuses mainly on the point of exchange, where decisions are made (in other words, on the margins). The Finiteists extended the Finite Principle that Ricardo had put forward in the theory of rent to all areas of economic theory.
2. Focus and emphasis on the rationality of economic behavior. The Finiteists assumed that people act rationally in balancing pleasure and pain, in calculating the marginal utility of different goods, and in balancing present and future needs. They also believed that purposeful human behavior is normal and ordinary, and that a few abnormal behaviors cancel each other out. The Finiteists' intellectual roots went back to the thoughts of Jeremy Bentham, because they believed that the dominant force in human action is the pursuit of utility and the avoidance of disutility (or negative utility).
3. Emphasis on microeconomic analysis. The fact is that in the finalists' dramas the individual and the firm are the main focus of the analysis. Instead of focusing on the total economic system, or in other words macroeconomics, the finalists focused mainly on individual decisions, market conditions for a type of commodity, the output of specific firms, and the like.
4. Use of abstract and deductive methods. The finalists opposed historical methods and supported the analytical and abstract methods of people like Ricardo and other classics.

5. Emphasis on pure competition. With exceptions such as Cournot, the finalists usually based their analyses on the assumption of pure competition. Pure competition is a world consisting of small, individualistic, and independent entrepreneurs; many buyers; a large number of sellers; homogeneous products; uniform prices; and no Advertising. No one person or firm has enough economic power to meaningfully affect market prices. Individuals can, by their actions, demand, supply, and exchange at prices determined in the market through the interactions of a large number of people. Each individual is so small in relation to the size of the market that no one will notice his or her presence or absence.

6. Demand-Based Price Theory. For the early financiers, demand was the main force in determining price. The classical economists emphasized the cost of production (supply) as the main determinant of exchange value. The early financiers took the opposite path and emphasized demand, albeit at the cost of practically eliminating supply. Although Alfred Marshall, a little later, created what is known as neoclassical economics by combining supply and demand, Marshallian economics was inherently heteronomous.

7. Emphasis on subjective utility. According to the financiers, demand depends on marginal utility, which is a subjective and psychological phenomenon. The costs of production also include such things as: dedicated and tedious work efforts, running a business, saving money to finance the capital needed.

8. Equilibrium approach. The financiers believed that economic forces generally tend towards equilibrium - that is, a kind of balance between opposing forces. Wherever disturbing factors cause the balance to be upset, new movements towards equilibrium will occur.

9. Integration of land into capital goods. In their analysis, the financiers lumped land and capital together and treated interest, rent, and profit as returns on assets. This move, in addition to having its own analytical advantages, also Some challenged the view that land rent was a windfall and an unnecessary payment to secure the use of land. The Finiteists generally linked land rent to the theory of usury.

10. Minimal government intervention. In the vein of the classical school, the Finiteists advocated minimal government intervention in the economic system as the most desirable policy. If the goal is to maximize social benefits, in most cases it is best not to interfere with the laws of natural economics.

Furthermore, the Finiteists believed that a better understanding of how the market can allocate resources efficiently and promote economic freedoms can provide the basis for increasing the well-being of all members of society. The finitists were largely successful in implementing this vision, especially in neutralizing Marx's ideas based on the argument that, under competitive conditions, the amount received by workers is equal to their share in the production of the value of the product.

Of course, the finitists also helped those who wanted to maintain the status quo, that is, those who resisted change. Among these were employers and landowners. In fact, their theories benefited employers (even if most of them were unaware of this fact) by opposing labor unions and by attributing unemployment to the artificially high wages and their inflexibility downwards, or both. The finitists protected landowners against attacks based on Ricardo's theory of rent. It can also be said that

this theory has been in favor of the wealthy, who are generally opposed to government intervention in the field of income redistribution (Brue & Grant, 2007).

Like any new idea, some of the ideas of the finitists have been quickly challenged, and some have been rejected. For example, Keynes pointed out the error of combining neoclassical and finitist employment theory. If a firm is forced to reduce wages, it can expand its market by selling more of its product at lower prices. The reduction in the purchasing power of its employees will not affect its sales much, since they usually only buy a small portion of that product.

But if all employers are forced to reduce wages, then their market is likely to not only expand, but also shrink. Moreover, critics believed that the pure competition hypothesis was a good hypothesis for the years before 1870, but not for the years after 1870. In those years, pure competition was found only in a small part of the economic system.

Institutional economists also believed that historical and institutional factors were the main determinants of the amount of daily work, consumer behavior, and wage rates, not the rational calculations of individuals. The ultimate view that the best government was the one that interfered the least was out of fashion as new ideas and theories emerged.

The principle of analysis of these thinkers was static, timeless, and lacking empirical support. Little effort was made to verify the theories. Indeed, the hypotheses were often constructed in such a way as to preclude the possibility of testing them. The firm belief that supplies creates its own demand led to a neglect of business cycles. The Finite-Dayton School failed to explain economic growth, and it became clear that this theory was not effective in explaining the cause of the slow development of developing countries.

Although addressing the story of the ineffectiveness of neoclassical theories in facing the development problems of countries is a detailed and separate topic, regarding this ineffectiveness, it is possible to point out issues such as their incorrect understanding of issues such as institutional changes, coordination failures, complementarities, multiple equilibria and low-level equilibria, and the like, which generally cannot be analyzed with neoclassical tools and have had serious consequences for developing countries.

Such as poverty, inadequate education and health, child labor, lack of industrialization despite the existence of high technologies, accelerated migration from rural to urban areas despite the existence of widespread unemployment in the cities, the inability to transition from traditional agriculture to industrial agriculture, internal brain drains, and the like (Todaro & Krugman, 1998 & Smith, 2012; Bowles, 2004).

Although some of the early legacies of the finitudes have not withstood the test of time and economists have gradually ignored them, some of them have endured overtime and remain intact. In fact, some of the most dogmatic beliefs of current mainstream economists can be traced back to the legacy of the above; one of the most important fanatical beliefs of mainstream economics is individualism (Arnesperger & Varoufakis, 2005 ).

Individualism can be considered the most important anchor of conventional economics. The truth is that none of the brilliant theoretical advances in economics have detached the neoclassical ship from its anchor. In other words, the neoclassical school has fanatically preserved its individualistic roots.

Their method still retains its analytical-synthetic character: the socio-economic phenomena under study are analyzed by focusing on the individuals whose actions have caused the phenomenon to occur. That is, the first step is to analyze actions at the individual level; Then, through combination, the necessary knowledge of the subject is obtained (such as analyzing individual demands separately and then combining these individual demands to arrive at market demand and finally analyzing the market based on that). At the individual level, further steps are taken to understand the complexities of the phenomenon under study.

In short, neoclassical theory follows the method of a watchmaker. To understand the functioning of a watch, he first examines each of the components of the watch separately and sees how each cog operates. From the neoclassical economist's point of view, individuals are like cogs with the main components to be studied because it is their actions that cause the social phenomenon to occur. Therefore, it can be argued that individualism is a very important component in conventional economics: the idea that socio-economic phenomena should be studied at the level of individual agents.

In fact, economists of the conventional school of structure-agent relations give primacy to the individual and operate their explanations in a philosophical individualist manner, believing that individuals are agents who are able to direct all their actions, actions, and decisions based on their desires and preferences.

Accordingly, this view emphasizes the characteristics and activities of each individual to explain his or her behavior. In fact, this approach assumes that human needs, talents, and motivations occur without any specific connection to social groups or social interactions. Hence, it is claimed that every social phenomenon and institution can and should be explained as the product of individual decisions, actions, and attitudes (Brian Fay, 2004: 65-67). This insight has led to an excessive and illogical emphasis on individual actors and the exclusion of collective actors from the economic scene. (Screpanti & Zamagni, 2005).

Of course, it is necessary to pay attention to two points here. First, this analytical method is not the method of classical economists such as Adam Smith. Even people like Keynes and Hayek did not follow this method. Second, this method is in complete harmony with the liberal individualism of the mid-19th century in Europe. This insight led to the separation of the agent from the structure and the insistence that any socio-economic analysis and explanation at any point in time and space must proceed from the agent to the structure. In fact, in this view, structure was seen as the crystallization of the agent's past actions.

It can be shown that this rigid separation and separation between structure and agent is not only a central component in the definition of conventional economics, but also forms the basis of most recent theoretical efforts (Hodgson, 2004 & Varoufakis, 2005 & Arnesperger ).

There seems to be no dispute about the fact that all the various and new forms of manifestation of what we call mainstream economics are all committed to individualism. Despite the fact that mainstream economists have paid attention in the last few decades to the fact that the agent is a creature of his social environment and that the structure and the agent are intertwined, the emphasis in their modeling is still on the individual. That is, the path of explanation is still from the individual to the structure. Another bigoted belief of conventional economics can be called instrumentalism.

That is, the belief that all human behavior is preference-driven, or more precisely, considered as a means to maximize preferences. This thinking is based on the philosophical belief that economics seeks to allocate scarce resources to unlimited wants, which ultimately lies in Samuelson's voice as a golden formula that he believes lies at the heart of all economic problems, a mathematical function for maximizing given the available constraints (Screpanti & Zamagni, 2005).

According to some institutionalists, in this view, the preferences of individuals are considered to be given, unconditioned, completely deterministic, and separate from the beliefs and instruments used (Hodgson, 2000). In fact, according to this view, everything that human beings do or say is a means to satisfy their preferences. Hence, there is no philosophical space left for the question of whether the agent will act in accordance with his preferences or not? Does he have any practical freedom in his choices?

In this connection, Tony Lawson believes that economists often refer to their project as a theory of choice, which is why the discourse of choice is so prevalent. However, despite all these claims, the truth is something else. In all the formal models published in reputable scientific journals, what is ultimately denied is "choice".

For if choice has any meaning, its real meaning is that each individual can always act in another way, and this is precisely what contemporary theorists cannot accept in their formal models. Individuals can have only one kind of choice and only one kind of action. In fact, the type of approach here is ambivalent, or in other words, this or that, not both (Lawson, 1997 & 2003).

On this basis, it can be argued that neoclassical theory is a more limited version of consequentialism, in which the only outcome that matters is the one in which a homogeneous index of satisfaction-preferences is maximized (Arnesperger & Varoufakis, 2005).

The roots of instrumentalism can be found in David Hume's treatise *On Human Nature*. In this treatise, the Scottish philosopher divided the human decision-making process into three separate modules: passion, belief, and reason (logic). Passion determines the destination, reason (logic) determines the path to that destination. The whole process is determined by a set of beliefs about external constraints and the possible consequences of alternative actions.

It is not difficult to see how this view relates to conventional microeconomics: in microeconomics the individual is defined as a set of preferences, his beliefs are reduced to a set of mental probability density functions that allow him to translate his preferences into expected utilities, and finally his reason is so callous that his choices do not go beyond maximizing utility.

It is, of course, a mistake to imagine that Hume endorses this neoclassical view. For the passion he is referring to is far too vague to be neatly aligned with the ordinal or expected utility function. In the tumultuous twentieth century, conventional economists have made a great deal of effort to They promoted the development of psychological issues related to the decision-making process of economic agents. There was little research on the philosophical issues related to the rationality of economic man. It was thought that individuals could (and should) be modeled as if they had consistent preferences that guided their behavior automatically.

The question of whether all rational men and women were really doomed to maximize their utility function at every moment in time was considered an absurd question. Thus, instrumentalism lost its connection with the philosophies of Hume, Bentham, and Mill and became a technical movement, something like the gestures and postures of an actor before coming on stage. Another fundamental belief of the neoclassicals is what can be called counterfactualism. But the question is why economics Neoclassicism requires such an insight. The important point is that, according to neoclassicists, the most important goal of economists in their scientific efforts is to provide predictions (Friedman, 1953).

Friedman considers the goal of conventional economics to be to provide a system of generalizations that can predict the results of changes in conditions. He believes that the performance of this system is measured in terms of the breadth, accuracy, and results of its predictions.

Although resorting to individualism and methodological instrumentalism are useful in formalizing the subjects and phenomena under study, they cannot fulfill the goal of prediction. Equilibrium is something that can overcome this shortcoming. Uncertainty avoidance and determination require that the instrumental behaviors of agents be coordinated in such a way that their macro-behavior becomes sufficiently regularized so that reliable predictions can be made of them.

The standard question that is usually asked, explicitly or implicitly, in the mainstream economic literature is: What behavior can we expect in equilibrium? And the question of whether equilibrium is possible, or how it is actually achieved, is generally treated as an additional and irrelevant question that is never addressed (Arnesperger & Varoufakis, 2005).

The reason for imposing equilibrium as a self-evident principle is not so complicated: it cannot be otherwise! In fact, neoclassical economists cannot show that equilibrium is the result of rational, instrumental choices by agents. They therefore opt for the second best, resorting to the methodological alternative that the behavior of economic agents fluctuates around an intuitive-analytical equilibrium, and instead of paying attention to the essence of the matter, they indulge in the tempting question of whether the system tends to return to equilibrium if it is out of equilibrium, without worrying about its real value.

It can easily be shown that this insight has accompanied economists since the infancy of economics. When Cournot was explaining the first economic models in 1938, he quickly realized that there was a glaring gap in his theory in explaining the occurrence of equilibrium.

However, instead of exploring this analytical problem, he proceeded to investigate what happens when we start from equilibrium. Whether the system tends to return to equilibrium or not. In other words, whether the equilibrium in question is stable or not. The proof of the stability of his hypothetical equilibrium is what has secured Cournot his place in the pantheon of theoreticians in neoclassical economics.

Moreover, an interesting conclusion can be drawn from Cournot's analytical method. In neoclassical economics, the theorist first discovers an equilibrium state; then he assumes as a matter of course that the economic agents will find their equilibrium in it.

Finally, it is shown that, once in equilibrium, all small disturbances are incapable of creating centrifugal forces that would drive self-interested behavior out of the discovered equilibrium. These three theoretical stages are equivalent to what is called equilibration. It is important to note that equilibria are synonymous with avoiding what can be considered the central question of behaviorism: do rational agents act in accordance with the predictions of the equilibrium theory? Instead, the question is: if rational agents act in accordance with the predictions of the equilibrium theory, is there any reason to stop doing so? It is also interesting to note that equilibria has remained intact since its first use by Cournot in 1838.

Not only has it remained intact, but it has given rise to many elaborate interpretations, including general equilibrium theory and game theory. In neither of these theories does the equilibrium solution naturally arise from the model hypothesis.

By the admission of the theorists of general equilibrium theory themselves, convergence towards general equilibrium can only be proven under many constraints and for special cases. Of course, it is true that it is not only difficult but impossible to prove that a system of theoretical markets will produce equilibrium in every market (see Mantel, 1973 and 1974). Game theory is no exception to this conclusion: in most human socio-economic interactions (or games), the common knowledge that all actors are instrumentally rational rarely leads to interactive Nash equilibria.

In fact, more is needed to achieve equilibrium. This is in addition to the self-evident principle that at each stage of the game the beliefs of all individuals are consistently aligned. It is clear that this assumption is another embodiment of counterfactualism: for, when we assume that the beliefs of the agents are consistently and systematically aligned, we are in fact assuming that they are in (Nash) equilibrium. In fact, again, equilibrium is imposed as an axiom on the model and theory, before its stability against possible disturbances is examined. That is, the spirit of Cournot continues to live.

The passage from the obscurity of the cosmogony in economic laws is also another important feature of neoclassicism. The analogy of economics to natural sciences in general, and to physics in particular, has led to hypotheses of knowing the same objective and absolute nature of natural laws for economic laws, regardless of their historical and social context.

The inclusion and encompassing of the imposed problem of neoclassicism, namely the problem of scarcity, has provided universal validity for economic laws. But for this to make sense, social relations

must be excluded from the field of economics. For this reason, they have been treated as superstitions, subjects incompatible with new scientific achievements, and the like (Screpanti & Zamagni, 2005).

Consequently, according to institutionalists, in the neoclassical tradition the choice of what can be studied as an economic subject will depend on whether or not it will be covered with the cloak of formalism. If it is covered, so much the better; otherwise it should be excluded from analysis. The problem, of course, is that most of the things that are covered with this royal cloak have nothing to do with the realities of human life (Veblen, 1909).

It can be said that while the individualistic reductionism of the neoclassicals leads to the elimination of social classes from economic analyses, their anti-historical reductionism leads to the elimination of social relations from economic analyses. Naturally, the study of changes in these categories also loses its importance. Does the picture of neoclassical economics presented in the history of economics textbooks correspond to reality?

At present, neoclassical economics, with a body embodied in the aforementioned hypotheses, not only continues to exist but also enjoys a significant hegemony over other paradigms. Due to this relative hegemony, the written history of economics also reflects a bias towards neoclassicism to some extent. Contemporary historians of economics, that is, those who began writing in the second half of the 20th century, tend to focus on those economists of the past whose scientific contributions were in the line of neoclassical research.

The relatively negative judgment of these economic historians of approaches such as institutionalism, which has criticized conventional economics and attempted to act as a barrier against the intellectual trends leading to the current modern economy, does not reflect the honesty and integrity expected of them as professional economists (Yonay, 1998).

This is not only evident in the depiction of other paradigms but also in the actual presentation of neoclassical economics. The truth is that the spirit of neoclassical economics that spread in the second half of the twentieth century is very different from the neoclassical economics of the first half of the twentieth century. In fact, the neoclassical that spread in the second half emphasized aspects of conventional economics that were anti-institutional and anti-historical. In order to demonstrate its legitimacy, this movement tried to show that this way of thinking had a historical continuity since the emergence of the marginalist/neoclassical school.

Therefore, to some extent, the presentation of history was accompanied by deviations and distortions. It is true that there are many ways to tell the story of the past (White, 1973&1987; Gerrard, 1993).

In fact, when a historian wants to narrate the contribution of past scholars, he has no choice but to select, according to his own criteria, those categories that he considers important and valuable. Personal biases are therefore unavoidable. But the problem is that in the history of economic thought almost all historians have suffered from similar biases when recounting historical events. This may lead to the mistake of assuming that the only valid way to describe the past is what is observed in conventional history.

Although many of the stories narrated by neoclassical historians are correct, their selection nevertheless seems to have left important aspects of the past ambiguous, such as the nature, success, and fortunes of institutional economics, or parts of the early neoclassical insights that were closer to institutional and historical analysis.

In the history of economic thought in the period of marginalism and neoclassicism, that is, the last decades of the 19th century and the first decades of the 20th century, we mainly witness an over-exaggeration of the obscurity of the economic gods. So that one might easily imagine that the main practice of economists of that era was to use the ultimate tools provided by the ultimateists to analyze specific problems and situations.

There is no doubt that such a picture is wrong. Marginalism, Marxism, and institutionalism are three traditions of thought with significant influences that came into being in the same “neoclassical era”. Stigler has shown through his extensive research that in that era, marginalism did not form the main core of economic studies.

Stigler claims that “utility was not among the research tools of economists in this period”. To illustrate this point, Stigler says that in 1940 no articles in the *American Economic Review* used marginal utility theory, while in 1970, 29 percent of the articles did (Stigler, 1973).

The fact is that marginal analysis became part of the curriculum of economics at the end of the nineteenth century, but it was only one topic among countless others of equal importance and did not become the main tool of economists until after World War II. In fact, up until then, it was possible to be a successful economist without being a master of marginal analysis, or even without knowing much about it.

Today, Alfred Marshall is considered the most important neoclassical economist; The one who gave a boost to the new school of economics, established a connection between it and earlier education, and wrote the most original textbook that was the center of economic education throughout the world. Among the greats of economics, Marshall enjoys a position similar to that of Smith, Ricardo, Marx, and Keynes. Niehans (1990) argues that at the time of Marshall's death, "the universities of Britain" were Marshallian. Marshall's *Principles of Economics* dominated economics education (Niehans, 1990; Rima, 1977), and only Samuelson's *Economics: An Introductory Analysis* has succeeded in replacing it as the most important textbook reference. Contemporary neoclassical economists consider the position and influence of Leon Walras to be on a par with Marshall's.

But this is a new insight. While English-speaking economists in the late nineteenth century were familiar with Walras and his work, we did not see the importance and usefulness of his work as Marshall did (Yonay, 1998).

One interesting point to make is that economic historians have been somewhat biased even in their accounts of Marshall's neoclassical ideas. They try to show a continuity from Marshall to modern neoclassical economics, and so they emphasize Marshall's contributions to ultimate analysis—the famous supply-demand scissors, the analysis of monopolies, the exposition of economies of scale, and so on. Because of this bias, there has been almost no attention paid to evaluating Marshall's overall

approach to economics. In fact, it is easy to show that economists either did not know Marshall well or did not present a true picture of him.

It is true that Marshall's discussions of evolutionary and biological ideas are present only in a few parts of his *Principles* and that he has not been very successful in moving beyond his static and equilibrium theoretical systems (Hodgson, 1993). However, he nevertheless considered biology to be the main model of economics, recognizing the importance of continuous changes in economic phenomena, although he has not been very successful in moving from an equilibrium approach to an evolutionary approach due to his Spencerian view. This does not mean, however, that he was not inclined to include historical and institutional analyses in economic research. In fact, some contemporary researchers have shed light on some of these dimensions. For example, Becattini (2003) believes that Marshall cannot be considered a neoclassical economist according to existing definitions of neoclassical economics.

(Marchionatti, 2003) also identifies many similarities between Keynes and Marshall, and as we know, there are undeniable similarities between Keynes and the institutionalists. The fact is that Marshall, in addition to emphasizing ultimate analysis, sought to “present a balanced macro-picture of the economic system by giving appropriate weight to institutional and historical factors” (Brien, 1981 & Harcourt, 1987).

German idealism, Spencerian evolutionism, and the utilitarianism of Bentham and Mill can be mentioned as themes that shaped and influenced Marshall. Marshall placed the graphical and mathematical proofs for which he is accused today in footnotes and appendices. Blaug, of course, interprets this fact as meaning that Marshall hoped that his work would be read by business people (Blaug, 1986), but this interpretation seems to be incorrect. Whatever Marshall's original intention, he seems to have been well aware that his book would become a major source for advanced education in economics. Moreover, Marshall went to great lengths to ensure that economics was institutionalized as an independent discipline and even more so as a science.

Thus, Marshall's care in not making his book mathematical was not to appeal to business people, but to them; a book that deals with the fundamentals should therefore devote a significant portion to mechanical deductions; It was because he did not want to turn economics into a sub-discipline of mathematics (Yonay, 1998).

According to the conventional view, Marshall's approach was in complete opposition to the historical and institutionalist approaches. Marshall preferred deductive methods, while the historical and institutionalist approaches preferred induction, in other words, they called for empirical methods. But, in fact, Marshall was a strong advocate of historical methods and agreed with the institutionalists and historicists in criticizing the universality of the deductive method.

For example, in Marshall's view, one of Ricardo's major analytical errors was that he treated economic agents as if they were all merchants in the City of London. “Ricardo and his followers, in order to simplify the discussion, often spoke as if they considered man a fixed quantity, and therefore never bothered to study his variations.

Most of the people they knew directly were city dwellers; and sometimes they presented their arguments so carelessly that they assumed that other Englishmen were very much like the city dwellers they knew. [Of course] they were aware that the people of other countries had their own characteristics, and that these characteristics were worthy of scientific study; but they seem to have believed that these differences were superficial and would disappear as soon as other nations learned a better way of life from the English.” (Marshall, 1910, quoted in (Yonay, 1998)

Qatar Marshall's profound analysis of Ricardo and his followers is that "their greatest error was in not paying attention to the capacity of industrial habits and institutions to change." This error distracted them from the relations between the different industrial classes.

