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Presentation of the journal
Présentation de la revue

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This journal has been published for six years, with twenty-two issues that include a valuable number of scientific articles written by researchers from all continents of the world, such as America, Europe, Africa and Asia.

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The Journal of Afro-Asian Studies is committed to the ethics of scientific publishing and encourages researchers to adhere to them, in accordance with the international standards for authors set by the Publication Ethics Committee (COPE).

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Scientific Research in Law between Thought and Ethics

- ***Dr. Ali Latreche***
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DOI : https://doi.org/10.63939/JAAS.2025-Vol8.N26.15-37

Abstract:

Scientific research in the field of legal studies intersects with many other sciences, such as commerce, medicine, economics, media, politics, etc. These areas are governed by legal rules such as: commercial law, medical law, economic relations law, media law, political party law, electoral law, which negates the existence of any area not regulated by law. Therefore, the researcher must realize that the quality of their legal research lies in the quality of their knowledge of the subject matter that intersects with it.

Researchers must also realize that the validity of previous research results is not absolute, because the belief in their relativity is what broadens the intellectual scope of the researcher. Nor should researchers sanctify other researchers, because this harms the nature and quality of their scientific research, so they only mention what they learned from their knowledge for the sake of ethics.

The desired objectives of this research are for the researcher to realize the importance of the scientific pen when analyzing and understanding any problem in the field of legal sciences, because the pen is a tool to stimulate the mind in the field of understanding the philosophy of before and after the existence of legal rules from many angles, This is necessary for judges, regardless of their specializations, when making their interpretations, and it is necessary for researchers, regardless of their legal specialization, because There is no absolute understanding of any problem addressed by the law, because the difference lies in the angle of rational understanding. Which means no sanctification of others' thoughts? As for the methods that I relied on to clarify the problem of the mind and the pen in the field of legal philosophy are analytical and descriptive.

Keywords: *Scientific Thought; Quality; Research Methodology; Research Ethics.*

Introduction:

God created human beings, put two greatest values at their disposal and honored them with the prostration of the angels. These values are the mind and the pen. As for the mind, although scholars differed in determining its location in the human body between the mind or the heart or in common links between them, it is ultimately what distinguishes between the foolish, the heedless, and the insane between the ignorant rational person and the illiterate rational person, and between the searching rational person and the knowledgeable rational person.

The first three categories are about the absence of mind or its deficiency that the difference between the mind of the ignorant and the mind of the illiterate lies in the fact that the first is the mind that harmed its owner, while the mind of the illiterate is the one that did not harness the power of the pen. On the one hand, this is meant to show the power of mind in research, contemplation and reflection and to leave the fingerprints of that for others, on the other hand. The rational and knowledgeable person is aware of the great power that exists in the pen, so he began to discuss it and to challenge his mind in an internal dialogue for every research he undertakes. As for the rational researcher, the strength of his research varies between the degree of his certainty in the strength of the mind and the pen.

In scientific reality, we find researchers who sanctify others, while in return dwarfing the powers of their own mind and pen. So, the scientific results they reach are mostly nothing more than mere scientific rumination and copying of the sacred ideas of others. In this case, the researcher has a certain belief in the relativity of the correctness of their ideas and deliberation and an absolute belief in the correctness of the ideas of those they sanctify. Also, we may find examples of robotic researchers who do not set goals for their research to develop science and humanity and may be satisfied with achieving narrow interests for certain legal positions, and we may also find a percentage of them who follow the path of plagiarism.

When focusing on scientific research within the scope of law, we find research from the same previous projections in the quality gradation pyramid. What are the reasons behind this? Do we attribute this to personal or objective conditions that must be met before and during the preparation of scientific research?

The importance of this study lies in mentioning the intellectual standards for the quality of scientific research in the legal field from the perspective of reconsidering the power of the mind and the pen, while mentioning some of the obstacles to their activity.

The methods followed in this research are:

- Descriptive approach.
- Analytical approach.