This led them to treat labor power as a commodity, without bothering to analyze the subject from the point of view of a worker; they therefore attributed to the forces of supply and demand actions that were more mechanical and regular than they could be observed in real life; and they introduced laws of profit and wages that were not true even in England in their time.

Mark Blaug believes that there is a kind of double standard in Marshall's work. He believes that "Marshall's Principles appears to be a static theory of microeconomics, but the reader is repeatedly reminded that conclusions based on static analyses are unreliable and that microeconomics cannot deal with the vital issues of economic policy." That is why Marshall says that “the Kaaba of economists’ aspirations is economic biology,” which, according to Blaug, “Marshall apparently means the study of the economic system as an organism over historical time” (Blaug, 1986).

Blaug recognizes a contradiction between these two approaches, which “seem very similar to the philosophical program of American institutionalism” and the fact that “Marshall’s scholarly efforts throughout his life have been devoted to the teaching, elaboration, and refinement of comparative static theory.” This dichotomy is well visible to observers. However, since Blaug is a Lakatosian historian, he cannot use contemporary insights to reconstruct the hard core of past research programs.

From the perspective of contemporary neoclassical thought, Marshall’s vision seems ambiguous and shaky, and yet, from the perspective of Marshall and his contemporaries were accustomed to attempting to combine comparative statics with evolutionary analyses of institutions (Maloney, 1985). Kadish (1989) argues that the apparent tension between Marshall's claim to the importance of "economic biology" and the fact that he spent most of his time writing and revising the final analyses of the Principles was Marshall's attempt to establish economics as a scientific discipline.

Final analysis was a tool that economists had a monopoly on. In contrast, history was an established discipline from which Marshall was keen to separate his field. Of course, this does not mean that Marshall was opposed to historical studies in economics, nor does it mean that he gave such studies secondary importance.

As Blaug has noted, John Clapham (1873-1946), a prominent economic historian, “turned to the study of British economic history at Marshall’s urging” (Blaug, 1986, see also Kadish, 1989). Marshall’s support for historical analysis is also evident in the works of another prominent economic theorist and historian, Arthur Bowley (1896-1957) (Blaug, 1986). These examples and examples of this kind

clearly demonstrate that Marshall was consistent in his support of historical studies and that he gave equal importance to historical studies and comparative theories (cited in Yonay, 1998). Of course, according to Marshall himself, his view was common and common at the time. He attributed this modern insight to changes in biology and claimed that John Stuart Mill was the first economist in whose work the influence of evolutionary theory was discernible (Marshall, 1910).

That is why we see that Marshall, in addition to his special praise for Jones, also praises people like Cliff Leslie, Walter Baught, John Kernis and Arnold Toynbee (Marshall, 1910). Jones is well known. He was the leader of the marginalist revolution. But Leslie, Baught and Toynbee were three of the leaders of the British historical school. Cairnes (1823-1875) was also a student of John Stuart Mill, the last giant of the classical age.

Marshall believed that all these thinkers had taken a new evolutionary approach. Indeed, although Jones is famous to modern economists for his theory of marginal utility, to his contemporaries he was famous for his empirical studies of money and other matters. The fact that Marshall sees this group of economists as having a similar line of thought indicates the deficiency of the historical reconstruction carried out in the modern era, which presents them as mortal enemies (cited in Yonay, 1998).

Of course, the “physiological pluralism” of Marshall, Jones, and others in John Neville Keynes’s *The Scope and Method of Political Economy*, which can be considered the most original book of the modern era, The English-speaking world of that time was reflected in Keynes's book, which reflected Marshall's "vision that the philosophical controversies raised by the German and English historical schools could be resolved by a more moderate approach, albeit by rejecting the somewhat more radical view of the younger historical economists who called for a complete reconstruction of economics on a historical basis and by accepting that the increased effectiveness of economic theory required an understanding of the historical forces that were causing disruptions in economic laws" (Blaug, 1986).

One of the things that has been passed down to us through written and oral knowledge is that all neoclassical economists were unequivocal supporters of the Lesser Heffer doctrine, and that is why they are called neoclassical. This is another bizarre distortion of historical facts. For example, John Maynard Keynes, one of Marshall's most prominent students, notes: "Some of Marshall's most important scientific efforts were directed to elucidating the salient cases in which private interests are not in harmony with social interests," i.e., those in which we need government intervention (Keynes, 1924)

See also Marshall, 1910. Blaug makes similar points about Jones, stating that he too “denied the Lesser Doctrine and advocated a more pragmatic approach to government intervention” (Blaug, 1986). Henry Sidgwick (1838-1900), one of the founders of the Cambridge School and a great influence on Marshall, was also a supporter of government intervention in the economic system, to the point where one might even claim that he had socialist connections (Blaug, 1986). Keynes claimed that since John Stuart Mill “no other economists have been linked to the political philosophies or teleologists from whom the subject of social order arose, and their scientific analyses do not lead to such conclusions” (Blaug, 1986). (Keynes, 1924). Jha (1973)'s findings support Keynes's testimony.

He claims, based on an analysis of the Economic Journal between 1891 and 1915: "Neoclassical economists were deeply concerned with various aspects of the poverty problem. Poverty and unemployment were increasingly seen as categories whose economic and non-economic causes were among those over which workers had the least control. [This insight] led economists to advocate unemployment insurance and pensions as desirable forms of state protection.

They also supported the trade union movement, believing that these were a prerequisite for establishing competitive wages and peace in industry." In sum, it can be said that, contrary to the narratives of early neoclassical economists, it was not the case that economists generally had difficulty with institutional and historical analyses and that they limited the input of their studies and insights to such discussions. In fact, if there was such a thing, it was a late move by the second generation of neoclassicals.

## **CONCLUSION**

In this article, we have briefly reviewed one of the most important economic paradigms. We have shown that neoclassical economics emerged in the context of the problems that arose in the face of classical economics and tried to both provide new answers to some existing problems and to create new problems, issues, and ideas. This effort led to the formation of some ideas and theories that formed the core of this paradigm.

But like any other new thought and idea, neoclassical ideas quickly faced fundamental challenges from some of the thinkers of the same era. However, this intellectual paradigm, which was very influential on the history of human thought, tried to maintain a number of its main and distinctive components, some of which we have referred to in this article.

Another issue that deserves much consideration is the way in which the history of economic thought is narrated by the pioneers of the neoclassical school. It is often pretended that this school was in complete opposition to all components of institutional and historical analysis, while this is not the case at all. In the last part of this article, we showed that the pioneers of neoclassical economics were well aware of the complexities of human nature and the prominent role of institutions in shaping human behavior.

This school considered historical studies as an important and inseparable part of economics. Some thinkers of this school believed in government intervention to mitigate the harms and disadvantages caused by free markets and viewed labor unions as a necessary tool for improving the situation of workers.

This issue is visible both among the European neoclassicals and in the case of the American neoclassicals. In sum, it can be claimed that, contrary to the image presented of the early neoclassicals, these thinkers were in no way evasive of institutional-historical and structural insights.

In fact, the science of economics was further distorted in the hands of people like Samuelson, so that it can be said that the current conventional economics is more a product of the minds of the later

generations of neoclassicals, people like Samuelson and Friedman, than of its early generations, people like Marshall and Clark.

## REFERENCES

- Tafazzoli, Fereydown (2009). *History of Economic Thought: From Plato to the Modern Period*, Ney Publishing, 8th edition, Tehran. For access: <https://tinyurl.com/bdmra5te>
- Robbins, Lionel (2005). *History of Economic Thought*; Translated by Dr. Gholamreza Azad (Armaki), Ney Publishing. For access: <https://agahbookshop.com/p-8270--.aspx>
- Qadiri Asli, Baqer (1969). *The History of Economic Thought: From Plato to Keynes*, Tehran University Press. For access: <https://sohalibrary.com/item/view/2421780>
- Arena, R. & Michel Quéré (2003). *The Economics of Alfred Marshall: Revisiting Marshall's Legacy*. Palgrave Macmillan.
- Arnesperger, C. & Y. Varoufakis, (2005). *What is Neoclassical Economics? The Three Axioms Responsible for its Theoretical Oeuvre, Practical Irrelevance and, Thus, Discursive Power*. <http://uadphil.econ.uoa.gr/UA/files/500490756..pdf>
- Blaug, M. (1985). *Economic Theory in Retrospect*. Cambridge: Cambridge University Press.
- Blaug, M. (1986). *Great Economists before Keynes*. Cambridge University Press.
- Bowles, Samuel, (2004). *Microeconomics: behavior, institutions, and evolution*, Princeton University Press.
- Brue, S. & R. Grant (2007). *The History of Economic Thought*. Thomson.
- Campus, A. (1988). *Marginalist Economics*, in J. Eatwell et al. *The New Palgrave: a Dictionary of Economics*, the Macmillan Press Limited.
- Friedman, Milton (1953). *Essays in Positive Economics*. The University of Chicago Press.
- Gerard, B. (1991). "Keynes's General Theory: Interpreting the Interpretations". *Economic Journal*. (2), pp: 27-687
- Hamilton, David (1987). "Institutional Economics and Consumption," *Journal of Economic Issues*, XXI (4). pp: 1531-1553
- Harcourt, Geoffrey C. (1987). "Theoretical Methods and Unfinished Business." In David Reese, ed., *The Legacy of Keynes*, 1-22
- Hodgson, G. M. (1993). "The Mecca of Alfred Marshall" *The Economic Journal*, 103(417), pp: 406-415
- Hodgson, G. M. (2000), "What is the Essence of Institutional Economics?" *Journal of Economic Issues*, XXXIV (2).

- Hodgson, Geoffrey M. (2004). *The Evolution of Institutional Economics; Agency, Structure and Darwinism in American Institutionalism* , Routledge.
- Jha, M. (1973). *The Age of Marshall: Aspects of British Economic Thought* : 2d ed. London: Frank Cass. pp: 1890-1915 .
- Kadish, A. (1989). *Historians, Economists, and Economic History* , London: Routledge.
- Krugman, P. (1998). *Development, Geography, and Economic Theory* . The MIT Press.
- Lawson, Tony (1997). *Economics and Reality* . Routledge.
- Lawson, Tony (2003). *Reorienting Economics* . Routledge.
- Maloney, J. (1985). *Marshall, Orthodoxy, and the Professionalization of Economics* . Cambridge: Cambridge University Press.
- Mantel R., (1974). 'On the Characterization of Aggregate Excess Demand', *Journal of Economic Theory* , 7, pp: 348-353 .
- Niehans, J. (1990). *A History of Economic Theory: Classic Contributions: 1920-1930* . In Sidney Weintraub, ed., *Modern Economic Thought*, 7-21. University of Pennsylvania Press.
- O'Brien, D. P. (1981). "A. Marshall, 1842-1924" . In D. P. O'Brien and J. R. Presley, eds . *Pioneers of Modern Economic in Britain*, 36-71 . Totowa, NJ: Barnes & Noble.
- Radzicki, Michael J. (2003). "Mr. Hamilton, Mr. Forrester, and A Foundation for Evolutionary Economics", *Journal of Economic Issues* , XXXVII (1).
- Rima, Ingrid H. (1977). "Neoclassicism and Dissent: 1890 - 1930" . In Sidney Weintraub, ed., *Modern Economic Thought*, 721-. Philadelphia: University of Pennsylvania Press.
- Screpanti E. & S. Zamagni, (2005). *An Outline of The History of Economic Thought* , Oxford University Press.
- Sonnenschein, H. (1973). "Do Walras' Identity and Continuity Characterize the Class of Community Excess Demand Functions?". *Journal of Economic Theory* , 6, pp: 345-354 .
- Sonnenschein, H. (1974). 'Market Excess Demand Functions', *Econometrica* , 40, pp: 549-563 .
- Stanfield, J. R. (1999). "The Scope, Method, and Significance of Original Institutional Economics", *Journal of Economic Issues* , XXXIII (2).
- Stigler, G. J. (1973). "The Adoption of The Marginal Utility Theory" . In R. D. Collison Black et al. eds., *The Marginal Revolution in Economics*, 305-320 . Durham: Duke university Press.
- Todaro, Michael P. & Stephen C. Smith, (2012). *Economic Development* . Eleventh Edition.
- Veblen, Thorstein (1898). "Why is Economics not an Evolutionary Science?". *The Quarterly Journal of Economics* , 12(4), pp: 373-397 .

- Veblen, Thorstein (1909). "The Limitation of Marginal Utility". *The Journal of Political Economy* , 17(9), pp: 620-636 .
- Walras, L. (1900). Preface to 4th ed. of the *Elements* . Reprinted in *Elements of Pure Economics*, ed. W. Jaffe, London: Allen & Unwin, 1954.
- White, H. (1973). *Metahistory: The Historical Imagination in Nineteenth-Century Europe* . Baltimore: Johns Hopkins University Press.
- White, H. (1987). *The Content of the Form: Narrative Discourses and Historical Representation* . Baltimore: Johns Hopkins University Press.
- Yonay, Y. P. (1998). *The Struggle over the Soul of Economics: Institutional and Neoclassical Economists in America between the Wars* . Princeton University Press.

# The world's superpowers' show of force against China's Silk Road Initiative (US confrontation)

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**Abstract.** From 2013 to 2023, the United States has followed a specific path in its response to China's Silk Road Initiative, gradually moving from a position of silence and indirect measures to aggressive and confrontational behavior towards China's infrastructure initiative. The purpose of this article is to explain the process of the gradual confrontation of the United States' position towards China's Silk Road Initiative.

In this regard, the main question based on the descriptive-explanatory method of the article is why, in the ten years since the announcement of the Silk Road Initiative (2013-2023), the position of the United States has gradually become more confrontational towards it? The hypothetical answer to this question is that the US's increasingly confrontational stance towards China's Silk Road Initiative is a result of the changing nature of the relationship between the two countries from cooperation to competition, and this has led to a shift from the Obama administration's relatively cooperative approach to the initiative to a more competitive approach under the Trump administration and an intensification of competition under the Biden administration.

The article finds that, given the evolving U.S. approach to the Belt and Road Initiative, there is also the potential for further intensification of competition with China in the area of international infrastructure development.

**Key words:** *United States, China, Belt and Road Initiative, Competition, Cooperation, Infrastructure Projects*

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## 1. Statement of the Issue

China's Silk Road Revitalization Initiative, now officially known as the Belt and Road Initiative, has assumed a central position in China's international approach more than a decade after its announcement by President Xi Jinping and is considered a signature or brand of China's foreign policy. The initiative is also aimed at addressing China's domestic challenges, such as ensuring economic growth, energy security, and job creation. The initiative aims to facilitate cooperation in infrastructure, trade, and finance between China and partner countries.

The initiative also seeks to strengthen soft links, meaning the promotion of common rules, standards, and procedures for people-to-people exchanges. As of March 2024, more than 180 countries and international organizations have signed agreements with the Chinese government on the initiative. Most of the signatories are developing countries in Asia, Africa, the Middle East, and Latin America, known as the "Global South."

On the other hand, China's efforts to promote the Belt and Road Initiative have been met with increasing negative reactions from the United States over the 2013-2023 decade. The country initially pursued a contradictory stance toward the initiative, based on occasional criticism of China's infrastructure performance and declarations of conditional willingness to cooperate in implementing infrastructure projects under the Belt and Road Initiative. However, as Washington increasingly understood the global dimensions and scope of China's initiative, its tone gradually shifted from a more selective criticism of China's infrastructure initiative to a cautionary approach to partnering with China and proposing alternative infrastructure plans.

The turning point in Washington's stance toward China's infrastructure initiative can be seen in the second half of 2017. The United States explicitly identified China as its most important rival in its national security strategy at this time, and "strategic competition" became the overarching framework for explaining U.S.-China relations.

The Biden administration's National Security Strategy report, released in October 2022, also described China as the greatest geopolitical challenge facing the United States. The report also spoke of a "ten determinants" of competition between the United States and China. This means that relations between these two great powers will move towards competition in various areas from now on and for the foreseeable future.

It is natural that in these circumstances, one of the important aspects of this competition will be the confrontation between the United States and China in the field of limiting and discrediting China's Belt and Road Initiative and the presentation of alternative infrastructure plans by Washington and its allies.

This article attempts to examine and analyze the reactions of the United States to China's infrastructure initiative over the more than ten years that have passed since the announcement of this initiative. In this regard, the main question based on the descriptive-explanatory method of the article is why, in the ten years since the announcement of the Silk Road Initiative (2013-2023), the position of the United States has gradually become more confrontational towards it? The hypothetical answer to this

question is that the US's increasingly confrontational stance towards China's Silk Road Initiative is a result of the changing nature of the relationship between the two countries from cooperation to competition, and this has caused the Obama administration's relatively cooperative approach to the initiative to shift towards a more competitive approach under the Trump administration and an intensification of competition under the Biden administration.

To test the above hypothesis, the article, after reviewing the relevant literature, introduces a theoretical framework in the form of the concept of "great power competition" to show that from this theoretical lens, the changing nature of US-China relations and Washington's reactive pattern towards China's infrastructure initiative can be better understood.

In the following, for the purpose of analyzing the hypothesis, the public and practical reactions of the Obama, Trump, and Biden administrations to China's Belt and Road Initiative are examined and evaluated.

## **2. Related Literature**

China's Belt and Road Initiative, along with its increasing scope and dimensions, has attracted more attention in intellectual and political circles in various parts of the world, especially in Western countries.

One of the aspects related to this phenomenon that has also received attention has been the reaction of the United States and Western countries to China's largest infrastructure development program in the world. A separate Persian article and a number of other works in English have been published on this subject.

In Persian, one can refer to the article "Strategic Competition between America and China in the Infrastructure Plan for Building a Better World and the Belt and Road" published by Hossein Dehshiar and Mehdi Pourbaqar. The article focuses on the Biden administration's response to the so-called "Building a Better World" plan announced in 2021 by the US government and other G7 countries to counter China's Belt and Road Initiative. While the present article examines the broader range of US responses from the Obama administration to Biden in a specific context to China's infrastructure initiative.

The article concludes that "the United States, as a hegemonic power, with a serious understanding of the strategic challenge posed by China, is seeking to prevent a possible China-centric order, with political, economic, and ideological deterrents as an initiative to build a better world, in order to preserve the current nature of the world order structure" (Dehshiyar and Pourbaqar, 2023:49).

The Institute for American and China Studies, a non-profit think tank, published a report entitled "Perspectives on the The American Report on the Belt and Road Initiative: Concerns and Opportunities for Cooperation" was published. As the title of this report suggests, it attempts to present and collect the views of American strategic studies, political economy, and international affairs experts on China's infrastructure initiative.

The report notes the ambiguity of the initiative, and the criticisms leveled at it, but its policy recommendations are also The colorful media coverage of the bilateral cooperation and mutual benefits between China and the United States. It has also been concluded that the initiative “should be designed in a way that can promote cooperation, not competition, in US-China relations” (Institute for China-America Studies, 2016).

The US House of Representatives Foreign Relations Committee, in a report titled “Assessment of US Efforts to Counter China’s Coercive Belt and Road Diplomacy,” published in June 2023, Lahn has been highly critical of China’s infrastructure initiative, believing that “this debt trap diplomacy leaves developing countries with unpayable debt and allows China to use it to increase its influence” (Committee on Foreign Affairs, 2023: 1).

In an article titled “The Belt and Road Initiative and US-China Competition in the Global South” (Zhao, 2021), Mingao Zhao has pointed out that most of the participating countries In China’s revitalization of the Silk Road, developing countries in Asia, Africa, the Middle East, and Latin America are known as the Global South.

According to the author, China’s efforts to promote innovation have aroused suspicion in the United States, which has sought to prevent China’s expansion into this vast part of the world by strengthening its ties with the Global South.

Jean-Marc Blanchard, in an article entitled “The United States, Competition with China and the Belt and Road Initiative “By examining the official positions of the Obama and Trump administrations and interviewing media activists, it has attempted to show that the announcement and promotion of the Belt and Road Initiative has led to a more competitive relationship between the United States and China (Blanchard, 2021).

The present article also focuses on the United States’ reaction to China’s Belt and Road Initiative, but its distinguishing feature from the existing literature is that:

- 1- Over a ten-year period, the media reactions and it has practically examined all three Obama, Trump, and Biden administrations, and from this point of view, the scope of its study is broader than the existing works.
- 2- It has tried to conduct this study in a systematic and analytical manner, based on the theoretical framework of great power competition, and on the basis of indicators related to cooperation and competition in bilateral relations.

### **3. Theoretical Framework: Great Power Competition**

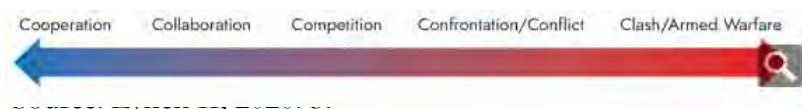
The concept of great power competition (GPC) has become an important reference and interpretive lens for researchers and policymakers in today’s international space. Its popularity stems from the idea of China’s rise to power, Russia’s resurgence, and the relative decline of the United States’ position in the international arena.

Based on this approach, observers speak of the persistence and intensification of differences between countries that are able to dominate a region or compete for global dominance (Wright, 2020). Criticisms have been raised about the explanatory power and strategic value of the concept of great power competition (Ashford, 2021), but this has not prevented a large number of researchers from using it to explain US strategy in the current context.

It should also be noted that the US national security strategy documents published by the Trump and Biden administrations have mentioned great power competition as a key feature of the international environment and have reminded us that in this new international space, this country's strategy must be readjusted.

The Trump administration's 2017 National Security Strategy specifically used the term "great power competition," and the Biden administration's 2021 National Security Strategy Interim Guidance also used the term "strategic competition" (United States Department of Defense, 2018: 2,4).

Figure 1. The continuum of the nature of relations between countries, from cooperation to armed conflict.



Relations between countries can be depicted along a continuum, which, as shown in the figure above, starts with cooperation on the left and ends with armed conflict at the right end of the spectrum. In this case, it is important to clarify the two concepts of cooperation and competition.

First, competition does not mean conflict, cooperating states are exceptionally aligned in their geopolitical goals and the means to achieve them, and are therefore able to pursue them in a coordinated manner. Cooperating states have similar goals and there is general agreement on the means to achieve them.

Rival states agree that only some of their core goals are compatible, while they also disagree about the best way to achieve the common interests in the agreed goals. Conflict and confrontation mean that the states in question are at odds over almost all of the core goals and the legitimate means to achieve those goals. At the other end of the spectrum, there is an unfavorable environment in which state goals are perceived as so incompatible and even threatening that the dominant form of state interaction with another state becomes armed conflict (Lynch II, 2020: 3).

Second, great powers have enormous, complex, and diverse capabilities. These capabilities are both material and intangible. Tangible elements include territory, population, wealth, comprehensive wealth, which includes health, education, environment, and infrastructure, and military and technological power.

Intangible elements include the ability to use these capabilities or the ability to mobilize and maintain them. Public support and diplomacy or the ability to obtain support from other countries (Onea, 2021). To enjoy great power status, a state must outperform conventional states in all areas and meet or approach the standards of members of the great power club on various dimensions.

Third, a great power uses those capabilities to pursue broader foreign policy interests beyond its immediate neighborhood. Ultimately, the relative position of that country is perceived by other countries as the dominant position, and other countries act accordingly towards that country. Using this definition, the three major powers in the modern era can be broadly considered: the United States, Russia, and China.

Fourth, the fact that relations between the United States and China are sometimes referred to as becoming competitive means that in the relations between these two powers, differences of opinion about the goals and methods of achieving them are increasing, and this is at a time when in the post-Cold War era, the tendency towards cooperation between the great powers had increased.

In this case, it can be concluded that continuing to move in the direction of competition may lead to the possibility of confrontation and conflict between these two powers (Mazarr et al, 2018).

In summarizing the discussion on the concept of great power competition, it can be noted that, citing US national security documents, this country views its relationship with China from the perspective of great power competition, which means that in relation to the subject under discussion, namely China's Belt and Road Initiative, it has differences with this country both in terms of the goals of this initiative and the methods that China pursues for the development of the infrastructure in question.

Accordingly, the United States believes that China's Belt and Road Initiative is a tool in the service of expanding the various dimensions of China's power in the international arena, which will ultimately lead to the loss of the United States' position and influence. The article shows that, in parallel with the reflection of the idea of great power competition in official documents of the United States, this country's public and practical approach to China's Belt and Road Initiative has become more aggressive and confrontational, and is approaching a state of confrontation and confrontation, the signs of which can be seen in the announcement and promotion of rival initiatives and the open rejection and criticism of China's initiative.

#### **4. Hypothesis Analysis: Reactions of the Three American States to China's Initiative**

##### **4.1 The Obama Administration: Reaction within the Framework of Cooperation**

The initial reactions of the United States to China's Belt and Road Initiative were expressed in opposition to the idea of creating the Asian Infrastructure Investment Bank (AIIB). The White House's position against the establishment of the bank came at a time when European countries were competing to join as founding members of the bank, leading analysts to claim that the United States was isolated in this regard (Ashbee, 2023: 41). Meanwhile, in September 2015, the White House announced that the United States would welcome China's growing support for development and infrastructure financing in Asia and beyond (Wuthnow, 2018).

It is clear that at this time the United States government has generally taken a contradictory position towards China's infrastructure initiative. Perhaps one important reason for this was that Washington was not well informed about the dimensions and significance of the Chinese initiative. "When China announced the Silk Road Initiative, most analysts believed that the plan did not threaten American interests.

Of course, it should be noted that at that time, the scope of the initiative and its subsequent consequences were still unknown. The United States sees cooperation with China to counter the North Korean nuclear threat, negotiating a nuclear deal with Iran, and unifying the world under the Paris climate and water agreements as positive and realistic goals.

Therefore, the US-China bilateral relationship was based on cooperation on these international issues, and therefore the US government pursued an open-handed approach to dealing with the Chinese initiative, which was based on freeing lower levels of decision-making to propose their own ideas on dealing with this phenomenon. (Lew et al, 2021:82)

It was thus that the Obama administration did not officially comment on the Chinese initiative, and based its policy on trying to complete The negotiations for the Transatlantic Partnership Agreement were launched.

The government's vision was that the agreement could create a trading bloc representing 40 percent of world production. In this context, the United States, as the most competitive economy in Asia, could pressure China to improve its standards. (Lew et al, 2021:83)

The Obama administration also made smaller commitments to connectivity and investment in the Indo-Pacific region and launched a plan called the Africa Power 2 Public-Private Partnership. It also led to the creation of a global training and development program at the U.S. Trade and Development Agency (USTDA) aimed at providing tailored training to developing countries on more transparent and better methods for determining fair value for procurement and guidance in selecting smarter and more sustainable infrastructure.

As a result, it can be said that rather than obstructing China's efforts to fill the significant infrastructure investment gap in Asia, the Obama administration is emphasizing the importance of ensuring good financial and governance standards in the implementation of the proposed Belt and Road Initiative and the Asian Infrastructure Investment Bank projects.

In this regard, the United States sought to promote its own rules and standards in infrastructure development projects based on the principles of its own liberal order. As Obama reminded them: "If we don't write the rules, China will write them" (Wall Street Journal, April . 27, 2015). In addition, at that time, the strategic focus of the Obama administration was focused on the conclusion of the Trans-Pacific Partnership (TPP).

The President argued that the pact would not only set U.S. standards for Asia-Pacific trade, but would also facilitate economic growth among the participants. Therefore, the pact would play a significant role in empowering the United States and its allies, and in this sense, this coalition, not China, would

be able to shape the future of the region. It was as if China's Belt and Road Initiative and its implications were ignored. Therefore, it is clear that at this time, the Obama administration is still pursuing a cooperative approach with the Chinese government and has not taken a negative approach to the goal of infrastructure development in various parts of the world and the direction of China's initiative in this field.

However, the United States disagreed with China on how to achieve this goal, and while promoting its own ideas in this area, it tried to continue cooperation with China in other areas and, through indirect means, maintain the United States' superiority in this area.

#### **4.2 The Trump Administration: Responding in a Competitive Context**

The policy of the Donald Trump administration towards China appeared uncertain and uncertain for most of 2017. In this context, a US delegation was dispatched to the first Belt and Road Forum, which was convened in Beijing in mid-May 2017.

Matthew Pottinger, the White House's top Asia official who led the delegation, declared that U.S. companies "are ready to participate in the Belt and Road Initiative, and they have a lot to offer." He pointed to the long and successful track record of U.S. companies in infrastructure development around the world (Gan and Delaney, 2019).

However, since the second half of 2017, the Trump administration has demonstrated a fundamental shift in its approach to China, and this has also had a profound impact on its stance on China's infrastructure initiative. Accordingly, the US move against the Belt and Road Initiative was part of a broader shift in the US approach toward strategic competition with China that began in the second half of 2017.

In this context, Chinese innovation was no longer perceived as a public good that could boost regional development, but rather as a tool in the hands of the Chinese government and in its efforts to pursue a mercantilist economic strategy.

From the American perspective, enshrining the Silk Road Initiative in China's constitution and enshrining it in Xi Jinping's legacy and thought demonstrated that the initiative was indeed a tool for China's national rejuvenation. In October 2017, the US Secretary of Defense told a Senate committee hearing: "In today's globalized world, there are too many Belts and Roads. And no nation should be in a position to dictate 'One Belt, One Road.'" US Secretary of State Rex Tillerson also reminded them, in what has since become a central feature of US policy statements on the initiative, that "the initiative has failed to create local jobs and has left poorer countries with heavy debts." "The US Pacific Command also agreed with this change in approach, declaring that "the Belt and Road Initiative is a coordinated and strategic activity by China to gain a foothold in the region and to take the place of the United States and our allies and partners" (Ashbee, 2023: 43).

In general, the more negative US stance towards China's infrastructure initiative can be said to have been rooted in growing concerns in Washington about the emergence of Chinese power. At the same time, in this new approach, the initiative itself was also interpreted as part of China's grand strategy to

sideline US power. “Considering the Belt and Road Initiative as part of China’s grand strategy has led the United States to perceive it as a ‘threat to China’s rise’” (Blumenthal, 2018: 5).

If we compare the United States’ approach to China under previous administrations from Richard Nixon to the Trump administration, it becomes clear that the biggest change under the Trump administration has been that China has become a ‘The title of “the main strategic challenge” for American national security has been introduced, and in this regard, it has taken a lead over Russia. It was in this context that Washington’s strategy towards China, which had been based on “partnership and protection” for several decades, was transformed into a competitive strategy. The publication of the Trump administration’s first National Security Strategy (NSS) in December 2017 highlighted this change (The White House, . 2017)

The report mentioned China more than 30 times. The report was largely focused on countering the “China threat.” According to Thomas Fingar, in the past few decades, China was considered an ordinary country by American policymakers, perhaps not even among the top 10 national security concerns, whereas now, countering the “China challenge” has taken a central place in the US national security policy agenda (Fingar, 2019: 15).

It should be noted that America’s perception of the “China threat” is multifaceted and focuses on the areas of economics, technology, security, diplomacy, ideology, etc. These areas are interconnected and influence each other (Cardenal et al., 2017).

Obama administration officials rarely speak publicly about China’s Belt and Road Initiative. However, as the dimensions of the plan have grown in recent years, the United States has come to realize that the initiative has gradually become a key pillar of China’s national development strategy and foreign policy. It was at this point that the initiative itself became one of America’s concerns about the phenomenon of “rising China.” Thus, the Trump administration took a very negative approach to the Chinese initiative. Trump once said behind closed doors that the initiative had the potential to disrupt global trade (Karni, 2018).

Mike Pompeo, the then US Secretary of State, also expressed a very negative approach to the initiative. He not only criticized China’s initiative on several occasions, but also put a lot of pressure on Pakistan, Panama, Israel, and other countries to be wary of Chinese investments and reduce their economic cooperation with China (Pompeo, 2019).

In March 2018, the U.S. Senate Armed Services Intelligence Committee held a “Global Threat Assessment” hearing. During this session, Dan Quast, Director of National Intelligence, claimed that China has strengthened its geopolitical advantages around the world through the Belt and Road Initiative, which poses a serious threat to the global influence of the United States (Coats, 2018: 13).

By the end of 2017, the Trump administration was on a clear path, although concerns about China’s initiative were generally framed within a broader critique of China’s ambitions. In this context, while the initiative itself was considered, it was remembered as a Chinese project to create a new global economic architecture, alongside the Asian Infrastructure Development Bank, which serves China’s geostrategic objectives in the South and East China Seas. Alongside this approach, there has been a

growing realization, not least within Washington's think tanks, that Chinese innovation will extend beyond the Indo-Pacific, to the Middle East, for example (Chaziza, 2021). In sum, as the National Security Strategy stated in December 2017, "China's infrastructure investments and trade strategies serve its geopolitical interests" (White House, 2017: 46).

At the same time, a broader critique of China's revitalized Silk Road Initiative emerged in American intellectual and academic circles. In this regard, the Belt and Road Initiative was seen as similar to other grand infrastructure projects, such as the Berlin-Baghdad railway, which served the interests of the German Empire and encouraged the expansion of trade in the late nineteenth and early twentieth centuries (Doshi, 1402:345). In this regard, the old adage that "trade follows the flag" was seen as being reversed, with the Chinese flag following the patterns of trade (Patey, 2021: 54)

Based on this idea, it was assumed that China would use this initiative to gain leverage in relations with other countries. For example, the Heritage Foundation, which has close ties to the Trump administration, supported this idea (Rolland, 2017: 94). In early October 2018, Trump signed the Building Better Investments for Development (BUILD) Act. The act provided the basis for the creation of a new agency in the United States to provide development assistance, called the International Development Finance Corporation (IDFC). Although there was no direct reference to China in the act, commentators had little doubt about its overall purpose.

The corporation was designated to provide loans for commercial investments, for example, in energy, port, and other projects. infrastructure in low-income countries. With a budget of \$60 billion, the organization will work to mobilize and facilitate private sector capital participation and economic development skills in developing countries.

In addition, a commitment was made to address challenges in partnership with the United States, including Canada, Japan, the United Kingdom, and the Netherlands. As of September 2020, the company had more than 200 projects in the Indo-Pacific It was busy and had made commitments of \$5.4 billion (Parpiani, 2021: 8).

It should be noted that the investment capacity of this institution has more than doubled compared to the previous institution in the US government. The African Prosperity Initiative was another step of the Trump administration in countering China's Belt and Road Initiative, which was announced in late 2018 but was officially launched in Mozambique in mid-2019.

The initiative's stated goals are to promote development by "advancing U.S. trade relations with countries throughout the region for the benefit of the United States and Africa." In fact, doubling U.S.-Africa trade and strengthening security have been key goals of the initiative. John Bolton, who served as the Trump administration's national security adviser from April 2018 to September 2019, has described the Africa Prosperity Initiative as a U.S. strategy in response to the described the Belt and Road Initiative and other trade and military initiatives of China (White House, 2018).

The Build Act and the corporation that was created on its basis were designed to be implemented around the mobilization of private sector capital rather than the extensive use of public sector

resources. This approach is to some extent rooted in the established principles of development assistance in developed countries, which are rooted in a firm belief in market forces.

Therefore, one of the implicit goals of these initiatives, beyond competing with the Chinese initiative for alternative financing, has been to move recipient countries away from the state-led growth model and instead promote a market-based growth model. The Blue Dot Network (BDN) 2 was another policy initiative launched during the Donald Trump administration, with the leadership of the United States and in cooperation with Australia and Japan, as a counterweight to China's infrastructure initiatives.

This showed that the Trump administration was also considering multilateral measures against China. Of course, this initiative, like the Building Better Investment for Development Act (BUILD Act) of 2018, was not framed in direct and overt opposition to China's Silk Road Initiative.

Its stated goal was to “promote quality infrastructure investment that is open and inclusive, transparent, economically and financially sustainable, and environmentally and socially sustainable and consistent with international standards, laws, and regulations.”

However, there was no doubt that this initiative was also viewed in opposition to China. The word “quality” was a key term that was widely used in these years as a way to compare infrastructure projects initiated by Japan or Western countries with those initiated under the auspices of China's Silk Road Initiative (Ashbee, 2023: 77).

In fact, Western and Japanese companies had been avoiding infrastructure investments in developing countries because they saw such projects as risky and uncertain. China's Silk Road project, which was more risk-averse, was implemented to fill this gap. The goal of the Water Point Network was to reduce these risks and uncertainties so that it could compete with Chinese innovation by conducting independent assessments of quality.

The Trump administration also committed to strengthening the Export-Import Bank (U.S. EXIM) to better compete with China. In 2019, China provided export credits worth more than six times that of the United States, and in the five years prior to that date, the value of China's official export credits had reached 90% of all credits provided by the G7 countries. Much of this financing was also provided to partner countries in the initiative.

Recognizing the need to provide necessary alternatives to the Belt and Road Initiative, the US Congress in 2019 approved a seven-year authorization for the Export-Import Bank of the United States, which would allow it to provide loans with lower rates and more flexible terms to compete with Chinese loans in high-tech sectors, including 5G and renewable energy. Congress also authorized the bank to allocate up to 20% of its lending authority, which amounts to \$27 billion, to this program. (Lew et al, 2021: 85)

To prevent Chinese technology companies from infiltrating critical infrastructure in partner countries, the Trump administration has pressured countries to refrain from using Chinese equipment in their 5G infrastructure. In 2020, US Secretary of State Pompeo launched the Clean Network Initiative,

which aims to promote privacy and information security in 5G networks. More than thirty carriers around the world have joined the network and pledged not to use Chinese equipment in their 5G infrastructure (Lew et al, 2021:86).

As shown, in the early days of the Trump administration, the government's approach to China's Belt and Road Initiative was not yet negative. However, after the publication of the National Security Strategy in the second half of 2017 and the introduction of China as a strategic competitor of the United States, the official US position on the Belt and Road Initiative was first negative, and then the government tried to present alternative approaches to competing with China's infrastructure initiative in various dimensions. Thus, it is clear that from the perspective of American intellectual and political circles, there was no longer any possibility of cooperation with China, neither in terms of objectives nor in terms of methods of assistance to the development of international infrastructure.

Also, since the Belt and Road Initiative was seen as a tool in the service of China's rise to power, competition with this country in providing alternative routes and efforts to discredit projects under the Belt and Road Initiative became a central part of US public statements and operational programs.

#### **4.3 The Biden Administration: Moving from Competition to Confrontation**

During the first months of the Biden administration, David Dollar, a researcher at the Brookings Institution, noted that the administration has largely continued Trump's approach to China.

According to him, China-US relations are undergoing a major transformation characterized by "great power competition," and China's Belt and Road Initiative will play a significant role in the strategic competition between the two powers for the foreseeable future (Dollar, 2021).

From January 2021 onwards, the new administration should strive to distance itself from the Trump administration's policies. However, the government was also quick to emphasize that it was committed to competing with China, but would do so on the basis of a broader and more inclusive coalition bloc.

Indeed, in some cases, the government seemed to have a stronger position vis-à-vis China. In this regard, the Water Point Network Initiative was completely reorganized. After some uncertainty about the new government's intentions, the network was relaunched in early June 2021 with a high-profile audience of investors, infrastructure developers, construction companies and civil society representatives. In a move that was seen as strengthening the multilateral dimension of the initiative, it was announced that the network would henceforth operate under the auspices of the Organisation for Economic Co-operation and Development (OECD).

The initiative established an Executive Advisory Group that attracted 150 business leaders and members of civil society organizations (OECD, 2021: 5). However, one of the most important measures taken by the Biden administration, in cooperation with its allies in the face of China's Belt and Road Initiative, is the infrastructure initiative called Building a Better World.

The initiative was announced at the G7 summit in June 2021. Participating leaders sought to restore ties that had been damaged during the Trump era. At the same time, a more direct position was also

announced regarding China's Belt and Road Initiative. Within the framework of this initiative, infrastructure was also understood on a broader basis.

While financing was envisaged for infrastructure projects ranging from "railways to wind farms", particular emphasis was placed on areas that went beyond traditional infrastructure, namely climate, health, digital technology, equality and gender equality (Bartlett, 2021). It was announced that this plan would collectively invest hundreds of billions of dollars in infrastructure in low- and middle-income countries over the coming years (Bermingham and Delaney, 2021).

The United States has committed to engaging multilateral development banks and other development finance institutions to invest up to \$40 trillion by 2035, in addition to official development support from its domestic institutions, and through international partnerships, to leverage the nearly \$3.3 trillion in infrastructure investment needed in target countries.

In addition to US federal financial institutions, many UN agencies are also present as partners and advisory bodies in relevant specialized fields (Dehshiar and Pourbaqer 2023:31). The challenge posed by China's Belt and Road Initiative has not only led to efforts to develop large-scale infrastructure projects in competition with Beijing but has also generated domestic demand for infrastructure projects. In The Biden administration has just unveiled the America's Business Plan, which in its first phase, envisioned spending as much as \$2.6 trillion. The deterioration of much of the United States' physical infrastructure is readily apparent to the average visitor, especially those whose lives have been damaged by the erosion of urban facilities. The United States may be a hegemonic power, but in terms of infrastructure, its situation can be compared to Many smaller, less affluent Latin American countries have done the same (OECD, 2016: 89).

Estimates show that in the decades following the construction of metropolitan areas in the 1950s, the United States devoted less than 1 percent of its gross domestic product to domestic infrastructure development. It has been argued that inadequate infrastructure provision has led to low-productivity growth in the United States (Sprague, 2017: 3).

It was against this backdrop that the Biden administration introduced the American Jobs Plan, which relied on a \$2.2 trillion increase in government spending over ten years and included \$400 billion in tax credits. The scale of the American Jobs Plan was far greater than the American Jobs Program implemented under the Roosevelt administration's New Deal in the 1930s (in adjusted dollars, the cost of this plan was \$324 billion). (based on today's dollar value). The proposals included a budget of \$115 billion for bridges, highways, roads, and major thoroughfares that were in dire need of repair. It was also decided to promote electric vehicles (Nilsen and Ward, 2021: 18).

The interesting point to note here is that the government should be able to attract support for this domestic infrastructure plan, as the US competes with China in the field of infrastructure. He sought to persuade his rival Republican Party to support it in Congress.

However, despite the belief among senior Democrats that a bipartisan coalition could be built around the America Jobs Plan, such a thing did not materialize in practice and the plan was met with opposition. After lengthy struggles in Congress, some of the plan's proposals were incorporated into

a bipartisan infrastructure bill and signed into law in mid-November 2021. However, the cost of securing bipartisan support for the plan was a sharp reduction in the projected cost level to \$550 billion (Ashbee, 2023: 132).

The latest example of the Biden administration's efforts to counter the Belt and Road Initiative can be seen in the announcement of the India-Middle East-Europe Economic Corridor (IMEC) at the G20 summit in September 2023. President Joe Biden announced at the meeting that the goal of launching this economic corridor is to counter China's advances through the Belt and Road Initiative by connecting India, the Persian Gulf, and Europe.

A report on the project by the Council on Foreign Relations said the announcement of the new initiative shows that the United States remains concerned about China's progress in its Belt and Road Initiative.

However, the report stressed that there are many uncertainties surrounding the implementation of the connectivity initiative and that "fundamental questions remain about its financing, timing, and sustainability." The report also described the range of Western initiatives in the face of China's Belt and Road Initiative, including the Initiative to Build a Better World, as "inadequate" in practical terms (Council on Foreign Relations, September 2023).

As noted, the Biden administration continued the China-competition strategy begun by the Trump administration and, in its national security strategy, spoke of ten determinants of China-competition. The same approach was followed in dealing with China's Belt and Road Initiative.

In this way, the government should pursue areas of competition with China in larger geographical areas and also try to include the United States in this competition. The government should also try to consider a broader definition of infrastructure that includes soft infrastructure and, on that basis, extend the competition and alignment with China to these new areas.

Even this government, based on the logic of competition with China, has presented an unprecedented plan to strengthen the domestic infrastructure of the United States and has tried to obtain the approval of the rival Republican Party for the approval of this plan in Congress.

All of these cases indicate a growing trend of competition between the United States and China over the development of a very broad and expansive spectrum of infrastructure, which is accompanied by a kind of blockade against the competitor.

## **5. Conclusion**

Today, there are many signs of intensifying confrontation in relations between the United States and China, the nature of which can be understood in terms of the concept of "great power competition."

This article attempts to examine why the United States' response to China's Belt and Road Initiative has become more confrontational and assesses Washington's set of countermeasures against China's rival initiative from 2013 to 2023.

As the article showed, the United States, with its portrayal of the threat posed by China's rise in its national security documents, interpreted China's infrastructure initiative as a tool to advance China's aggressive reorientation of the international order.

Thus, it can be said that the field of infrastructure development in its hard and soft dimensions has today become an arena for competition between these two great powers, and it can be said that the United States' counter-positions and actions against China's infrastructure initiative will continue for the foreseeable future.

Today, the nature of the US-China relationship has shifted from cooperation to competition, which means that the two sides' differences on many international goals and the methods for achieving them have intensified. This is clearly visible in the bilateral efforts to develop various types of infrastructure in different parts of the world.

The alignment of the US and its allies against China's Belt and Road Initiative and the effort to discredit the rival's actions in this field means intensifying the competition between the US and China, and this could shift the nature of bilateral relations from competition to confrontation and contradiction, although it is not yet possible to express a definitive opinion on this matter.

## References

- Dehshiyar, Hossein and Mehdi Pour-Baqer (2023) "The Strategic Competition of the United States and China in the Infrastructure Plan for Building a Better World and the Belt and Road," *Journal of International Relations Studies*, Volume 13, Issue 1, Serial Number 48, Spring. pp. 50-7
- Doshi, Rush (2023) *The Long Game: China's Grand Strategy to Replace the American System*, translated by Mehdi Ansari, Tehran: Abrar Cultural Institute for Contemporary International Studies and Research, Tehran.
- Ashbee, E. (2023). *Countering China, US Responses to the Belt and Road Initiative*, Colorado: Lynne Rienner Publishers.
- Ashford, E. (2021). "Great Power Competition: A Recipe for Disaster," *Foreign Policy*, April 1. <https://foreignpolicy.com/2021/04/01/china-usa-great-power-competition-recipe-for-disaster>.
- Bartlett, D. (2021). "What's in a Name? The Diplomat," June 15.
- Birmingham, F., & Delaney, R. (2021). "77 Leaders Turn Attention to China with Backlash," *South China Morning Post*, June 12.
- Blumenthal, D. (2018). "China Challenge: Part I," *Foreign Relations Testimony*, [https://www.foreign.senate.gov/imo/media/doc/072418\\_Blumenthal\\_Testimony.pdf](https://www.foreign.senate.gov/imo/media/doc/072418_Blumenthal_Testimony.pdf).
- Blanchard, J-M. (2021). "China's Belt and Road Initiative: A Strategic Challenge," *Foreign Affairs*, June 12.

Vestnik RUDN. International Relations, 21 (2), 288 — 303. DOI: 10.22363/2313-0660-2021-21-2-288-303.

Cardenal, J., et al. (2017). “Saappee :: gggggguttttt t aan eeeeeee”, aa iiaaa l wwwwww for Democracy, December 2017. [https://www.ned.org/wp-content/uploads/2017/](https://www.ned.org/wp-content/uploads/2017/12/Sharp-Power-Rising-AuthoritarianInfluence-Full-Report.pdf)

12/ Sharp- Power-Rising-AuthoritarianInfluence-Full-Report.pdf.

Chaziza, M. (2021). whh e “Blld Back Better Wo””: nn rrrrr rr iiee ooC”” ’ BRI oor eee dddd EE Ea””””W Wagggggggg ggg Middle East Institute , July.

Council on Foreign Relations (2023). “Will eee .... . nnnooCrrrrr Cii aass Bett add Raad Ittt eeeeeee ???”, Seeerrrr . <https://www.cfr.org/blog/will-us-plan-counter-chinas-belt-and-road-initiative-work>

Gan, N., & Delaney, R. (2019). “ddddddeees eeee r aaaa drrr ppp Is Veegggggg ay fmmm C””” ’ ’ ett aRR Raa””, South China Morning Post , April 25.

Institute for China-America Studies (2016). “mmeccan Peeeeeciies nn tee Bett add Raad Initiative Sources of Concern and Possibilities for Ceeee aai””” , eeee rrrr , Washington, DC 20036. <https://chinaus-icas.Org/wp-content/uploads/2017/02/American-Perspectives-on-the-Belt-and-Road-Initiative.pdf>

Committee on Foreign Affairs (2023). ”eeee iii gg SS ff rrr ssooCrrrrr C””” ’ Bett add Raad mmmmmcm””S Seaaa1 111 111– 33. <http://www.foreignaffairs.House.Gov>

Daniel, R. (2018). ”Wowwwewee eeeat attttttt tt eee SS tt elccccc commttt ””, rr ddd Services Committee, United States Senate. March 6. [https://www.armedservices.senate.gov/imo/media/doc/Coats\\_03-06-18.pdf](https://www.armedservices.senate.gov/imo/media/doc/Coats_03-06-18.pdf).

Dollar, D. (2021). “What eee s B””” ’ frst 000 aass llll ll atttt ttt aaaaaah ooC????? <https://www.brookings.edu/blog/fxgov/2021/04/26/what-does-bidens-frst-100-days-tell-us-about-his-approach-tochina>.

Fingar, T. (2019). “Fotty eass ff oaaaa l -but not yet normal- eesssssss, China International Strategy Review 1 (1):11 – 20.

Karni, A. (2018). “rr upp aass eedddd ddddd ddddd dddd d OO””, Politico , August 8. <https://www.politico.com/story/2018/08/08/trump-executive-dinner-bedminster-china-766609>.

Lew, J., et al. (2021). “C””” ’ Bett add Raad Ipp iicaiss rrr eee ddddddeeee””, The Council on Foreign Relations , Independent Task Force Report No. 79.

Lynch II, T. (2020). Strategic Assessment 2020: Into a New Era of Great Power Competition , Washington DC: National Defense University.

Mazarr, M. J., et al. (2018). Understanding the Emerging Era of International Competition: Theoretical and Historical Perspectives , RR2726, Santa Monica, CA: RAND.

- Nilsen, E., & Ward, A. (2021). “ Biden Is Using His Economic Plan to Challenge China ” Vox.com , April 26. <https://www.vox.com/22350402/biden-infrastructure-plan-foreign-policy-china>
- OECD (2016). “OECD Economic Surveys: United States” Paris: OECD.
- OECD (2021). OECD and Global Executives Engage with the Blue Dot Network to Develop Certification for Quality Infrastructure Investment , Paris: OECD, June 7.
- Onea, T. (2021). The grand strategies of great powers , London: Routledge.
- Parpiani, K. (2021). “Bnnnnnn \ooo - Pacccc:c Ciiii gggggggg“eee ccca Ftttt ” rrrr aach” ee w Delhi: Observer Research Foundation, January 29.
- Patey, L. (2021). How China Loses: The Pushback Against Chinese Global Ambitions , Oxford: Oxford University Press.
- Pompeo, M. (2019). “Ceeee aaaiinn hhhhh hhhwwwy at eee aa iiaaa l Reii ew Iiiii ttt ess 9999 aaaa mmmmtt”, aa cch 28. <https://www.state.gov/conversation-with-rich-lowry-at-the-national-review-institutes-2019-ideas-summit>.
- Sprague, Sh. (2017). “Bewwwrr e::: eee .... . ccccccttt y SwwwwwwSeeee eee rr eat Receiii ””” , Beyond the Numbers , January 6, no. 2. Washington, DC: Bureau of Labor Statistics.
- Rolland, N. (2017). China’s Eurasian Century? Political and Strategic Implications of the Belt and Road Initiative , Seattle: National Bureau of Asian Research.
- Wall Street Journal (2015). “... aa Pre.... . aee rrr aaaa rr ade ee a,, Wasss Fallrr e Wdddd d eeett C””””””” Geaadd F. Se,, <http://wsj.com/articles/obama-presses-case-for-asia-trade-deal-warns-failure-would-benefit-china-1430160415>
- Wuthnow, R. (2018). The Left Behind: Decline and Rage in Rural America , Princeton, NJ: Princeton University Press.
- Zhao, M. (2021). “eee Bett add Road Initiative and China – US strategic ctttttt ttt t aaaa International Strategy Review , 3:248 – 260. <https://doi.org/10.1007/s42533-021-00087->
- White House (2017). “Naiiaaa l Secyyyyyyaaaffff ff eee dddddddeees of Arrr aaa”, ee cerrr 2017. <https://trumpwhitehouse.archives.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf>
- White House (2018). “Rerrr ss yy aa iiaaa l Secuyyyyyyyyyyyyyyy ssarr nnnn n . Bttt nn on eee rr ppp iiiiii iiii iissss ss w Arraaa Saaaggg”””” Wagggggggggggg Wttt e eeeee e <https://trumpwhitehouse.archives.gov/briefings-statements/remarks-national-security-advisor-ambassador-john-r-bolton-trump-administrations-new-africa-strategy/>
- Wright, T. (2020). “COVID - ssss mmaact nn geat - eeee r ctttttt tttt tt .. Baasss & F. ..
- Gavin (Eds.), COVID-19 and world order: The future of conflict, competition, and cooperation, London: Johns Hopkins University Press.

# The Role of Cultural Heritage in Tourism Competitiveness

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**Abstract.** Cultural heritage has become a central pillar in shaping tourism experiences and enhancing the competitiveness of destinations. This study explores how cultural heritage contributes to tourism competitiveness by analyzing key factors such as destination identity, visitor engagement, and economic impact. Using a mixed-methods approach combining qualitative case studies and quantitative data from tourism boards, the findings indicate that destinations that effectively preserve and promote their cultural heritage outperform others in attracting and retaining tourists. The paper concludes by recommending strategic investments in heritage conservation and community involvement as levers to sustain long-term competitiveness.

**Key words:** *cultural tourism, competitiveness, cultural heritage, monument, destination*

## 1. Introduction

Tourism competitiveness is defined as the ability of a destination to attract and satisfy visitors in a sustainable manner. In an increasingly globalized and homogenized tourism landscape, cultural heritage has emerged as a distinguishing asset. It includes tangible elements such as monuments and museums, as well as intangible aspects like traditions, languages, and customs (Sadikhova & Babayev, 2025). Cultural heritage not only enhances the attractiveness of a destination but also fosters local pride and identity. However, the extent to which cultural heritage contributes to tourism competitiveness has not been consistently measured or understood. This study aims to fill this gap by examining the relationship between cultural heritage assets and tourism performance indicators.

Tourism is one of the fastest-growing sectors globally, contributing significantly to economic development, job creation, and cultural exchange (Mammadova & Abdullayev, 2025). As global competition among destinations intensifies, the ability to offer unique and memorable experiences becomes critical (Abdullayev et al, 2024). In this context, cultural heritage has emerged as a key driver of tourism competitiveness, allowing destinations to differentiate themselves through their history, traditions, architecture, art, and way of life (Timothy, 2011).

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Cultural heritage includes both tangible elements such as historical monuments, archaeological sites, museums, and architecture, as well as intangible elements like folklore, music, language, gastronomy, festivals, and traditional knowledge. These assets not only serve as attractions for international and domestic tourists but also embody the identity and values of local communities (Richards, 2018). Heritage tourism, a segment that focuses on visiting places of historical and cultural significance, has shown consistent growth, driven by travelers' increasing desire for authentic and meaningful experiences (Briedenhann & Wickens, 2004).

Furthermore, cultural heritage can contribute to sustainable tourism development. When properly managed, it encourages the preservation of cultural assets, fosters community involvement, and promotes economic diversification. However, this potential can be undermined by challenges such as inadequate infrastructure, lack of investment, mismanagement, and the pressures of mass tourism (Zhang et al, 1999). Balancing the preservation of cultural authenticity with the demands of a competitive tourism market remains a persistent issue (Javid & Sadikhova, 2025).

Despite the recognized importance of cultural heritage in tourism literature, there is still limited empirical research linking cultural heritage directly to measurable outcomes of tourism competitiveness, such as visitor numbers, spending patterns, destination branding, and economic impact (Farzaliyeva & Abdullayev, 2025). Additionally, many existing studies are either conceptual or focus on isolated case studies, without a broader comparative or analytical framework.

This study addresses this gap by examining how cultural heritage assets influence tourism competitiveness across different global contexts. By analyzing both quantitative data and qualitative insights from diverse case studies, it aims to answer the following research questions:

How does the presence and management of cultural heritage affect tourism performance indicators?

What role does community participation and heritage conservation play in sustaining destination competitiveness?

What best practices can be identified for integrating cultural heritage into tourism development strategies?

By exploring these questions, the paper aims to provide a clearer understanding of the strategic value of cultural heritage in tourism and offer practical recommendations for policymakers, tourism authorities, and heritage managers seeking to leverage their cultural assets for long-term competitive advantage.

## 2. Methods

### 2.1 Research Design

This study adopted a **mixed-methods research design**, combining quantitative and qualitative approaches to provide a comprehensive understanding of the relationship between cultural heritage and tourism competitiveness. The rationale for using a mixed-methods approach was to triangulate

data from different sources, enhancing the validity of the findings and offering both breadth and depth in analysis.

The research was conducted in two phases:

- **Phase 1 (Quantitative Analysis):** This phase involved statistical examination of secondary data related to cultural heritage sites and tourism performance indicators from selected countries.
- **Phase 2 (Qualitative Case Studies):** In-depth case studies were conducted in five culturally significant destinations to explore the mechanisms through which cultural heritage contributes to tourism competitiveness.

## 2.2 Site Selection and Sampling

For the qualitative phase, five culturally rich cities were selected using purposive sampling to ensure diversity in geography, cultural context, and tourism development stages (Babayev, 2024). The selected cities were:

- **Kyoto, Japan** – A city renowned for traditional architecture, temples, and geisha culture.
- **Florence, Italy** – A cradle of the Renaissance and a UNESCO World Heritage site.
- **Fez, Morocco** – One of the oldest cities in North Africa, known for its medina and Islamic heritage.
- **Cusco, Peru** – Former capital of the Inca Empire and gateway to Machu Picchu.
- **Luang Prabang, Laos** – A blend of Buddhist temples and colonial heritage, also UNESCO-listed.

Each destination was selected for its strong cultural heritage base and efforts in promoting cultural tourism. Participants for interviews were identified using **snowball sampling**, beginning with contacts in local tourism boards and extending to heritage site managers, cultural practitioners, and local business owners.

## 2.3 Data Collection

### Quantitative Data

Quantitative data were sourced from publicly available databases such as:

- United Nations World Tourism Organization (UNWTO)
- UNESCO World Heritage Centre
- National and regional tourism authorities

The key indicators collected included:

- Number of international and domestic tourist arrivals

- Tourist expenditure (per capita and total)
- Length of stay
- Number of cultural heritage sites (UNESCO and nationally recognized)
- Investments in cultural heritage preservation

### Qualitative Data

Qualitative data were gathered through:

- **Semi-structured interviews** (n = 25 across all sites)
- **Field observations** during site visits
- **Document analysis** of strategic plans, promotional materials, and policy documents related to cultural heritage and tourism

Interview questions focused on topics such as:

- The role of heritage in tourism marketing
- Community involvement in tourism development
- Conservation practices and their impact on tourism
- Perceived challenges and opportunities

## 2.4 Data Analysis

### Quantitative Analysis

Quantitative data were analyzed using **descriptive statistics**, **Pearson correlation**, and **regression analysis** to identify relationships between the presence and quality of cultural heritage and various tourism competitiveness indicators. The analysis was performed using SPSS software.

### Qualitative Analysis

A **thematic analysis** was used to examine the qualitative data. All interviews were transcribed and coded using NVivo. Themes were identified inductively and organized into categories such as:

- Heritage as a branding tool
- Economic impact of cultural tourism
- Role of local communities
- Tensions between preservation and commercialization

Triangulation of findings from the qualitative and quantitative phases ensured a more holistic understanding of the dynamics between heritage and tourism competitiveness.

### 3. Results

The findings from both the quantitative analysis and qualitative case studies revealed a consistent and positive relationship between cultural heritage and tourism competitiveness. Cultural heritage contributes significantly to destination appeal, visitor satisfaction, and economic performance when effectively managed. The results are presented in two main parts: statistical analysis of heritage-tourism linkages and thematic insights from the five case studies.

#### 3.1 Quantitative Findings

##### 3.1.1 Correlation Between Heritage Sites and Tourism Indicators

Statistical analysis showed a strong positive correlation between the number of recognized cultural heritage sites and key tourism performance indicators:

- The **Pearson correlation coefficient** between the number of UNESCO World Heritage Sites and international tourist arrivals was  $r = 0.68$  ( $p < 0.01$ ).
- A similarly high correlation was found between cultural heritage site density and average tourist spending ( $r = 0.72$ ,  $p < 0.01$ ).
- Destinations with high concentrations of cultural heritage assets (5+ major sites within a 100 km radius) reported a 25% longer average visitor stay and 30–35% higher per capita tourist expenditure than those with fewer cultural attractions.

##### 3.1.2 Heritage Investment and Economic Performance

Destinations that allocated a higher share of public tourism budgets (above 20%) to heritage preservation and interpretation reported:

- Increased visitor satisfaction and repeat visitation rates.
- Growth in cultural tourism-related SMEs, especially in handicrafts, guided tours, and cultural events.
- Greater resilience in off-peak seasons, as cultural festivals and exhibitions helped maintain visitor flow year-round.

#### 3.2 Qualitative Case Study Insights

##### 3.2.1 Kyoto, Japan

Kyoto's emphasis on preserving traditional neighborhoods, temples, and performing arts has contributed to a distinct identity that differentiates it from other urban destinations in Japan (Sadikhova, 2024). Interviewees from Kyoto's tourism office reported a 40% increase in repeat visitors over five years, attributed largely to cultural festivals and heritage walking tours. Strict zoning laws and collaboration with local artisans ensured that modernization did not erode cultural authenticity.

##### 3.2.2 Florence, Italy

Florence integrates its Renaissance legacy with modern tourism infrastructure (Yin, 2018). Investments in digital heritage tools—such as augmented reality tours and multilingual mobile apps—have enhanced accessibility to historical knowledge for diverse tourists. Local officials noted that these innovations increased museum ticket sales and extended average museum stay time by over 20 minutes per visitor, improving both revenue and educational value (Mammadova & Abdullayev, 2025)

### 3.2.3 Fez, Morocco

Fez's old medina, a UNESCO World Heritage Site, exemplifies how cultural authenticity can attract niche tourism markets (UNESCO, 2021). However, challenges such as over-tourism and limited public investment were noted. Despite these, community-led restoration initiatives, supported by NGOs and private partners, have revitalized historic buildings while creating new jobs in the hospitality and craft sectors. Tour operators emphasized that authenticity was the key factor in attracting European and North American travelers.

### 3.2.4 Cusco, Peru

Cusco, the gateway to Machu Picchu, has capitalized on its Inca heritage by developing immersive cultural experiences. Local stakeholders emphasized that community involvement in tourism planning has been essential. For example, indigenous communities offer home-stays and traditional weaving workshops, which have not only diversified the tourism product but also ensured that economic benefits are more evenly distributed. These initiatives have helped mitigate overtourism in core archaeological areas.

### 3.2.5 Luang Prabang, Laos

Despite its relatively small size, Luang Prabang has positioned itself as a hub for cultural tourism in Southeast Asia. The city combines Buddhist spiritual heritage, French colonial architecture, and rural traditions to offer a tranquil yet culturally rich experience. Limited infrastructure has been a constraint, but low-volume, high-value tourism has helped maintain the city's cultural character. Visitor surveys conducted by the tourism board indicated a 95% satisfaction rate with cultural experiences.

## 3.3 Emergent Themes Across Cases

Several cross-cutting themes emerged across the case studies:

- **Heritage as a branding tool:** Destinations that framed their cultural identity clearly were more successful in global tourism marketing.
- **Community engagement:** Inclusion of local populations in tourism design and service delivery strengthened cultural authenticity and improved social sustainability.
- **Tensions between conservation and commercialization:** While tourism revenues support preservation, excessive tourist flow risks damaging heritage integrity.
- **Innovation in interpretation:** Use of technology and creative storytelling enhanced the accessibility and educational value of heritage assets.

#### 4. Discussion

The results confirm that cultural heritage plays a significant role in enhancing tourism competitiveness. Destinations that actively invest in heritage conservation and integrate local communities into the tourism value chain experience higher visitor satisfaction and economic returns. Moreover, cultural heritage contributes to brand differentiation, allowing destinations to stand out in the crowded global tourism market.

However, the findings also highlight potential risks, such as over-tourism and the commodification of culture, which can undermine the authenticity that tourists seek. Therefore, a balanced approach is required, combining heritage protection with responsible tourism policies.

The strong positive correlation between the presence of cultural heritage assets and key tourism performance indicators (visitor numbers, expenditure, and length of stay) reinforces the notion that heritage is a major driver of destination appeal. Destinations such as Kyoto, Florence, and Cusco have leveraged their unique historical and cultural attributes to build distinct destination brands that stand out in the global tourism market (Sadikhova, 2023). These cases align with the findings of previous studies that emphasize the role of place identity and authenticity in tourism competitiveness (Richards, 2018; UNWTO, 2021).

In particular, destinations that combine tangible and intangible heritage—such as traditional architecture alongside festivals and local customs—tend to offer a more immersive visitor experience. This hybrid approach not only enhances cultural depth but also increases the emotional and psychological connection tourists feel toward a place, often resulting in longer stays and repeat visits (SADIKHOVA, 2022).

Another important finding is the contribution of cultural heritage to local economic development. Case studies showed that investments in heritage conservation not only improved site quality but also stimulated related sectors such as arts and crafts, gastronomy, and small-scale hospitality (Садыхова, 2017). In Cusco and Fez, community-driven initiatives demonstrated how cultural tourism can empower marginalized groups and contribute to more inclusive economic growth.

Furthermore, cultural heritage provides economic resilience by diversifying tourism offerings beyond traditional sun-and-sand packages. For example, while some destinations suffer from seasonal fluctuations, heritage-based tourism can attract year-round visitors through events, exhibitions, and cultural workshops. This has important implications for destinations seeking sustainable growth in a competitive and often volatile global tourism market.

#### 5. Conclusion

Cultural heritage is not just a passive attraction but a dynamic asset that can drive tourism competitiveness when effectively managed. Policymakers and tourism stakeholders should prioritize heritage-based strategies, community involvement, and sustainable practices to ensure that cultural tourism continues to thrive without compromising the values it seeks to promote.

This study has provided clear and compelling evidence that cultural heritage plays a vital role in enhancing tourism competitiveness across a variety of contexts. By integrating quantitative analysis with qualitative case studies, it has shown that destinations rich in tangible and intangible heritage consistently outperform others in terms of visitor attraction, spending, satisfaction, and destination branding.

One of the core conclusions is that cultural heritage is not merely a passive asset—a relic of the past to be observed—it is a dynamic force that shapes the identity, economy, and sustainability of tourism destinations. When effectively conserved, interpreted, and integrated into tourism strategies, heritage becomes a cornerstone for competitive advantage.

## References

- Abdullayev, A. E., Asgerova, M. R., Abbasova, M. M., & Humbat, E. (2024). Global Challenges of Regional Management in The Modern World: The Main Factors Shaping the Infrastructure Base of Regional Management. *International Journal*, 5(11), 4639-4644.
- Babayev, J. (2024). Usage Sphere and Lexico-Stylistic Features of Anthroponomastics. *EuroGlobal Journal of Linguistics and Language Education*, 1(2), 38-43.
- Briedenhann, J., & Wickens, E. (2004). Tourism routes as a tool for the economic development of rural areas—vibrant hope or impossible dream? *Tourism Management*, 25(1), 71–79. [https://doi.org/10.1016/S0261-5177\(03\)00063-3](https://doi.org/10.1016/S0261-5177(03)00063-3)
- Farzaliyeva, E., & Abdullayev, A. (2025). The Economic Power of Culture: How Arts and Heritage Drive Employment. *Global Spectrum of Research and Humanities*, 2(3), 80-91.
- Javid, B., & Sadikhova, S. (2025, May). Culturonyms in Food and Drink: How Language Reflects Cultural Identity Through Cuisine. In Publisher. agency: Proceedings of the 10th International Scientific Conference «Modern scientific technology»(May 29-30, 2025). Stockholm, Sweden (p. 346).
- Mammadova, E., & Abdullayev, A. (2025). Cultural Industries and National Economic Competitiveness: A Global Perspective. *Porta Universorum*, 1(3), 322-344.
- Mammadova, E., & Abdullayev, A. (2025). Protection of Cultural Heritage and Its Economic Benefit. *Acta Globalis Humanitatis et Linguarum*, 2(3), 180-187.
- Richards, G. (2018). Cultural tourism: A review of recent research and trends. *Journal of Hospitality and Tourism Management*, 36, 12–21. <https://doi.org/10.1016/j.jhtm.2018.03.004>
- Sadikhova, S. (2024). Contrasting Splendor: A Comparative Study of Baroque and Classical Styles in Visual Arts. *Acta Globalis Humanitatis et Linguarum*, 1(2), 144-154.
- Sadikhova, S. (2023). MANNERISM IN ITALIAN ART IN XVI-XVII CENTURIES. *Norwegian Journal of development of the International Science No*, 120, 15.

- Sadikhova, S., & Babayev, J. (2025). Linguistic Analysis of Art Terms in English. *Porta Universorum*, 1(3), 214-223.
- Sadikhova, S., & Babayev, J. (2025). Challenges Encountered in Translation of Culture-bound and Subject-specific Terminology While Using Google Translate. *EuroGlobal Journal of Linguistics and Language Education*, 2(3), 119-126.
- SADIKHOVA, S. N. (2022). PRINCIPLES OF CREATION OF SOME GEOMETRIC ORNAMENTS AND THEIR MEANINGS. In *WORLD SCIENCE: PROBLEMS AND INNOVATIONS* (pp. 300-302).
- Timothy, D. J. (2011). *Cultural heritage and tourism: An introduction*. Channel View Publications.
- UNESCO. (2021). *World Heritage and tourism in a changing climate*. United Nations Educational, Scientific and Cultural Organization. <https://whc.unesco.org/en/tourism-climate-change/>
- UNWTO. (2021). *Tourism and culture synergies*. United Nations World Tourism Organization. <https://www.unwto.org/tourism-and-culture>
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.
- Zhang, H. Q., Chong, K., & Ap, J. (1999). An analysis of tourism policy development in modern China. *Tourism Management*, 20(4), 471–485. [https://doi.org/10.1016/S0261-5177\(99\)00024-8](https://doi.org/10.1016/S0261-5177(99)00024-8)
- Садыхова, С. Н. (2017). ЖАНРОВЫЕ ОСОБЕННОСТИ ТВОРЧЕСТВА АЗЕРБАЙДЖАНСКОГО ХУДОЖНИКА ГУСЕЙНА АЛИЕВА. Декоративное искусство и предметно-пространственная среда. Вестник РГХПУ им. СГ Строганова, (1), 459-465.

# Artificial Intelligence Integration in the Acquisition of English Academic Writing

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**Abstract.** The rapid proliferation of Generative Artificial Intelligence (AI) has introduced a paradigm shift in higher education, particularly in the acquisition of English academic writing skills. This paper examines the transformative role of AI tools, analysing their pedagogical benefits against the significant challenges and ethical dilemmas they present. Through a comprehensive review of current literature and empirical studies, this analysis synthesises the dual nature of AI as both a powerful assistant and a potential impediment to developing core academic competencies. Key findings indicate that while AI offers substantial advantages in improving writing fluency, providing instant feedback, and enhancing learner engagement, it also poses risks related to academic integrity, over-reliance, and the potential erosion of critical thinking skills. The discussion is contextualised with a focus on the educational landscape in the Baltic region, highlighting local research and initiatives at institutions like the University of Tartu. The paper concludes that a successful integration of AI into academic writing pedagogy necessitates the development of critical AI literacy among students and educators, alongside the implementation of clear institutional guidelines to ensure that these technologies augment, rather than undermine, the fundamental goals of academic learning.

**Key words:** *artificial intelligence, academic writing, English for Academic Purposes (EAP), higher education, AI literacy, pedagogy, educational technology*

## INTRODUCTION

With the public release of sophisticated generative AI models like ChatGPT, educational establishments are facing a new reality that demands careful consideration of how such tools can be integrated without harming the educational process or impeding learning outcomes (Dwivedi et al., 2023: 102642). The integration of AI in language acquisition has become a source of constant debate, presenting a dichotomy where these technologies are viewed as either a 'villain or the champion' in the classroom (Praphan and Praphan, 2023: 101072). On one hand, AI-powered tools offer innovative methodologies to augment language teaching and learning, with the potential to significantly enhance students' writing skills by providing automated assistance, corrections, and suggestions (Artiana and Fakhurriana, 2024: 112). On the other hand, their use raises profound concerns regarding academic

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integrity, the potential for over-reliance, and the deskilling of students in critical thinking and authentic writing (Kasneci et al., 2023: 3; Sahli et al., 2024: 286).

This paper aims to investigate the multifaceted impact of AI integration on the acquisition of English academic writing. It synthesises findings from recent empirical studies to explore the benefits and challenges as perceived and experienced by students and educators. The goal is to provide a balanced perspective on how these powerful tools are being used and to consider the pedagogical adjustments required to harness their potential responsibly. This topic is of particular relevance to the Baltic region, where educational institutions are actively navigating this new technological landscape. A recent study involving upper-secondary and university students in Latvia, for example, revealed a high awareness of AI tools but concluded that their use in academic writing remains ‘irregular, cautious and/or secretive’ (Farneste et al., 2025: 31). This indicates a pressing need for structured pedagogical approaches and clear institutional frameworks. By examining global trends and grounding them in local contexts, such as the research initiatives at the University of Tartu, this paper seeks to contribute to the ongoing discourse on creating an effective and ethical AI-integrated learning environment.

## **THEORETICAL BACKGROUND**

The integration of AI into education is not merely a technological update but a pedagogical shift that intersects with established theories of learning and competence. To understand its impact on academic writing, it is essential to first define the core competencies involved in this complex skill and then to survey the landscape of AI tools designed to assist in its acquisition.

### ***1 COMPETENCES IN ACADEMIC WRITING***

Academic writing is a multifaceted competence that extends beyond mere linguistic proficiency. The European Commission’s framework on key competences defines literacy as ‘the ability to identify, understand, express, create, and interpret concepts, feelings, facts and opinions in both oral and written forms, using visual, sound/audio and digital materials across disciplines and contexts’ (European Commission, 2018: 5). In an academic context, this involves a sophisticated set of skills, including critical thinking, the ability to construct a coherent argument, the logical structuring of ideas, and the ethical use of sources through proper citation (Nesi and Gardner, 2012: 45). It requires writers to engage in a process of inquiry, analysis, and synthesis, rather than simply reporting information. The development of these skills is a primary objective of higher education, as they are foundational to knowledge creation and scholarly communication. The introduction of AI tools challenges educators to ensure that technology serves as a scaffold for these core competencies rather than a substitute for the intellectual labour they require.

### ***2 AI-POWERED TOOLS FOR ACADEMIC WRITING***

The ecosystem of AI tools available to students is vast and varied, catering to different stages of the writing process. These tools can be broadly categorised based on their primary function. For research and idea generation, platforms like Consensus, SciSpace, and ResearchRabbit use semantic search and citation network analysis to help students find relevant literature, summarise complex papers, and visualise connections between sources (Blainy, 2024; SciSpace, 2024). For drafting and content

creation, generative AI models such as ChatGPT, Gemini, and Claude can produce outlines, draft paragraphs, and help overcome writer's block by offering different angles on a topic (Oklahoma State University Library, 2024). In the revision and editing phase, tools like Grammarly, QuillBot, and Paperpal provide advanced grammar checking, stylistic suggestions, and paraphrasing capabilities to improve clarity and fluency (Goyibova et al., 2024: 3; Yomu AI, 2024). Finally, citation management software like Zotero and Mendeley automates the tedious process of formatting references, helping to ensure academic integrity (Tran et al., 2024: 12). The availability of these specialised tools means that students can receive AI assistance at nearly every step, transforming the traditional workflow of academic writing.

## **AI IN ACADEMIC WRITING: A DUAL PERSPECTIVE**

The integration of AI in the acquisition of academic writing skills presents a dual-edged sword. On one side, it offers a host of pedagogical benefits that can enhance learning and efficiency. On the other, it introduces significant challenges and ethical concerns that require careful navigation by both students and educators.

### ***1 PEDAGOGICAL BENEFITS***

Empirical studies have begun to highlight the positive impacts of AI on student writing. A primary benefit is the provision of personalised and instantaneous feedback. AI tools can offer real-time suggestions on grammar, syntax, and style, allowing learners to make immediate corrections and internalise linguistic rules more effectively (Alhalangy and Abdalgane, 2023: 15; Haristiani, 2019: 3). This is particularly valuable in large classes where individualised teacher feedback is limited. According to a study by Su et al. (2023: 8), AI-powered platforms can enhance student engagement and performance by providing customised learning pathways. Furthermore, AI serves as a powerful tool for brainstorming and overcoming writer's block, helping students generate ideas and structure their arguments (University of Kansas, 2024). For English as a Foreign Language (EFL) learners, these tools can build confidence by improving writing fluency and reducing the anxiety associated with language production (Jeon, 2022: 112). Studies have also shown that AI-assisted revisions can lead to higher scores, particularly for students who initially struggle with writing, thereby offering a potential mechanism for levelling the playing field (Gao, 2023: 5).

### ***2 CHALLENGES AND ETHICAL CONSIDERATIONS***

Despite these benefits, the challenges are formidable. The most significant concern is academic integrity. Submitting AI-generated text as one's own work constitutes a new form of plagiarism, and while tools like Turnitin are adapting, detection remains a complex issue (Elkhatat et al., 2023: 7; Wignall and Hart, 2024). Another major risk is the potential for over-reliance on technology, which can hinder the development of students' own critical thinking, research, and writing skills (Hwang et al., 2020: 225; Sahli et al., 2024: 293). If students use AI as a crutch rather than a tool, they may fail to engage deeply with their subject matter. Accuracy is another critical issue; AI models are known to 'hallucinate' and generate factually incorrect information or fabricate non-existent sources, which can severely undermine the credibility of academic work (Oklahoma State University Library, 2024;

Thesify, 2024). Furthermore, AI algorithms can perpetuate biases present in their training data, potentially leading to the exclusion of diverse perspectives and the reinforcement of stereotypes (SciTechEdit, 2024). Finally, data privacy is a significant concern, as uploading unpublished research or personal reflections to third-party platforms carries inherent risks (Research Com, 2024).

## **AI-INTEGRATED PEDAGOGY IN THE BALTIC CONTEXT**

Addressing the challenges of AI requires a deliberate pedagogical shift away from prohibitive measures towards fostering critical AI literacy. This involves teaching students how to use these tools ethically and effectively as allies in their learning journey (Cooper, 2023). This approach is gaining traction in the Baltic region, where institutions are beginning to formalise their strategies. The University of Tartu's Centre for Academic Writing and Communication (AVOK), for example, is actively involved in projects like FLAIR (Fostering Learners' AI Readiness), which aims to promote an ethical and meaningful use of generative AI by developing self-learning modules and transdisciplinary activities (University of Tartu, 2024a). AVOK also offers virtual exchange courses where students from different European universities can learn writing strategies, experiment with AI-based tools, and reflect on the writing process, thereby strengthening both their academic and intercultural competencies (University of Tartu, 2024b).

Such initiatives are crucial because, as the BWRITE research group highlights, academic writing is culturally dependent, with distinct rhetorical traditions in Estonian, Latvian, and Lithuanian (bwrite, 2024). A key pedagogical task is to teach students to critically evaluate AI-generated text, which often defaults to a generic, anglocentric style, and adapt it to fit specific disciplinary and cultural conventions. Effective pedagogical strategies include redesigning assignments to focus on the writing process rather than just the final product. For example, instructors can ask students to critique AI-generated summaries, use AI to brainstorm counterarguments, or document and reflect on their prompting process (University of Kansas, 2024). By making the use of AI transparent and a subject of analysis, educators can transform it from a potential tool for cheating into a valuable object of study that enhances critical thinking and metacognitive awareness (Mollick and Mollick, 2023).

## **CONCLUSIONS**

The integration of artificial intelligence into the acquisition of English academic writing is an irreversible trend that presents both profound opportunities and significant risks. AI tools can demonstrably enhance the writing process by offering powerful support for research, drafting, and revision, leading to improved efficiency and linguistic quality. However, these benefits are counterbalanced by serious ethical challenges, including threats to academic integrity, the potential for deskilling, and issues of bias and inaccuracy. Simply banning these tools is an untenable and ultimately counterproductive strategy. Instead, the path forward lies in a proactive and pedagogical response.

Educational institutions, including those in the Baltic states, must develop clear, nuanced policies that guide the responsible use of AI. More importantly, educators must embrace the challenge of teaching AI literacy. This means equipping students with the skills to critically evaluate AI-generated content, to understand its limitations, and to use it as a tool to augment, not replace, their own intellectual

engagement. By redesigning curricula and assessments to focus on process, reflection, and critical thinking, educators can transform AI from a perceived threat into a powerful educational ally. The future of academic writing will not be about choosing between human and machine, but about fostering a new synergy where technology, guided by human intellect and ethical principles, enhances our capacity for scholarly inquiry and communication.

## REFERENCES

- Alhalangy, B. and Abdalgane, M. (2023) The role of artificial intelligence in enhancing EFL students' writing skills. *Shanlax International Journal of English*, 12 (1): 14-21.
- Artiana, Y. and Fakhurriana, A. (2024) The transformative role of artificial intelligence in English language learning. *Journal of English Language Teaching and Linguistics*, 9 (1): 111-125.
- Blainy (2024) *11 Best AI Tools for Research Paper Writing in 2025*. Available from <https://blainy.com/best-ai-tools-for-research-paper-writing/>.
- bwrite (2024) *About BWRITE*. Available from <https://www.bwrite.ut.ee/>.
- Babayev, J. (2023, December). Usage of audio and video tasks in language teaching. In *Publisher. agency: Proceedings of the 5th International Scientific Conference «Modern scientific technology»(December 21-22, 2023). Stockholm, Sweden* (p. 6).
- Babayev, J. (2023, December). How to teach a foreign language through CLT. In *Proceedings of the 4th International Scientific Conference" Interdisciplinary Science Studies* (p. 123).
- Babayev, J. (2021). The role of instructional materials in language learning. *ELMI XƏBƏRLƏR, Humanitar elmlər seriyası*, 2, 29-35.
- Cooper, G. (2023) Examining science education in ChatGPT: an exploratory study of generative artificial intelligence. *Journal of Science Education and Technology*, 32: 444-452.
- Dwivedi, Y. K., Kshetri, N., Hughes, L. et al. (2023) Opinion paper: 'So what if ChatGPT wrote it?' Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, 71, Article 102642.
- Elkhatat, A., Elsaid, K. and Almeer, S. (2023) The impact of artificial intelligence on academic integrity: a review and future research directions. *Journal of the American Society for Information Science and Technology*, 74 (11): 1-15.
- European Commission (2018) *Council Recommendation on Key Competences for Lifelong Learning*. Brussels: European Commission.
- Farneste, M., Leijen, D. and Roze, L. (2025) (forthcoming) Artificial Intelligence Integration in Acquisition of English Academic Writing: a comparative analysis of student perspectives in school and university settings. *Baltic Journal of English Language, Literature and Culture*, 15: 31-50.

- Gao, Y. (2023) A study on the impact of ChatGPT-assisted revision on the quality of English writing. *Journal of Educational Technology Development and Exchange*, 16 (2): 1-18.
- Goyibova, N., Muslimov, N., Kannazarova, Z. et al. (2024) Exploring the impact of artificial intelligence on academic writing: a bibliometric analysis of trends, advancements, and ethical challenges. *Forum for Linguistic Studies*, 6 (3): 1-18.
- Haristiani, N. (2019) Artificial intelligence (AI) chatbot as language learning medium: an inquiry. *Journal of Physics: Conference Series*, 1387, Article 012020.
- Hwang, G. J., Chien, S. Y. and Li, J. J. (2020) A study of the effects of a personalized learning environment on students' learning outcomes and cognitive load. *Computers & Education*, 144, Article 103702.
- Jeon, J. (2022) The effects of AI chatbot-based learning on EFL learners' speaking competence and learner perception. *Multimedia-Assisted Language Learning*, 25 (3): 107-128.
- Kasneci, E., Seßler, K., Küchemann, S. et al. (2023) ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, Article 102274.
- Mollick, E. and Mollick, L. (2023) Using AI to implement effective teaching strategies in classrooms: five strategies, including prompts. SSRN. Available from <https://dx.doi.org/10.2139/ssrn.4406333> [Accessed on 25 June 2025].
- Nesi, H. and Gardner, S. (2012) *Genres Across the Disciplines: Student Writing in Higher Education*. Cambridge: Cambridge University Press.
- Oklahoma State University Library (2024) *AI Tools*. Available from <https://info.library.okstate.edu/AI/tools> [Accessed on 25 June 2025].
- Praphan, W. and Praphan, K. (2023) AI technologies in the ESL/EFL writing classroom: the villain or the champion? *Journal of Second Language Writing*, 62, Article 101072.
- Research Com (2024) *The Role of AI in Academic Research*. Available from <https://research.com/research/the-role-of-ai-in-academic-research> [Accessed on 25 June 2025].
- Sahli, N., Boughena, K. and Abdelhadi, A. (2024) A systematic review of empirical studies on the impact of artificial intelligence on university students' writing skills. *Annals of the University of Craiova, Psychology, Pedagogy Series*, 46 (2): 285-297.
- SciSpace (2024) *AI Writer for Research*. Available from <https://scispace.com/ai-writer> [Accessed on 25 June 2025].
- SciTechEdit (2024) *AI in Academic Writing: Pros, Cons, and Ethical Considerations*. Available from <https://scitechedit.com/ai-in-academic-writing/> [Accessed on 25 June 2025].

- Su, Y., Wu, Y. and Liu, Y. (2023) The impact of AI-powered writing assistance on EFL learners' writing performance and self-efficacy. *Journal of Language Teaching and Research*, 14 (4): 986-998.
- Thesify (2024) *When Does AI Use Become Plagiarism?* Available from <https://www.thesify.ai/blog/when-does-ai-use-become-plagiarism-what-students-need-to-know> [Accessed on 25 June 2025].
- Tran, T. V. B., Nguyen, T. T. H. and Tran, V. B. U. (2024) AI tools in learning academic writing: benefits and challenges for MA students in the English language studies at the Industrial University of Ho Chi Minh City. *International Journal of AI in Language Education*, 2 (1): 1-15.
- University of Kansas (2024) *Ethical Use of AI in Writing Assignments*. Available from <https://cte.ku.edu/ethical-use-ai-writing-assignments> [Accessed on 25 June 2025].
- University of Tartu (2024a) *Centre for Academic Writing and Communication*. Available from <https://ut.ee/en/centre-academic-writing-and-communication> [Accessed on 25 June 2025].
- University of Tartu (2024b) *FLAIR: Fostering Learners' AI Readiness*. Available from <https://maailmakeeled.ut.ee/en/content/centre-academic-writing-and-communication> [Accessed on 25 June 2025].
- Wignall, G. and Hart, E. (2024) School-research partnerships – plagiarism and student use of AI. *Teacher Magazine*. Available from [https://www.teachermagazine.com/au\\_en/articles/school-research-partnerships-plagiarism-and-student-use-of-ai-tools](https://www.teachermagazine.com/au_en/articles/school-research-partnerships-plagiarism-and-student-use-of-ai-tools) [Accessed on 25 June 2025].
- Yomu AI (2024) *10 Best AI Tools for Clear Academic Writing in 2025*. Available from <https://www.yomu.ai/blog/10-best-ai-tools-for-clear-academic-writing-2025> [Accessed on 25 June 2025].

# Wave Attenuation as a Function of Saltmarsh Vegetation Phenology in the Wadden Sea: A Coupled Hydrodynamic-Ecological Study

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**Abstract:** Salt marshes play a vital role in reducing wave energy, thus protecting coastlines. However, this function varies seasonally, depending on vegetation growth. This study quantitatively examines seasonal wave attenuation in a Wadden Sea salt marsh using a coupled eco-hydrodynamic approach. Field data on *Spartina anglica* and *Puccinellia maritima* were integrated with the SWAN model across three seasonal phases: summer growth, autumn senescence, and winter dormancy. Results showed an 80% drop in biomass and stem stiffness from summer to winter. Wave modeling during a typical storm revealed attenuation rising from 55% in winter to over 90% in summer. The findings expose a seasonal protection gap, with lowest vegetation defense during peak winter storm risk. This highlights the need for seasonally responsive coastal management strategies under changing climate conditions.

**Keywords:** Salt marsh, wave attenuation, vegetation phenology, Wadden Sea, SWAN, *Spartina anglica*, *Puccinellia maritima*, nature-based solutions, coastal resilience.

## 1. INTRODUCTION

### 1.1. The Wadden Sea: A Dynamic Coastal Environment of Global Importance

The Wadden Sea, extending along the North Sea coasts of The Netherlands, Germany, and Denmark, represents the largest unbroken system of intertidal sand and mud flats in the world.<sup>1</sup> This unique status is recognized through its designation as a UNESCO World Heritage site, celebrated for its unparalleled scale, geomorphological diversity, and the largely undisturbed natural processes that shape its landscape.<sup>1</sup> The system is fundamentally dynamic, characterized by a complex interplay of climatological, geological, and hydraulic components.<sup>3</sup> It operates under a meso-tidal regime, with a mean tidal range of approximately 2.5 m, which drives the constant exchange of water, sediment, and nutrients between the tidal basins and the adjacent North Sea.<sup>4</sup> This environment fosters exceptionally high biological productivity and supports a rich biodiversity, with the salt marshes alone hosting an estimated 2,300 species of flora and fauna.<sup>1</sup> The inherent dynamism, driven by tides, waves, and sediment transport, not only defines the ecological character of the Wadden Sea but also creates the

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very conditions that allow for the formation of extensive salt marshes and dictates the physical forces these ecosystems must withstand.<sup>7</sup>

## **1.2. Salt Marshes as Nature-Based Solutions for Coastal Protection**

In the face of climate change and sea-level rise, there is increasing global recognition of the role of coastal ecosystems as Nature-Based Solutions (NBS) for mitigating coastal hazards.<sup>9</sup> Salt marshes are at the forefront of this approach, providing a vital coastal protection service by dissipating wave and tidal energy, thereby reducing hydrodynamic loads on engineered structures such as sea dikes.<sup>11</sup> This function is of paramount importance in the Wadden Sea region, where approximately 3.5 million inhabitants depend on the integrity of coastal flood defenses.<sup>14</sup> Historically, many of the region's foreland salt marshes were engineered or actively managed to enhance coastal safety, creating a co-produced landscape where human intervention and natural processes are deeply intertwined.<sup>2</sup> Modeling studies and field observations have consistently demonstrated the effectiveness of these ecosystems; Wadden Sea marshes have been shown to reduce storm wave heights by up to 60% and can significantly lower the required dimensions and reinforcement costs for adjacent dikes.<sup>11</sup> Understanding and quantifying the protective function of these marshes is therefore not merely an academic pursuit but a practical necessity for sustainable and effective coastal risk management.

## **1.3. The Critical Role of Vegetation Phenology in Wave Attenuation Dynamics**

The capacity of a salt marsh to provide coastal protection is fundamentally governed by its vegetation. The physical presence of plant stems and leaves increases hydraulic roughness and exerts a drag force on the water column, which dissipates wave energy and attenuates wave height.<sup>17</sup> However, the biophysical characteristics of this vegetation are not constant throughout the year. Plant phenology—the timing of seasonal life-cycle events such as leaf emergence, growth, flowering, and senescence—drives profound changes in the physical structure of the plant canopy.<sup>19</sup> Key parameters that determine wave attenuation, including above-ground biomass, stem density, height, and biomechanical properties like stem stiffness, vary significantly between seasons.<sup>21</sup> Previous field studies have established a clear link between these phenological changes and wave dissipation, with attenuation rates being highest in late summer and autumn, corresponding to the peak of the growing season, and lowest in late winter and early spring, when vegetation has died back.<sup>24</sup> This temporal variability implies that a static assessment of a marsh's protective value, often based on a single point in time, is inherently incomplete and may lead to an inaccurate understanding of its year-round performance. A critical vulnerability may exist during the winter storm season, when the need for coastal protection is greatest, yet the marsh vegetation is in its weakest, most dormant state.<sup>11</sup> Quantifying this seasonal variation is essential for a realistic assessment of coastal safety.

## **1.4. Objectives and Hypotheses**

While the general relationship between vegetation and wave attenuation is well-established, and the influence of seasonality is acknowledged, there remains a critical gap in the integrated, quantitative assessment of this dynamic interaction for key Wadden Sea species. Few studies have explicitly

coupled detailed, season-specific field measurements of vegetation phenology with validated hydrodynamic models to quantify the resulting impact on wave attenuation under realistic storm conditions.<sup>3</sup> This study aims to address this knowledge gap.

The primary objectives are:

1. To quantify the complete seasonal phenological cycle of two dominant Wadden Sea salt marsh species, *Spartina anglica* (Common Cordgrass) and *Puccinellia maritima* (Common Saltmarsh-grass), in terms of their key biophysical and biomechanical properties relevant to wave attenuation.
2. To develop and validate a coupled eco-hydrodynamic model for a representative Wadden Sea salt marsh that integrates this detailed, season-specific vegetation data.
3. To apply the validated model to quantify the seasonal variation in wave attenuation across the marsh during a characteristic storm event, thereby testing the influence of vegetation phenology on the coastal protection function.

Based on these objectives, the following hypotheses were formulated:

1. Wave attenuation by the salt marsh will be significantly greater during the summer peak-biomass season compared to the winter dormant season, driven by the substantial increase in vegetation-induced drag from higher biomass, stem density, and stiffness.

The relative contribution of different vegetation zones (the pioneer zone dominated by *S. anglica* versus the low-marsh dominated by *P. maritima*) to the total wave attenuation will shift seasonally, reflecting the distinct phenological strategies and structural changes of each species.

## 2. MATERIALS AND METHODS

### 2.1. Study Site

The investigation was conducted at a mainland foreland salt marsh located in Ley Bay, part of the German Wadden Sea National Park of Lower Saxony. This site was selected as it is representative of the extensive, often man-made, salt marshes that front primary sea dikes along the mainland coast.<sup>4</sup> The area is characterized by a semi-diurnal, meso-tidal regime with a mean tidal range of approximately 2.5 m and is exposed to locally generated wind-waves, particularly from the prevailing north-westerly sector.<sup>4</sup> The marsh platform has a mean elevation of +1.8 m NN (Normalnull, the German standard elevation datum) and exhibits a distinct ecological zonation typical of the Wadden Sea. The seaward edge forms a pioneer zone, approximately 50 m wide, dominated by dense stands of

*Spartina anglica*. This transitions into a wider, more established low-marsh plain characterized by a near-monoculture of *Puccinellia maritima*.<sup>21</sup> The total width of the marsh from its seaward edge to the toe of the landward sea dike is approximately 300 m.

## 2.2. Ecological Field Campaigns: Characterizing Seasonal Vegetation States

To comprehensively capture the annual phenological cycle of the dominant vegetation, intensive field campaigns were carried out during three distinct periods representing key seasonal states: **Summer Peak** (late July 2021), **Autumn Senescence** (early November 2021), and **Winter Dormancy** (late January 2022). During each campaign, a suite of biophysical and biomechanical parameters was measured at 10 randomly selected plots within both the *S. anglica* pioneer zone and the *P. maritima* low-marsh zone. The following parameters, critical for hydrodynamic modeling, were quantified:

- **Stem Density (Nv):** The total number of individual plant stems was counted within five replicate 0.25 m<sup>2</sup> quadrats at each plot and averaged to determine the mean density in stems m<sup>-2</sup>.<sup>21</sup>
- **Stem Height (hv):** The vertical height from the marsh surface to the top of the plant was measured for 30 randomly selected stems at each plot using a ruler, and the average height was calculated (m).<sup>21</sup>
- **Stem Diameter (bv):** The diameter at the base of 30 randomly selected stems was measured using digital calipers to the nearest 0.1 mm.<sup>30</sup>
- **Above-ground Biomass (AGB):** All above-ground plant material within a 0.25 m<sup>2</sup> quadrat was harvested at each plot. The samples were transported to the laboratory, rinsed of sediment, dried in an oven at 60°C for 72 hours to a constant weight, and weighed to determine the dry biomass in g m<sup>-2</sup>.<sup>21</sup>
- **Flexural Stiffness (EI):** To quantify the biomechanical resistance of the stems to bending, three-point bending tests were performed on 20 freshly collected, representative stems of each species during each campaign. Flexural stiffness (EI, in N m<sup>2</sup>), a product of the material's Young's Modulus (E) and the area moment of inertia (I), was calculated from the force-deflection curves. This property is a key indicator of how a plant will interact with and resist hydrodynamic forces.<sup>11</sup>

The data collected from these campaigns provide the direct, quantitative inputs for parameterizing the different seasonal vegetation scenarios within the hydrodynamic model.

## 2.3. Hydrodynamic Measurements

To measure wave transformation across the marsh and to provide a dataset for model validation, an array of five synchronized pressure transducers (RBR*virtuoso* D|wave) was deployed along a shore-normal transect. The instruments were mounted on steel posts approximately 0.1 m above the bed. The transect included one instrument on the tidal flat 20 m seaward of the marsh edge (P1), one at the marsh edge (P2), one within the *S. anglica* zone (P3, 50 m from edge), one within the *P. maritima* zone (P4, 150 m from edge), and one near the landward boundary at the toe of the dike (P5, 300 m from edge). The instruments recorded pressure fluctuations at a frequency of 4 Hz. Data were

collected continuously over a three-week period in winter (January-February 2022), which included a significant storm event on 18 February 2022. This event, characterized by north-westerly winds exceeding  $20 \text{ m s}^{-1}$  and a storm surge of 1.5 m, provided a robust dataset of wave attenuation under high-energy conditions for model calibration and validation.<sup>11</sup>

## **2.4. Coupled Eco-Hydrodynamic Modeling Framework**

A coupled modeling approach was used to investigate the influence of vegetation phenology on wave attenuation. This involved parameterizing the SWAN wave model with the season-specific ecological data.

### **2.4.1. The SWAN Wave Model**

The third-generation spectral wave model SWAN (Simulating WAVes Nearshore), version 41.31, was employed for this study.<sup>33</sup> SWAN solves the spectral action balance equation and is specifically designed for coastal regions, accounting for wave generation, propagation, and dissipation processes including shoaling, refraction, depth-induced wave breaking, whitecapping, and bottom friction.<sup>35</sup> Its ability to handle complex bathymetries and shallow-water physics makes it highly suitable for the Wadden Sea environment.

### **2.4.2. Model Setup and Configuration**

A high-resolution, structured computational grid with a resolution of  $5 \text{ m} \times 5 \text{ m}$  was created for the study area, extending 1 km offshore and 500 m alongshore. The grid was populated with a digital elevation model combining multibeam echosounder data for the subtidal and intertidal flats with LiDAR data for the emergent marsh platform. The model was forced along its offshore boundary using wave spectra (significant wave height  $H_s$ , peak period  $T_p$ , and direction) and water levels extracted from a larger-scale operational model of the German Bight. Spatially uniform wind fields, derived from a nearby meteorological station, were applied across the domain. For the storm event simulation, time-varying wind, water level, and wave boundary conditions were used. Key physical processes activated in the model were depth-induced breaking (Battjes and Janssen, 1978), bottom friction using the JONSWAP formulation, and quadruplet wave-wave interactions.<sup>11</sup>

### **2.4.3. Integrating Phenology: Parameterization of Seasonal Vegetation Scenarios**

Wave dissipation by vegetation was implemented using the SWAN-VEG module, which represents vegetation as an array of rigid vertical cylinders.<sup>37</sup> The model calculates an additional energy dissipation term,

$S_{ds,veg}$ , based on the formulation by Mendez and Losada (2004) for irregular waves, which is a function of plant-induced drag<sup>39</sup>:

$$S_{ds,veg}(\sigma, \theta) = -\frac{1}{2g} \sqrt{\frac{g}{\pi}} \rho C_D b_v N_v \left( \frac{gk}{\sigma} \right)^3 \frac{\sinh^3(kh_v) + 3\sinh(kh_v)}{3k \cosh^3(kh)} E_{tot}(\sigma, \theta)$$

where  $\rho$  is the water density,  $C_D$  is the bulk drag coefficient,  $b_v$  is the stem diameter,  $N_v$  is the stem density,  $h_v$  is the vegetation height,  $h$  is the water depth,  $k$  is the wave number,  $\sigma$  is the angular frequency,  $E_{tot}$  is the total wave energy, and  $E(\sigma, \theta)$  is the spectral energy density.

Three distinct vegetation scenarios were created by populating the model grid with the spatially explicit, season-specific vegetation parameters ( $h_v$ ,  $b_v$ ,  $N_v$ ) measured in the field (Table 1).

- **Summer Peak Scenario:** Utilized parameters from the July field campaign.
- **Autumn Senescence Scenario:** Utilized parameters from the November field campaign.
- **Winter Dormancy Scenario:** Utilized parameters from the January field campaign.

#### 2.4.4. Model Calibration and Validation

The model was calibrated using the hydrodynamic data collected during the peak of the winter storm event on 18 February 2022. The bulk drag coefficient ( $C_D$ ) is the primary calibration parameter in the vegetation formulation, as it implicitly accounts for the complex drag effects of non-cylindrical plant shapes and plant motion.<sup>38</sup> The

$C_D$  value was systematically varied until the modeled significant wave heights ( $H_s$ ) at pressure sensor locations P3, P4, and P5 achieved the best fit with the measured data. A constant  $C_D$  value of 0.4 provided the optimal agreement between modeled and observed wave heights. This value is consistent with previous calibrated values for *Spartina* and *Scirpus* marshes in the Wadden Sea under storm conditions.<sup>11</sup> This calibrated

$C_D$  was then held constant for all three seasonal scenarios. This ensures that any differences in wave attenuation predicted by the model are a direct result of the measured seasonal changes in the physical vegetation properties ( $h_v$ ,  $b_v$ ,  $N_v$ ), thereby isolating the effect of phenology.

**Table 1. Seasonal Biophysical and Biomechanical Properties of *Spartina anglica* and *Puccinellia maritima* used for SWAN Model Parameterization.** Mean values ( $\pm$  standard deviation) are presented for each vegetation zone based on field campaigns conducted in Summer (July 2021), Autumn (November 2021), and Winter (January 2022).

Parameter	Species	Summer Peak	Autumn Senescence	Winter Dormancy
<b>Stem Density (Nv)</b>	<i>Spartina anglica</i>	750 ( $\pm$ 120)	680 ( $\pm$ 150)	550 ( $\pm$ 180)
(stems m <sup>-2</sup> )	<i>Puccinellia maritima</i>	2200 ( $\pm$ 350)	2100 ( $\pm$ 300)	1950 ( $\pm$ 400)
<b>Stem Height (hv)</b>	<i>Spartina anglica</i>	0.65 ( $\pm$ 0.10)	0.45 ( $\pm$ 0.12)	0.20 ( $\pm$ 0.08)
(m)	<i>Puccinellia maritima</i>	0.30 ( $\pm$ 0.05)	0.28 ( $\pm$ 0.06)	0.25 ( $\pm$ 0.07)
<b>Stem Diameter (bv)</b>	<i>Spartina anglica</i>	5.2 ( $\pm$ 0.8)	4.8 ( $\pm$ 0.9)	4.5 ( $\pm$ 1.1)
(mm)	<i>Puccinellia maritima</i>	2.5 ( $\pm$ 0.4)	2.4 ( $\pm$ 0.5)	2.3 ( $\pm$ 0.5)
<b>Above-Ground Biomass (AGB)</b>	<i>Spartina anglica</i>	1150 ( $\pm$ 250)	650 ( $\pm$ 180)	210 ( $\pm$ 90)
(g dry wt m <sup>-2</sup> )	<i>Puccinellia maritima</i>	850 ( $\pm$ 150)	780 ( $\pm$ 160)	650 ( $\pm$ 200)
<b>Flexural Stiffness (EI)</b>	<i>Spartina anglica</i>	0.085 ( $\pm$ 0.02)	0.030 ( $\pm$ 0.01)	0.012 ( $\pm$ 0.005)
(N m <sup>2</sup> )	<i>Puccinellia maritima</i>	0.025 ( $\pm$ 0.008)	0.022 ( $\pm$ 0.007)	0.020 ( $\pm$ 0.009)

### 3. RESULTS

#### 3.1. Seasonal Signatures in Saltmarsh Biophysical Properties

The ecological field campaigns revealed distinct and significant seasonal variability in the biophysical and biomechanical properties of both salt marsh species, as detailed in Table 1. *Spartina anglica*, the dominant pioneer species, exhibited a pronounced phenological cycle. Its above-ground biomass (AGB) peaked in summer at 1150 g m<sup>-2</sup>, decreasing by 43% in autumn and by a total of 82% to a winter minimum of 210 g m<sup>-2</sup>. This decline in biomass was accompanied by a reduction in mean stem height from 0.65 m in summer to just 0.20 m in winter, representing the remaining dead, standing culms. The biomechanical integrity of *S. anglica* also varied dramatically; flexural stiffness (EI), a measure of the stem's resistance to bending, was seven times greater in summer (0.085 N m<sup>2</sup>) than in winter (0.012 N m<sup>2</sup>), indicating a transition from robust, stiff stems to weak, flexible winter stubble.<sup>21</sup>

In contrast, *Puccinellia maritima* displayed a more conservative, "evergreen" phenological strategy. While its AGB and stem stiffness also peaked in summer, the seasonal decline was far less pronounced. AGB decreased by only 24% from its summer peak of 850 g m<sup>-2</sup> to its winter value of 650 g m<sup>-2</sup>. Similarly, flexural stiffness showed only a minor reduction, maintaining a relatively consistent value around 0.02 N m<sup>2</sup> throughout the year. Stem density and diameter for both species showed less seasonal variation, though a slight decline was observed through the winter months. These contrasting phenological strategies result in a marsh structure that changes dramatically from a tall, dense, and stiff barrier in summer to a shorter, sparser, and more flexible structure in winter, with the relative structural contribution of *Puccinellia* increasing as *Spartina* dies back.

### 3.2. Observed Wave Attenuation During a Winter Storm Event

Analysis of the hydrodynamic data collected during the storm event of 18 February 2022, demonstrated substantial wave attenuation across the marsh, even during its winter dormant state. At the peak of the storm, incident significant wave heights (Hs) measured at the seaward edge of the marsh (P2) reached 0.85 m. As these waves propagated across the 300 m width of the marsh, their energy was progressively dissipated. At the landward boundary near the dike toe (P5), the measured Hs was reduced to 0.38 m, corresponding to an overall wave height reduction of 55%. The rate of attenuation was not uniform; the most rapid reduction occurred within the first 50 m of the marsh, across the *Spartina* pioneer zone, where wave height decreased by approximately 30%.<sup>11</sup> This confirms that the marsh provides a significant coastal protection function even when its vegetation is at its minimum annual biomass and structural integrity.

### 3.3. Model Validation

The SWAN model, configured with the winter vegetation parameters (Table 1) and a calibrated drag coefficient (CD) of 0.4, successfully reproduced the wave height decay observed during the storm event. A comparison of modeled versus measured Hs at the three internal sensor locations (P3, P4, P5) showed excellent agreement. A scatter plot of the data yielded a coefficient of determination (R<sup>2</sup>) of 0.94 and a linear regression slope of 0.98, indicating that the model accurately captured the magnitude and spatial pattern of wave dissipation across the marsh. This strong performance validated the model setup and provided confidence in its application to simulate the hypothetical autumn and summer scenarios, for which no storm data was available.

### 3.4. Quantifying the Impact of Phenology on Wave Attenuation

With the model validated, it was used to simulate the same storm event under the three distinct seasonal vegetation scenarios. The results, summarized in Table 2, reveal that vegetation phenology is a dominant control on wave attenuation.

- **Winter Dormancy Scenario:** This run replicated the validation case, confirming a total wave height reduction of 55.3% over the 300 m marsh transect.

- **Autumn Senescence Scenario:** By implementing the autumn vegetation parameters, which represent a partially senesced but still structurally significant canopy, the model predicted a marked increase in wave dissipation. The total wave height reduction increased to 76.5%. The wave height at the dike toe was only 0.20 m, nearly half of that in the winter scenario.
- **Summer Peak Scenario:** This scenario, representing the marsh at its maximum growth and structural integrity, demonstrated the most dramatic effect. The model predicted a total wave height reduction of 91.8%. The incident wave height of 0.85 m was almost entirely dissipated, resulting in a residual wave height of just 0.07 m at the dike toe.

These results provide a direct, quantitative measure of the impact of phenology. The coastal protection service provided by the salt marsh, in terms of its ability to reduce storm wave heights, is nearly twice as effective in summer as it is in winter. The difference in wave energy reaching the dike toe between the summer and winter scenarios is over an order of magnitude, highlighting the profound influence of the vegetation's seasonal life cycle.

**Table 2. Modeled Significant Wave Height (Hs) and Cumulative Percentage Reduction Across the Marsh Transect for a Standardized Storm Event (Hs = 0.85 m at marsh edge) Under Different Phenological Scenarios.**

Scenario	Hs at Marsh Edge (0 m)	Hs at 50 m	Hs at 150 m	Hs at Dike Toe (300 m)	Total Hs Reduction (%)
Summer Peak	0.85 m	0.35 m (58.8%)	0.15 m (82.4%)	0.07 m (91.8%)	91.8%
Autumn Senescence	0.85 m	0.48 m (43.5%)	0.29 m (65.9%)	0.20 m (76.5%)	76.5%
Winter Dormancy	0.85 m	0.60 m (29.4%)	0.46 m (45.9%)	0.38 m (55.3%)	55.3%

## 4. DISCUSSION

### 4.1. The Magnitude of Seasonal Control on Wave Dissipation

The results of this study unequivocally demonstrate that vegetation phenology is a first-order control on the wave attenuation capacity of Wadden Sea salt marshes. The modeled wave height reduction varied by nearly a factor of two between the summer peak growth and winter dormant seasons, from 92% down to 55%. This substantial variation is directly attributable to the seasonal changes in the biophysical and biomechanical properties of the vegetation canopy.<sup>21</sup> During summer, the combination of maximum stem height, density, and biomass creates a dense, rigid canopy that presents a large frontal area to the incoming waves. This structure maximizes the drag forces exerted on the water column, leading to highly efficient energy dissipation per unit distance of wave propagation.<sup>17</sup> As the plants senesce into autumn and winter, the canopy becomes shorter, sparser, and significantly

more flexible due to the decay of structural tissues. This reduction in both biomass and stiffness drastically lowers the vegetation's ability to resist and dissipate wave energy, allowing a much larger fraction of the incident wave energy to propagate across the marsh to the dike behind it.

#### 4.2. Contrasting Phenological Strategies and Their Impact on Zonal Attenuation

The study highlights how the differing phenological strategies of the two dominant species, *S. anglica* and *P. maritima*, result in a seasonally shifting pattern of wave attenuation across the marsh zones. The *Spartina* pioneer zone, positioned at the seaward edge, is subjected to the highest incident wave energy. Despite its dramatic winter die-back, its location ensures it provides the most significant *initial* reduction in wave height in all seasons, acting as a crucial first line of defense.<sup>24</sup> However, its relative contribution diminishes significantly in winter. In contrast, the low-marsh

*Puccinellia* zone exhibits a more "evergreen" strategy, retaining a substantial portion of its biomass and structural integrity throughout the year.<sup>41</sup> Consequently, while its contribution to overall attenuation is secondary to the

*Spartina* zone in summer, it becomes relatively more important during winter. The *Puccinellia* meadow provides a consistent, year-round baseline of wave damping that moderates the extreme seasonal variability driven by the pioneer zone. This reveals the marsh not as a uniform block of vegetation, but as a composite system where different zones and species play complementary roles in providing coastal protection throughout the year.

#### 4.3. Feedback and Implications for Marsh Morphodynamics and Sedimentation

The seasonal cycle of wave attenuation has profound implications for the long-term geomorphic stability and evolution of the salt marsh. The highly effective wave damping during the summer growing season creates a low-energy environment over the marsh platform. These calm conditions facilitate the settling of fine-grained suspended sediment from the water column, a critical process for vertical accretion.<sup>8</sup> This accretion allows the marsh surface to build elevation, a key mechanism for adapting to relative sea-level rise.<sup>2</sup> This process creates a positive bio-geomorphic feedback loop: summer plant growth enhances wave attenuation, which enhances sedimentation, which in turn provides a fertile substrate that supports further plant growth.

Conversely, the reduced attenuation during winter allows higher wave energy to penetrate the marsh. This increased energy can lead to sediment resuspension and erosion, particularly at the exposed seaward edge of the marsh.<sup>5</sup> This winter erosion may limit the lateral expansion of the marsh but can also serve as a source of sediment that is then transported and deposited further back on the marsh platform during calmer periods or subsequent storm surges. This dynamic equilibrium, governed by the seasonal interplay of biological growth and physical forces, is fundamental to the marsh's long-term resilience and its ability to maintain its elevation within the tidal frame.

#### 4.4. Rethinking Coastal Management: From Static to Dynamic Assessment of Nature-Based Solutions

The findings present a significant challenge to conventional approaches in coastal risk management, which often rely on static or time-invariant parameters for assessing the performance of flood defenses.<sup>11</sup> A common conservative approach is to evaluate the protective function of a salt marsh using its winter state, when vegetation is at a minimum. While this method provides a "worst-case" scenario for wave loads on a dike, this study demonstrates that it fails to capture the full dynamics of the system. It significantly undervalues the protection offered during the majority of the year and, more critically, it may misidentify the period of highest risk. The true vulnerability may not be in mid-winter, but during powerful autumn storms, which can occur when water temperatures are still elevated but the vegetation has begun to senesce and lose its structural strength, making it more susceptible to breakage and less effective at damping waves.<sup>25</sup>

This necessitates a paradigm shift in how nature-based solutions are incorporated into coastal management. The concept of a single, fixed "safety level" provided by a salt marsh is flawed. Instead, the protection it offers should be understood as a probability distribution that varies seasonally. Coastal managers and engineers responsible for dike design, safety assessments, and emergency response planning must recognize and account for this seasonal "protection deficit".<sup>14</sup> Management strategies, such as marsh restoration or sediment nourishment, could be timed to maximize their benefit, for example, by implementing measures to strengthen the pioneer zone before the onset of the autumn and winter storm season. A dynamic, seasonally-aware approach to risk assessment is crucial for leveraging the full potential of NBS while accurately accounting for their inherent variability.

#### 4.5. Limitations and Directions for Future Research

While this study provides a significant step forward, certain limitations should be acknowledged. The SWAN model represents vegetation as rigid, vertical cylinders, an approach that does not fully capture the complex motion of flexible plants, such as swaying and bending, which can alter the effective drag.<sup>39</sup> Furthermore, the bulk drag coefficient (

CD) was calibrated for a single storm event and held constant across all scenarios. In reality, CD is known to be a function of hydrodynamic conditions, varying with parameters like the Reynolds number (Re) and Keulegan-Carpenter number (KC), as well as with the phenological state of the plant itself.<sup>32</sup>

Future research should be directed towards addressing these limitations to further refine our understanding. Key directions include:

1. **Advanced Vegetation Modeling:** Incorporating more sophisticated vegetation modules into hydrodynamic models, such as those in XBeach-VEG or Delft3D, which can account for plant flexibility, reconfiguration under flow, and even breakage.<sup>47</sup>

2. **Improved Drag Parameterization:** Conducting dedicated field and laboratory flume experiments to develop robust parameterizations that relate the drag coefficient not only to hydrodynamic conditions but also to the specific phenological and biomechanical state of the vegetation.
3. **Long-Term, High-Frequency Monitoring:** Extending field measurements to cover the full annual cycle and a wider range of storm types and magnitudes to capture a broader spectrum of conditions.
4. **Integrated Biomass-Based Metrics:** Exploring the use of holistic parameters like the Hydraulic Standing Biomass (HSB), which aims to directly link wave attenuation to measurable properties like AGB and local hydraulics. Such metrics could provide a more universally applicable and easily measured tool for coastal managers to estimate the protective function of marshes without requiring complex model calibrations.<sup>49</sup>

## 5. CONCLUSIONS

This coupled eco-hydrodynamic study provides a quantitative assessment of the profound influence of vegetation phenology on the coastal protection function of Wadden Sea salt marshes. The following key conclusions are drawn:

1. The phenological cycle of salt marsh vegetation, characterized by seasonal changes in biomass, height, and stem stiffness, exerts a first-order control on its capacity to attenuate wave energy.
2. In the Wadden Sea, the wave height reduction provided by a typical foreland salt marsh during a storm event can be almost twice as effective during the summer peak growth season (92% reduction) as it is in the winter dormant season (55% reduction).
3. This seasonal variability in performance creates a potential "vulnerability gap" where the period of highest coastal risk (winter storms) coincides with the period of minimum ecosystem-based protection, a critical consideration for coastal safety assessments.
4. The findings underscore the urgent need for coastal management frameworks to evolve from static to dynamic approaches. To ensure long-term coastal resilience in a changing climate, the assessment and management of nature-based solutions must explicitly account for the inherent seasonality and dynamic nature of the ecosystems upon which they depend.

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## REFERENCES

- Adam, P. (1990). *Saltmarsh Ecology*. Cambridge University Press. <sup>15</sup>
- Anderson, M. E., & Smith, J. M. (2014). Wave attenuation by vegetation: A review of current knowledge and future opportunities. *Coastal Engineering*, 87, 32-41. <sup>22</sup>
- Booij, N., Ris, R. C., & Holthuijsen, L. H. (1999). A third-generation wave model for coastal regions: 1. Model description and validation. *Journal of Geophysical Research: Oceans*, 104(C4), 7649-7666. <sup>33</sup>
- Bouma, T. J., De Vries, M. B., Low, E., Peralta, G., Tánzos, I. C., van de Koppel, J., & Herman, P. M. J. (2005). Trade-offs related to ecosystem engineering: a case study on stiffness of salt marsh vegetation. *Ecology*, 86(8), 2187-2199. <sup>44</sup>
- Dalrymple, R. A., Kirby, J. T., & Hwang, P. A. (1984). Wave diffraction due to areas of energy dissipation. *Journal of Waterway, Port, Coastal, and Ocean Engineering*, 110(1), 67-79. <sup>38</sup>
- Garzon, J. L., Maza, M., & Lara, J. L. (2022). Wave attenuation by saltmarshes based on standing biomass. *Scientific Reports*, 12(1), 13898. <sup>49</sup>
- Gray, A. J., & Scott, R. (1977). *The ecology of Morecambe Bay. VII. The salt marshes of the inner bay*. The Journal of Applied Ecology, 14(1), 229-241. <sup>41</sup>
- Jadhav, R. S. (2012). *Field Investigation of Wave and Surge Attenuation in Salt Marsh*. LSU Doctoral Dissertations. 3939. <sup>32</sup>
- Kaiser, R., Brandt, G., Gartner, J., Glaser, D., Grüne, J., & Niemeyer, H. D. (1994). Wave climate study in Wadden Sea areas. In *Coastal Engineering 1994* (pp. 181-195). <sup>27</sup>
- Mendez, F. J., & Losada, I. J. (2004). An empirical model to estimate the propagation of random breaking and nonbreaking waves over vegetation fields. *Coastal Engineering*, 51(2), 103-118. <sup>39</sup>
- Möller, I., Spencer, T., French, J. R., Leggett, D. J., & Dixon, M. (1999). Wave transformation over salt marshes: A field and numerical modelling study from north Norfolk, England. *Estuarine, Coastal and Shelf Science*, 49(3), 411-426. <sup>17</sup>
- Reise, K., Olenin, S., & Thielges, D. W. (2010). Are aliens threatening European aquatic coastal ecosystems? *ICES Journal of Marine Science*, 67(7), 1539-1542. <sup>12</sup>
- Schulze, P., Schoutens, K., & Bouma, T. J. (2019). Seasonal and spatial within-marsh differences of biophysical plant properties: implications for wave attenuation capacity of salt marshes. *Estuaries and Coasts*, 42(6), 1575-1588. <sup>21</sup>

- Temmerman, S., Meire, P., Bouma, T. J., Herman, P. M., Ysebaert, T., & De Vriend, H. J. (2013). Ecosystem-based coastal defence in the face of global change. *Nature*, 504(7478), 79-83. <sup>50</sup>
- van der Wal, D., Pye, K., & Neal, A. (2015). Long-term morphological change in the Wadden Sea. *Ocean & Coastal Management*, 116, 356-373. <sup>7</sup>
- Vuik, V., Zhu, Z., Borsje, B. W., & Jonkman, S. N. (2018). The effect of vegetation on the failure probability of coastal dikes. *Coastal Engineering*, 136, 1-12. <sup>11</sup>
- Vuik, V., Jonkman, S. N., Borsje, B. W., & Suzuki, T. (2016). Nature-based flood protection: The efficiency of marshes for reducing wave loads on coastal dikes. *Coastal Engineering*, 116, 171-186. <sup>11</sup>
- Widdows, J., Pope, N. D., & Brinsley, M. D. (2008). Effect of *Spartina anglica* stems on near-bed hydrodynamics, sediment dynamics and their influence on seasonal morphological changes on the upper shore and salt marsh of an intertidal mudflat. *Marine Ecology Progress Series*, 362, 45-57. <sup>43</sup>
- Willemsen, P. W. J. M., et al. (2020). Biomechanical properties of marsh vegetation in space and time: effects of salinity, inundation and seasonality. *Annals of Botany*, 125(3), 497-510. <sup>22</sup>
- Zhu, Z., et al. (2022). Species-specific and seasonal differences in the resistance of salt-marsh vegetation to wave impact. *Frontiers in Marine Science*, 9, 898080. <sup>25</sup>

# Cognitive and Emotional Barriers in Second Language Learning: A Psychological Perspective

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**Abstract:** The study investigates the interdependent nature of cognitive and emotional barriers in second language (L2) learning from a psychological perspective. While prior research in Second Language Acquisition (SLA) has focused heavily on linguistic competence and language structure, the psychological dimensions of learning remain underexplored. This study seeks to fill this gap by analyzing how cognitive factors such as working memory limitations interact with emotional challenges like anxiety and stress to impede language acquisition. Drawing upon theoretical models in cognitive psychology and supported by a large-scale questionnaire, the study aims to provide a holistic view of the psychological hurdles L2 learners encounter. Findings indicate that cognitive and emotional barriers often function in tandem, influencing learner performance and motivation. The study further emphasizes the need for pedagogical strategies tailored to individual learner differences, offering practical implications for language educators to create supportive learning environments. The research underscores the importance of integrating both cognitive and emotional perspectives to enhance L2 learning outcomes and bridge the divide between theory and practice in language education.

**Keywords:** *Second Language Acquisition, Cognitive Barriers, Emotional Barriers, Working Memory, Language Anxiety*

## INTRODUCTION

The multifaceted nature of challenges language learners face encompasses a myriad of cognitive and emotional barriers. From limited vocabulary to low self-confidence, these barriers do not operate independently. When explored from a psychological standpoint, the complex and dialectical interplay between cognitive and emotional barriers emerges. Despite the ongoing debate about the relationship between cognition and emotion, the role of cognitive barriers can explain the emotional process, such as frustration and anxiety. In order to provide a comprehensive understanding, it is crucial to investigate both cognitive and emotional barriers in L2 learning simultaneously. By and large, the

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purpose of the current study, therefore, is to provide a psychological perspective which fills in the aforementioned gap. This study was grounded in the assumption that cognitive and emotional barriers interdependently function and hence aimed to explore the nature of these barriers when they are co-occurring. Second language acquisition (SLA) researchers have been primarily concerned with propositional and procedural knowledge of language structure.

## **1. Cognitive Theories of Second Language Learning**

The cognitive theories that attempt to explain how learners acquire a second language and what is learned during the acquisition process are surveyed in this section. Some of the basic elements that make-up a language are outlined in terms of these theories. In doing so, cognitive models will be introduced and some basic ideas about the function and structure of language can be there in order to feed into the discussion of learning. Further there will be the relevance of cognitive models to an analysis of what learners are capable of for the purposes of learning (Abdel Aziz Metwalli, 2011). The following discussion is based on a view of how learners receive, process and learn language built up over many years of second language teaching and research. In an attempt to clarify this view, the presentation of cognitive models is accompanied by certain terminological constraints related to them. Second language (L2) learning is obviously a concern in a multi-lingual society with various cognitive models existing according to different stages of complexity and variation. Sequencing is also vital for the understanding of models and the level of proficiency of language learners. At this point, learners need mechanisms that allow incoming information to be stored and manipulated in memory (Azhar, 2015). This section provides a framework for understanding cognitive barriers, which can render this type of learning impossible or extremely difficult. A more detailed exploration of cognitive barriers will be discussed in the following section. Broadly speaking, this view of how learners might internalise language is described how knowledge of language may transfer from the first language to the second, or later language, and how it may eventually develop into Autonomous skills in writing and speaking.

## **2. Cognitive Barriers in Second Language Learning**

When learning a second language, specific cognitive difficulties are encountered in the acquisition of the target language. It is important for language educators and learners to have a good understanding of these barriers, which can help the learners to develop effective learning strategies and the educators to devise better teaching methodologies. Working memory constraints are believed to affect the processing and retention of language's input material, particularly in the study of texts or narratives. Language learners process the sounds and meanings of the words they hear and read by resorting to an intricate system of working memory resources. On the other hand, the demand for holding more and more items in working memory may result in faster item decay, earlier displacement, and interference, therefore making the learning and retention of new input material more difficult. In the context of a dual-task experiment, there is evidence that working memory is not only engaged in first but also second language sentence comprehension. While interference from an already acquired first language is a well-known and extensively researched phenomenon, the role that the subject's memory constraints on working memory and other cognitive resources play in the avoidance of language transfer has not been equally investigated. The acceptance that interference is modulated by individual

differences has noteworthy implications for issues of language learning and teaching. Larger efforts should be made to help learners bypass their natural working memory constraints and emphasize noticing strategies, whereas language teaching methodology should avoid facilitating the activation of language transfer. Cognitive barriers to second language learning reflect the intricacy of psycholinguistic processes (Roberts, 2012).

### **3. Emotional Barriers in Second Language Learning**

As has been well documented, the acquisition of a second language can be exceptionally challenging in light of the multitude of cognitive, emotional, and social factors that can impede successful language learning (Byrd & Abrams, 2022). From a psychological standpoint, the emotional barriers associated with learning a second language are of particular interest since the intensity of an emotional experience can have a significant impact on the cognitive processes that underlie learning (Uysal & Güven, 2018). It has been suggested that emotions can serve as an affective filter, or a mental barrier governing the acquisition of a second language by learners whose stress and anxiety prevent new linguistic input from being converted into long-term memory.

Cognitive and emotional barriers might have effects on both adults and children in learning a foreign language. Emotional factors play significant roles in learning a second language. It has been widely accepted that emotions coexist with cognition, motivation, and other mental aspects. Anxiety is a common phenomenon in foreign language classrooms. It is defined as a state of distress or uneasiness of mind caused by fear, hence it functions as a barrier to learning, communication, and performance. It is suggested that foreign language anxiety is a complex emotional response to language study because of the unique setting of the language classroom. Meanwhile, when foreign language learners cannot understand what is being said or become hesitant, anxious feelings are often aroused because they worry about the possible negative emotions of other students as the result of the lack of understanding or hesitation. The affective aspect of language, such as nervousness and worry of students, are treated as category of anxiety, and the psychological and emotional reactions of fear in a second language learning environment may well have a potential deleterious influence on learning.

### **4. Strategies for Overcoming Cognitive and Emotional Barriers**

Both cognitive and emotional barriers exist in psychology. Learning any language involves different cognitive and emotional processes. Language learners are often faced with complex environments, accent problems, speaking problems, and reading problems which can cause cognitive barriers. Emotional memory focusing on the subject can be aroused regardless of the actual external stimuli. It is therefore essential for a person to create his or her own emotional memory for the learning process. In other words, the person inserts himself into the task environment and determines the other elements of the task environment. By associating the concepts with this situation, he is in a process of remembering more easily and for a longer time. Language learning is not a “task-focused” process. Language learning can often cause emotional barriers before he falls out of love, his dislike, and his interest in the subject diminishes. As self-esteem reduction continues in this and similar negative situations, it ceases to be an easy thing to return to love for the work. Even though a person falls in love again, it is difficult and takes a long time to reach the initial stage again. It is difficult to manage

well in learning environments, especially against such a process, and it is necessary to invest a lot in order to prevent the collapse of love. But if the environment in which the person is an emotional barrier is organized positively, he observes that the cognitive barriers decrease to a great extent and even lead to walking in a more successful way. (Byrd & Abrams, 2022) studied second language classroom anxiety with an emphasis on English language teaching students at a South African university. Data was gathered through informal biographical interviews and oral narrative reports.

## Conclusion and Future Directions

The purpose of this paper has been to focus on cognitive and emotional barriers as separate, but concurrently occurring, and interacting issues in language acquisition and to consider them in a psychological perspective. Doing so, a comprehensive outlook on language barriers consisted of cognitive factors, such as motivation, anxiety, memory and attitude and perceptual, socio-cognitive, and learning strategy issues, as well as emotional dimension, composed of negative feelings like annoyance, shame, and fear, has been presented. The main conclusion to be drawn is that in order to increase teacher knowledge about different types of barriers, solely linguistic skills are not enough. In teaching foreign languages, one ought to be a good psychologist as well. It is not possible to fully ensure satisfactory second language learning outcomes without addressing these barriers and having understanding of how they interact. While cognitive barriers are more apparent and argumentatively observable, success in a second language learning is equally dependent on overcoming emotional barriers: Relations between cognition and emotion have been investigated to a great extent also in other areas of psychology, and results imply that having both cognitive and emotional disorders may have an even more deteriorative impact. Hence, a feasible future avenue may be exploring how the interplay of cognitive and emotional factors influence each other and the learning of a foreign language in consequence.

## REFERENCES:

- Afitska, O. (2014). *Formative use of language assessment: Supporting learning through the medium of a second language* [PDF].
- Arifin, W. L. (2011). *Interference: Its role in the target language mastery to Indonesian learners* [PDF].
- Azhar, S. (2015). *Second language acquisition in teaching English as a second language* [PDF].
- Asadova, B. (2023). Phonetic fluidity in English pronunciation: Techniques for native-like articulation. *Norwegian Journal of development of the International Science*, 121, 81.
- Qizi, A. B. A. (2023). From past to present to future: The interplay of English tenses in multimodal contexts. *International Journal of Philosophical Studies and Social Sciences*, 3(5), 13-24.
- Byrd, D., & Abrams, Z. (2022). Applying positive psychology to the L2 classroom: Acknowledging and fostering emotions in L2 writing. *NCBI*. <https://www.ncbi.nlm.nih.gov>
- Chen, Y. (2011). *The influence of integrating technology in language learning courses* [PDF].
- Chenowith, N. H. (2014). *Cultural and linguistic obstacles for ELLs* [PDF].

Fattahi Marnani, P., & Cuocci, S. (2022). *Foreign language anxiety: A review on theories, causes, consequences and implications for educators* [PDF].

Ma, Y. (2022). The triarchy of L2 learners' emotion, cognition, and language performance: Anxiety, self-efficacy, and speaking skill in lights of the emerging theories in SLA. *NCBI*. <https://www.ncbi.nlm.nih.gov>

# Effective Language Teaching Practices in Middle School Classrooms: Challenges and Strategies

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**Abstract:** Middle school language education faces unique developmental and pedagogical challenges. Adolescents at this stage exhibit wide-ranging interests, motivational levels, and proficiency, all of which impact language learning. Effective teaching requires strategies that engage students and accommodate diverse needs. This article reviews key obstacles in middle school language classrooms – including limited motivation, large class sizes, exam-focused curricula, and teacher training gapspdf.erytis.com – and proposes evidence-based practices. Communicative and task-based approaches (e.g. project-based learning) have demonstrated positive effects on communicative competence and learner autonomy. Differentiated instruction and scaffolding address individual differences and cognitive load. Cooperative learning with assigned roles helps manage large classes and foster participation. Using authentic materials and multimedia increases relevance and motivation. Finally, ongoing formative assessment and professional development ensure instruction remains aligned with student needs. By combining theoretical insights (constructivism, Vygotskian ZPD, communicative pedagogy) with practical methods, teachers can create dynamic middle school language environments that improve both proficiency and attitudes.

**Keywords:** *language teaching, middle school, pedagogy, instructional strategies, communication, differentiation, English language learners*

## 1. INTRODUCTION

Middle school (roughly ages 11–14) is a pivotal period for language learning. Students at this stage transition to more abstract thinking and peer-oriented social contexts, but also face issues like fluctuating motivation and self-consciousness. Globally, educators recognize the importance of fostering solid language skills in early adolescence for future academic success and global citizenship. However, achieving effective instruction at this level is challenging. Recent studies note that many middle school language programs remain overly exam-driven and teacher-centeredpdf.erytis.com. For example, Mushtaq *et al.* (2020) surveyed 150 Pakistani middle school English teachers and found heavy reliance on grammar–translation methods with “a very low percentage” using interactive strategies. Similarly, Yang (2025) observes that in China many middle school classrooms struggle under exam pressures, teacher shortages, and uneven resource allocationpdf.erytis.com. This article analyzes such challenges and reviews research-based strategies that align theory and practice. Drawing on studies and international recommendations, it offers a comprehensive overview of how communicative

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approaches, differentiation, cooperative learning, and authentic materials can address middle school learners' needs.

## 2. CHALLENGES IN MIDDLE SCHOOL LANGUAGE TEACHING

Language teachers at the middle school level confront a complex mix of student, teacher, and systemic challenges. Adolescents' motivation can be low: Yang (2025) highlights “students’ low interest in English classes” as a common problem. Developmentally, this age group may question authority and become self-conscious, making participation in language activities harder. Class sizes are often large, which complicates interactive activities. The same Chinese study reports a “shortage of English teachers” and “uneven distribution of teaching resources”, issues common in many contexts (under-funded rural schools, etc.). Globally, teachers cite similar barriers: Nguyen *et al.* (2021) found Vietnamese teachers struggled with “uninteresting teaching style; insufficient time for communicative activities; [and] grammar-driven teaching”. In practice, a top-down grammar-translation focus persists in many curricula, leaving little class time for speaking or listening practice. In Mushtaq *et al.* (2020) study, Pakistani teachers even admitted their instructions were “not aligned with [the] National Curriculum,” indicating a lack of up-to-date pedagogical guidance. Formative feedback and alignment between objectives and assessments are often weak; education is dominated by final exams, which forces teachers to “cover the syllabus” rather than ensure understanding. These factors contribute to performance gaps: Yang reports a “wide disparity in students’ English proficiency levels” even within the same grade. In sum, middle school language classes worldwide can be characterized by curriculum constraints, resource shortages, teacher training gaps, and low student engagement – all of which must be addressed by innovative teaching practices.

## 3. COMMUNICATIVE AND TASK-BASED APPROACHES

A foundational shift in many successful language classrooms has been moving from lecture-based grammar teaching to communicative, task-based methods. Communicative Language Teaching (CLT) emphasizes authentic interaction in the target language. Qasserras (2023) reviewed CLT research and concluded that when well-implemented it “enhances communicative competence, language proficiency, cultural awareness, learner autonomy, critical thinking, [and] problem-solving”. These gains are particularly valuable for motivated learning: by using language in realistic contexts, CLT makes classes more engaging for adolescents. For example, role-plays, debates, and pair work allow students to use English to express their ideas, which both boosts confidence and provides immediate practice with listening and speaking skills.

Project-Based Learning (PBL) and other task-based methods align closely with CLT principles. PBL involves students working on collaborative projects that require language use in real-world scenarios. Mouni's (2022) qualitative study of Nepali middle school EFL teachers found that PBL projects can “motivate students to use [the] language in real-life environment” and involve all skills (speaking, listening, reading, writing) equally. These projects often build on constructivist theory: Dewey's concept of “learning by doing” applies here, as students solve concrete problems (e.g., creating a class magazine or conducting interviews) while internalizing vocabulary and structures. Scaffolded support is important: teachers assist students in planning and research, providing sentence starters or graphic organizers as needed. Scaffolding mitigates cognitive load for younger learners, allowing them to

achieve steps “just beyond their reach”. In these tasks, teacher guidance gradually fades as students become more proficient.

Despite their benefits, communicative and task-based methods pose challenges. PBL activities are time-consuming, which can clash with heavy syllabi. Mouni (2022) notes that teachers often report projects as “time consuming” and struggle with large class management. Student factors also intervene: teachers found many pupils had too low proficiency to participate fully, and outspoken or “talented” students tended to dominate group work. To combat this, teachers should group students heterogeneously and rotate roles so that quieter learners are supported by peers. Careful time management – breaking a project into shorter deliverables – also helps. In general, shifting toward CLT/PBL requires initial training: teachers need to learn how to design tasks with clear linguistic goals and how to facilitate group work without reverting to traditional lecturing. When properly balanced with curriculum requirements, however, these methods offer a powerful way to stimulate interest and communication.

#### 4. DIFFERENTIATION AND SCAFFOLDING

Middle school classes are inherently diverse in ability, background, and learning style. Effective instruction recognizes this diversity through differentiated teaching. Stanford’s Center for Teaching and Learning defines differentiated instruction as “teaching in a way that meets the different needs and interests of students using varied content, activities, and assessments”. In practice, this means providing multiple pathways within the same lesson. For example, a reading activity might include leveled texts or tiered questions so each student can work at an appropriate challenge level. Teachers might also offer choices in output: students could summarize a story by writing an essay, recording a podcast, or creating a comic strip, depending on their strengths.

Scaffolding is a related strategy derived from Vygotsky’s Zone of Proximal Development. Here, teachers offer support (prompts, modeling, visual aids) to help students accomplish tasks they could not do alone. Mouni (2022) emphasizes the value of teacher support in PBL: “Teachers’ professional and personal skills are essential to facilitate students to involve in successful language learning,” including creating real-life project situations and guiding students’ language use. This scaffolding can take many forms in a middle school language class: pre-teaching key vocabulary before a lesson, using sentence frames to structure responses, or conducting group workshops where the teacher circulates to help struggling students. For adolescent learners, scaffolds also include connecting new content to their existing knowledge or interests; for instance, an English lesson on a science topic might begin with a discussion of how students use similar concepts in their first language.

Effective differentiation and scaffolding require knowing students well. As Reading Rockets (University of Texas) notes, ELLs (and by extension all learners) vary “considerably” in language and literacy proficiency, cultural background, and experiences. Teachers must assess these profiles and adapt accordingly. This is supported by **ongoing assessment** (informal checks, exit tickets, etc.) to monitor progress. Without differentiation, large-class strategies fall flat: Nguyen *et al.* (2021) found that Vietnam’s large, mixed-level classes suffered because teachers defaulted to “grammar-driven teaching” with “insufficient time for communicative activities,” which often left lower-level students behind. By contrast, when lessons include differentiated tiers or peer tutoring, every student can

engage at their own level. For example, in group work one student might handle vocabulary research while another leads a group discussion, thereby distributing roles to match each student's readiness.

## 5. COOPERATIVE AND INTERACTIVE METHODS

Building a participatory classroom environment is crucial at the middle school level. Cooperative learning – structured group activities where students work toward a common goal – has well-documented benefits. Nguyen *et al.* (2021) surveyed Vietnamese teachers on cooperative learning (CL) in English classes and found that most had positive views of CL. However, teachers also reported common obstacles: “big class size, noise, and [losing] class control” frequently undermined group tasks. To address these, teachers can assign clear roles (e.g. discussion leader, recorder, presenter) and set norms for teamwork. Nguyen *et al.*'s study suggests that defining roles and “setting the stage for learning” (explaining procedures and expectations before activities) helps manage disruptions. Teachers should monitor groups closely, offering feedback and redirecting groups as needed.

Interactive games and pair activities are another way to spark engagement. Adolescents often respond well to movement and variety. For instance, a relay race asking students to match English sentences to images can make review energetic and fun. Total Physical Response (TPR) activities – where students physically act out commands – build listening and speaking confidence in a stress-free way. The key is variety: if instruction is always lectures and worksheets, even a motivated group will drift. By contrast, a class that regularly uses think-pair-share, interviews, or language games can maintain interest and give students multiple chances to speak. These methods also build soft skills like cooperation and communication, aligning with 21st-century learning goals. Teachers should ensure activities still practice target language and grammar, perhaps by debriefing in English or having students reflect on the language used during games.

Cooperative and interactive techniques also help immigrant or minority students feel included. Students from different linguistic backgrounds can teach one another (peer tutoring) and share cultural perspectives, which enriches the class. Group projects that incorporate students' own experiences make learning relevant. As Reading Rockets emphasizes, instruction should build on students' backgrounds. For example, ELLs might work in pairs explaining words from their first language, connecting new English words to concepts they already know. This peer-assisted approach not only supports ELLs but raises the achievement of the whole class by fostering empathy and mutual learning.

## 6. AUTHENTIC MATERIALS AND TECHNOLOGY INTEGRATION

Middle school students are digital natives and motivated by relevant, real-world content. Using **authentic materials** – texts and media created for native speakers – can boost both motivation and language exposure. The U.S. State Department's American English program notes that authentic materials (news clips, songs, blogs, etc.) “often increases students' motivation and willingness to take risks with English” because it presents language in real context. Instead of simplified textbooks, teachers can incorporate short video clips from current shows, popular music lyrics, or social media posts. For example, a lesson on travel might involve reading a blog post by a teen about visiting a famous landmark; students can then use the vocabulary in their own mini travel videos. Even menus, games instructions, or smartphone apps in English can become learning tools. The challenge is to scaffold these materials: teachers might pre-teach difficult words or use subtitles first. But by hearing

and reading language “as it is used in a real-life situation”, students gain exposure to slang, diverse accents, and cultural references that standard texts lack.

Educational technology should be used thoughtfully as a complement. Multimedia presentations, language learning apps, and online collaborative tools can enrich lessons. For instance, language learning games on tablets can reinforce vocabulary with interactive feedback. Google Classroom or similar platforms allow students to post spoken or written responses (e.g., podcasts or video diaries) that teachers and peers can comment on. Virtual exchanges (pen-pal video chats) connect students with native speakers abroad for authentic conversation practice. However, as Bell (2010) cautions, technology must be supported by good pedagogical design: students need guidance on using tools and time to make them meaningful. Simply using an app is not enough; it should be integrated into a lesson plan with clear objectives. When done well, technology and authentic media create a multimodal environment that appeals to adolescents’ interests and promotes language use outside class.

## 7. ASSESSMENT, FEEDBACK, AND PROFESSIONAL DEVELOPMENT

Continuous assessment and feedback are key to informing instruction. Rather than relying solely on high-stakes tests, effective teachers use formative checks (quizzes, oral interviews, peer review) to gauge understanding. This aligns with Yang’s emphasis on curriculum **evaluation**: regular evaluation helps teachers identify “deficiencies and problems in English teaching” and adjust their methods pdf.erytis.com. For example, quick writing activities or exit tickets at lesson end can reveal if many students still lack a target grammar. The teacher can then review or re-teach with more examples. Likewise, encouraging students to self-assess (e.g. rate their own speaking confidence) builds autonomy and metacognition. Feedback should be timely, specific, and constructive: instead of only correcting errors, teachers can highlight student progress (“You used three new vocabulary words correctly!”) to encourage continued effort.

Alignment between curriculum, instruction, and assessment is also crucial. Mushtaq *et al.* (2020) found that many teachers were unaware of the official English curriculum’s goals. Professional development (PD) can address this gap by training teachers in the latest methods and curricular standards. Workshops and peer observations help teachers learn from each other. For instance, a school might have English teachers demo a successful communicative lesson to colleagues. PD should emphasize classroom practice: teachers may study a strategy (like how to conduct a Socratic seminar in English), then try it out and reflect on the results. National teacher standards and local education offices should support such in-service training, especially in regions where traditional grammar instruction still dominates.

Finally, teacher collaboration builds capacity. Middle school language teachers benefit from sharing lesson plans and student data. For example, a team might analyze why many students struggled on a vocabulary unit and jointly develop games to reinforce it. Coordination with other subject teachers also helps integrate language skills (e.g. a science teacher and an English teacher co-design a project on environmental topics, each reinforcing language objectives). Research indicates that **staff capacity** – the collective knowledge and skills of educators – is one of the “critical factors” in ELL success. In other words, supporting teachers through PD and a collaborative culture is as important as the strategies they implement in class.

## 8. CONCLUSION

Effective language teaching in middle school demands a blend of research-based strategies and responsiveness to local context. This review has highlighted that no single method suffices on its own. A communicative approach (CLT, PBL) injects relevance and interaction into the classroom, but must be balanced with some explicit instruction in grammar and vocabulary to satisfy curricular requirements. Differentiation and scaffolding ensure that varied learners – from high achievers to novices – each make progress. Cooperative learning and interactive activities keep adolescents engaged and practicing English authentically. Additionally, integrating authentic materials and appropriate technology bridges the gap between classroom English and real-world language, increasing motivation.

Simultaneously, systemic factors cannot be ignored. Teacher training and evaluation systems must align to support these methods. Studies consistently recommend investing in professional development so teachers can move beyond outdated practices. Moreover, curriculum reform is needed to reward communicative competence, not just rote knowledge. When teachers feel empowered by training and collaboration, they are better equipped to implement innovative practices.

Overall, an effective middle school language teacher is one who creates a dynamic, student-centered learning environment. As Yang (2025) concludes, combining theory and practice through reflective teaching and adaptive evaluation “promotes the continuous improvement of teaching” pdf.erytis.com. By employing a variety of strategies – grounded in theory but tested in the classroom – teachers can overcome many of the challenges of the middle years. Ultimately, it is this blend of creativity, support, and evidence-based pedagogy that will help adolescent learners become confident, competent users of language.

## REFERENCES:

- American English. (n.d.). *Teaching with Authentic Materials*. U.S. Department of State. Retrieved from <https://americanenglish.state.gov/resources/teachers-corner-teaching-authentic-materials>
- Mouni, R. B. (2022). Implementing Project-Based Language Learning and Teaching in Classrooms: EFL Teachers’ Perspectives. *KMC Journal*, 4(2), 89–102. <https://doi.org/10.3126/kmcj.v4i2.47741>
- Mushtaq, M., Khurshid, R., & Khan, M. K. (2020). Analyzing English Language Teaching Practices in Public Middle Schools of AJK, Pakistan. *International Journal of English Language and Literature Studies*, 9(1), 18–30. <https://doi.org/10.18488/journal.23.2020.91.18.30>
- Nguyen, C., Trinh, T., Le, D., & Nguyen, K. (2021). Cooperative Learning in English Language Classrooms: Teachers’ Perceptions and Actions. *Anatolian Journal of Education*, 6(2), 89–108. <https://doi.org/10.29333/aje.2021.628a>
- Qasserras, L. (2023). Systematic Review of Communicative Language Teaching (CLT) in Language Education: A Balanced Perspective. *European Journal of Education and Pedagogy*, 4(6), 17–23. <https://doi.org/10.24018/ejedu.2023.4.6.763>
- University of Texas at Austin, The Meadows Center for Preventing Educational Risk. (2018). *10 Key Policies and Practices for Teaching English Language Learners*. Reading Rockets. Retrieved from <https://www.readingrockets.org/>

- Yang, L. M. (2025). The Journey of Optimizing Middle School English Teaching: The Role and Influence of Curriculum Evaluation. *Education and Social Work*, 1(3), 1–17. <https://doi.org/10.63313/ESW.9031>
- Sadiqzade, Z., & Alisoy, H. (2024). Level-Up Learning: Using Games to Teach English Across Student Levels. *EuroGlobal Journal of Linguistics and Language Education*, 1(3), 181-194.
- Sadiqzade, Z. (2024). The Impact of Music on Language Learning: A Harmonious Path to Mastery. *EuroGlobal Journal of Linguistics and Language Education*, 1(1), 134-140. <https://doi.org/10.69760/zma1bn56>
- Mammadova, I. (2024). The Role of Proverbs in Language Learning: A Cognitive and Cultural Perspective. *EuroGlobal Journal of Linguistics and Language Education*, 1(1), 40-45. <https://doi.org/10.69760/8qj8tr41>

# Justification of Combined Methodologies for Innovation Research in the Higher Education System

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**Abstract:** This article explores the methodological foundations of innovation research within the higher education system of Azerbaijan, substantiating the necessity of applying mixed-method approaches. Based on quantitative and qualitative data from 2020–2024, the study employed SPSS-based factor analysis, focus group interviews, and content analysis of policy documents. The findings were synthesized using the triangulation method, which helped identify the key success factors and interactive mechanisms of innovation initiatives. Results indicate that the presence of innovation infrastructure, management incentives, and financial support significantly influence the efficiency of innovation projects. The article concludes with recommendations for future research and policy strategies.

**Keywords:** *higher education, innovation, methodology, triangulation, factor analysis, Azerbaijan*

## INTRODUCTION

In the modern era, the higher education system stands out as one of the key strategic sectors in the development of society, the formation of human capital, and the realization of innovation potential. Globalization, technological advancement, and dynamic changes in the labor market necessitate that higher education institutions function not only as knowledge-transferring bodies but also as centers of scientific research and innovation. In this regard, innovation research conducted within the higher education system requires more flexible, complex, and multifaceted methodological approaches.

Mixed methodologies have become widely applied in educational sciences in recent years and play a significant role in achieving high-quality results. By combining the strengths of both qualitative and quantitative research methods, this approach enables a more comprehensive and in-depth analysis of complex educational issues. Such methodologies are particularly important in the study of areas like innovation, which are characterized by multifactorial and context-dependent variability.

In the Republic of Azerbaijan, several significant steps have been taken in recent years to modernize higher education and implement innovations. State programs, legislative acts, and the process of integration into international education standards have made it necessary to revisit and reassess the methodological foundations in this field. At the same time, the context-appropriate selection and

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justification of research methodologies are crucial for determining the effectiveness of innovation policies in higher education.

The aim of this article is to theoretically and practically analyze the justification of mixed methodologies for innovation research in the higher education system based on the case of Azerbaijan, to evaluate the effectiveness of methodological approaches, and to establish a scientific foundation for new research directions in this field. Taking into account the current situation and innovation opportunities in Azerbaijan's higher education system, the article also aims to reveal the potential for applying mixed methods.

## **LITERATURE REVIEW**

The development of innovations in the higher education system and the methodological justification of research in this field are widely explored topics in the global academic literature. The literature review covers three main directions: the role of innovation in higher education, the scientific foundations of mixed methodologies, and local and regional research conducted in the context of Azerbaijan.

### **1. The Importance of Innovation in the Higher Education System.**

At the global level, it is emphasized that higher education institutions should not be limited to being centers of instruction alone, but must also function as hubs of science, research, and innovation (Etzkowitz & Leydesdorff, 2000). The “Triple Helix” model highlights the potential of universities to create an innovative environment through interaction with the government and business sectors. Reports published by UNESCO and the OECD underline that innovation is regarded as a strategic priority in enhancing the competitiveness of higher education systems (OECD, 2019).

In the experience of the European Union countries, innovation policies in higher education, university autonomy, and the financing of scientific research are key focus areas (European Commission, 2020). Moreover, supportive mechanisms such as mentoring, startup incubators, and digital infrastructure are particularly emphasized to involve both faculty and students in innovation activities.

### **2. Application of Mixed Methodologies.**

In recent years, mixed methodologies have been widely used in educational research to enhance the effectiveness of studies. Creswell and Plano Clark (2017) emphasize the advantages of this approach, noting that the combined use of quantitative and qualitative methods allows for a more comprehensive analysis of complex socio-educational phenomena.

Exploratory and explanatory mixed models have been supported by numerous researchers for their applicability in education research (Johnson, Onwuegbuzie & Turner, 2007). The use of analytical tools such as SPSS, NVivo, and others in alignment with this methodology increases the validity and reliability of research outcomes (Teddle & Tashakkori, 2009).

### 3. Research Conducted in the Context of Azerbaijan.

In recent years, several studies have been carried out on the implementation and development of innovations in Azerbaijan's higher education system. The 2022 report by the Ministry of Education highlights the establishment of innovation centers at universities, the transition toward research universities, and the expansion of international cooperation as key objectives. Qurbanov and Aliyeva (2021) emphasized that digitalization in the teaching process strengthens the innovation potential in higher education institutions.

An analytical report by the Azerbaijan National Academy of Sciences (ANAS) in 2023 noted that, despite the existence of scientific potential in local universities, the lack of coordination and analytical depth in methodological approaches hinders the sustainability of innovative outcomes. Local researchers Abbasov and Rahimli (2020) investigated the positive impact of project-based learning practices on the formation of an innovative environment in universities.

## METHODOLOGY

This study employs a mixed methodology to analyze innovation activities within the higher education system. The methodological framework is based on the integration of quantitative and qualitative approaches, the principle of triangulation, and empirical validation. The aim of the research is to understand the dynamics of innovation development in Azerbaijan's higher education system in recent years, analyze the structural factors influencing this process, and interpret the findings based on scientific evidence.

**1. Quantitative Approach.** The objective of the quantitative phase is to identify general trends in innovation activities and to perform statistical analyses on a mathematical basis. The following tools and methods were used during this phase:

- **Statistical Analysis:** Innovation indicators were collected and analyzed for innovation projects implemented across various higher education institutions in the Republic of Azerbaijan from 2020 to 2024. These indicators include parameters such as the number and types of projects, sources of funding, and project outcomes.
- **Survey Research:** A standardized survey was conducted among a group of 200 respondents, including students and faculty members. The survey aimed to measure key aspects such as the innovation environment, infrastructure, support mechanisms, and project participation.
- **Factor Analysis:** The collected survey data were analyzed using factor analysis via **SPSS** software. This enabled the identification of key factors within respondents' answers and helped uncover relationships between various variables.

**Table 1. Number of Innovation Projects Implemented in Higher Education Institutions (2020–2024)**

Year	The number of the projects
2020	35
2021	47
2022	63
2023	72
2024	81

**Source:** State Agency for Science and Higher Education of the Republic of Azerbaijan (2024)

**Table 2. Distribution of Respondents by Role**

Roles	Number of Respondents
Students	130
Teachers	70

**Source:** Compiled by the author

The analysis revealed that although students exhibit a high tendency to participate in innovation processes, there is a need for more systematic encouragement of their involvement. In contrast, faculty members primarily highlighted resource shortages and management challenges.

**Table 3. Key Factors Determining Innovation Activity**

Factor	Mean Score (1-5)
Availability of Infrastructure	3.8
Financial Support	3.4
Management Incentives	3.9
Training and Mentorship	4.1

**Source:** SPSS analysis results, calculated by the author (2024)

The results indicate that training and mentorship are considered one of the key factors in strengthening the innovation environment in higher education. Management incentives and infrastructure development also serve as other important factors. Although financing was rated relatively lower, there has been an observed increase in initiatives from both the public and private sectors in this direction.

**2. Qualitative Approach.** The qualitative phase aimed to gain a deeper understanding of innovation activities and to identify the perspectives of decision-makers and experts. The following methods were employed in this phase:

- **Focus Group Interviews:** Semi-structured focus group interviews were conducted with vice-rectors, researchers, and heads of innovation centers at 10 higher education institutions in Baku and regional areas. Discussions during the interviews covered innovation strategies, encountered challenges, and future prospects.

- **Document Analysis:** Content analysis was performed on educational strategies, state programs, and policy documents related to higher education adopted in the Republic of Azerbaijan. This analysis provided insights into the legal and institutional framework for innovation research.

Focus groups at the 10 institutions used semi-structured questionnaires and addressed key topics such as:

- University innovation strategies;
- Interactions within the innovation ecosystem;
- The role of legislation and regulatory frameworks;
- Faculty motivation and initiative.

A key finding from the focus groups was that the lack of administrative and financial autonomy restricts innovation initiatives.

Documents analyzed included the “State Strategy for Education Development 2022–2026,” the “Law on Science and Education,” and other relevant legal documents of Azerbaijan. While these documents define the normative basis for innovation activities, weak coordination and monitoring mechanisms in practice were identified as major issues.

To integrate quantitative and qualitative data, the triangulation method was applied in the study:

- Results obtained from surveys and statistical analyses were compared with focus group data.
- The mutual influence and confirmation levels between results derived from different methods for the same indicators were assessed.

Ultimately, although training and mentorship emerged as statistically significant factors, focus groups noted that their effectiveness depends on systematic leadership support. This indicates that individual factors interact with each other and outcomes may vary depending on the context.

**3. Principle of Combination.** A distinguishing feature of the research is the integration and triangulation of quantitative and qualitative data. This principle was realized as follows:

- **Triangulation Method:** Consistencies, discrepancies, and complementarities between results from the quantitative and qualitative phases were analyzed. This method served to jointly interpret data from various sources and to enhance the reliability of findings.
- **Mutual Influence Mechanisms of Results:** Statistical trends identified in the quantitative analysis were linked with qualitative insights from focus groups, explaining how these factors impact the innovation environment in the higher education system.

Through this methodological approach, the study offers deep and complex results grounded both in empirical data and contextual analysis. Consequently, a strong scientific basis has been established for formulating more targeted policies and decisions to promote the development of innovation in higher education in Azerbaijan.

## **DISCUSSIONS**

The discussion of the research findings reveals that although innovation activity within Azerbaijan's higher education system has significantly developed in recent years, a number of structural, methodological, and institutional challenges remain for its full functional and sustainable organization. The empirical results obtained through the mixed methodology, as well as the observed parallels and divergences between quantitative and qualitative indicators, are systematically analyzed in this section.

### **1. Annual Growth and Strengthening of the Innovation Environment.**

The steady increase in the number of innovation projects implemented between 2020 and 2024 (Table 1) demonstrates the strengthening of innovation potential within the higher education system. This trend is a result of both strategically adopted state-level documents and internal university initiatives. However, an increase in the number of projects does not automatically ensure their quality and impact. During focus groups, many university representatives emphasized the lack of practical outcomes and weak commercialization mechanisms.

### **2. Analysis of Respondents and Participation Levels.**

The respondent base of 200 individuals (Table 2) showed that students are more active in innovation initiatives. This can be explained by young people's high interest in technology and advanced digital skills. Conversely, the lower participation of faculty members is attributed to lack of motivation, additional workload, and insufficient financial incentives. This finding aligns with international experience: the OECD (2019) report highlights students and young researchers as the main driving forces of innovation in higher education.

### **3. Key Factors: Infrastructure and Leadership Support.**

Factor analysis results (Table 3) indicated that training and mentorship (mean score 4.1) and management incentives (mean score 3.9) are the most influential factors on innovation activity. This aligns with both survey results and opinions voiced in focus groups. Although university leaders acknowledged the existence of training programs and incentive mechanisms, they noted these need to be improved and systematized.

At the same time, the availability of infrastructure (mean score 3.8), despite technological advancements, highlights the inequality in resource distribution (between regional and central universities), which creates disparities in the innovation environment.

### **4. Implementation of Legislation and Policy Documents.**

Document analysis revealed that education and innovation strategies adopted in Azerbaijan (e.g., the "State Strategy for Education Development 2022–2026") provide systematic support for innovation.

However, discrepancies and coordination gaps between normative acts and enforcement mechanisms have been observed in practice. The majority of focus groups identified this gap as one of the main obstacles.

### 5. Synthesis of Triangulation Results.

The triangulation principle applied within the mixed methodology framework allowed for uncovering the mechanisms of mutual influence between results. For example, the high rating of training and mentorship in survey results was repeatedly emphasized in focus groups, confirming the need for further development in this area. This synthesis demonstrates that methodological pluralism not only enriches information but also builds a reliable bridge between different analytical levels.

## CONSLUSION

The research findings indicate that innovation activity in Azerbaijan's higher education system has demonstrated increasing dynamics in recent years. The observed rise in the number of innovation projects between 2020 and 2024 (Table 1) confirms the growing interest of higher education institutions in this field. However, the quality, sustainability, and commercialization of these projects remain below the desired level.

According to the survey results (Table 2), a large majority of students and faculty members acknowledge the importance of innovation initiatives in higher education. The factor analysis results (Table 3) revealed that the primary factors strengthening innovation activities are training and mentorship (mean score 4.1), management incentives (3.9), and availability of infrastructure (3.8). This highlights the need for a comprehensive approach to organizing an innovation environment in universities.

Qualitative analysis results indicate that university leadership primarily emphasizes two directions for innovation development — strategic planning and strengthening human capital. Data from focus groups showed that most decision-makers associate innovation more with scientific research activities and give relatively less attention to promoting practical applications.

Content analysis of policy documents demonstrated that although certain steps have been taken at the state level to stimulate innovation in higher education, the implementation of these strategies is poorly coordinated and insufficiently resourced.

The joint analysis of these findings through the triangulation method reveals the necessity for comprehensive reforms at structural, cultural, and managerial levels to advance innovation activities within the higher education system.

## REFERENCE

Abbasov, R., & Rəhimli, S. (2020). Layihə əsaslı tədris modelinin ali təhsil müəssisələrində tətbiqi və innovasiya mühitinə təsiri. *Azərbaycan Təhsil Jurnalı*, (4), 35–42.

Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and conducting mixed methods research* (3rd ed.). Sage Publications.

- Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From national systems and “Mode 2” to a triple helix of university–industry–government relations. *Research Policy*, 29(2), 109–123. [https://doi.org/10.1016/S0048-7333\(99\)00055-4](https://doi.org/10.1016/S0048-7333(99)00055-4)
- European Commission. (2020). *Innovative teaching and learning in higher education in Europe*. Publications Office of the European Union. <https://data.europa.eu/doi/10.2766/58413>
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112–133. <https://doi.org/10.1177/1558689806298224>
- OECD. (2019). *Benchmarking higher education system performance*. OECD Publishing. <https://doi.org/10.1787/be5514d7-en>
- Qurbanov, E., & Əliyeva, N. (2021). Rəqəmsal texnologiyaların ali təhsildə innovativ tətbiqi: Çağırışlar və imkanlar. *Azərbaycan Elmi-Pedaqoji Jurnalı*, (3), 65–72.
- Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Sage Publications.
- Təhsil Nazirliyi. (2022). *Ali təhsildə innovasiya fəaliyyətinin təşkili və perspektivləri üzrə illik hesabat*. Azərbaycan Respublikasının Təhsil Nazirliyi. <https://edu.gov.az>
- UNESCO. (2021). *Futures of education: A new social contract for education*. UNESCO Publishing. <https://unesdoc.unesco.org/ark:/48223/pf0000379707>
- Azərbaycan Milli Elmlər Akademiyası (AMEA). (2023). *Azərbaycan universitetlərində innovasiya ekosisteminin inkişaf imkanları*. AMEA Analitik Mərkəzi.

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