Through the descriptive approach, I bring the image closer to the reader, especially since the research idea revolves around an intangible mental orbit, and the analytical approach is the backbone of this research, because closed or complex ideas about the importance of the scientific pen in the field of the relativity of thought can only be simplified by scientific analysis.

Finally, I followed the dual academic methodology.

- Chapter One: Personal Conditions for Preparing Legal Scientific Research
- Chapter Two: Objective Conditions for Preparing Legal Scientific Research

1. **Chapter One: Personal Conditions for Preparing Legal Scientific Research**

Through the topic of this research, I will highlight the most important general intellectual, private intellectual and ethical personal conditions requirements that must be available in the researcher for the quality of preparing legal scientific research through the following sections:

1.1 General personal intellectual conditions.

1.2 Personal intellectual conditions.

1.3 Personal ethical conditions.

1.1 General personal intellectual conditions

It is better for the researcher, who seeks to present serious scientific research with distinguished content to establish a fertile intellectual ground for it, and this fertility must be based on the actual establishment of general intellectual conditions, and through this requirement we will shed light on its most important branches, which are:

1.1.1 Freeing the researcher's mind from the prisons of others' thoughts.

1.1.2 Expanding the researcher's thinking by freeing them from their illusory conditionality.

1.1.3 Freedom from the researcher's intellectual aura towards the research topic.

1.1.1 Freeing the researcher's mind from the prisons of others' thoughts

The problem of scientific research is that dark scientific gap separating previous scientific knowledge and the scientific knowledge that we seek and the, latter needs to be highlighted intensively by the researcher. We often find that the researcher has previous scientific ideas, but they are not of the type of scientific research knowledge, but rather they are sacred ideas stemming from the sanctification of people and from the sanctification of scientists as if they were completely perfect.

These researchers may be right in part of their research, but in parallel with that they may deviate from the truth in many angles because they start from a certain belief in the correctness of the research of the person, they sanctify and the sanctified is a human being with a limited

mind who may be right sometimes, and may deviate from the truth at other times.[1]

1.1.2 Expanding the researcher's thinking by freeing them from their illusory conditionality.

In order to understand the meaning of expanding the researcher's thought by liberating himself from his illusory conditionality, one of our honorable professors once presented to us a geometric shape of nine pints[2] and asked us to connect them together with a pen, with two conditions:

1. The pen must not be lifted from the beginning of the connection to the end.

2. The number of straight drawn lines must not exceed four.

All our attempts to achieve both geometric conditions failed,[3] but the professor showed us through a simple drawing that achieving the connection of the dots with the two conditions was possible if our drawing of the straight lines extends beyond the framework of the nine unconditional points within the two previous conditions. It was necessary to free our thinking from any other conditionality other than the two obligatory conditions set to solve the problem of the complete drawing.

We simply did not succeed in reaching a geometric solution, even though we acknowledge that it is impossible, because we imprisoned our thinking within the framework of the square, as if there is a condition that imposes this on us. Al l the professor did was to free us from this condition that we restricted ourselves with. He showed us the

[1] For more scientific ideas on this topic, refer to the author: Latreche Ali Issa Abd-el-Kader, Methods of Interpretation between Separation and Cloning in Sharia and Legislation, New University Publishing House, Tlemcen, Algeria, 2019.

[2] Alal Amin, Professor of Higher Education at the University of Tlemcen, Member of the Pedagogical Training Committee, The relationship between thought and mind 2017.

[3] Most attempts were to draw 5 lines without lifting the pen.

possibility of achieving the two conditions if our drawing of the lines extends outside the geometric framework.

We often look at research problems through a closed space designed by our thinking. We do not realize through it all the research problems that form the problem in their consistency. The more the percentage of liberation of our thinking from our subjective conditions for our research thinking increases, the more the angle of our scientific vision of the problem of our research increases. That is, the percentage of success, no matter how relative, is close to being achieved when we think in an open space, in which we move freely from one angle to another.[4]

1.1.3 Freedom from the researcher's intellectual aura towards the research topic

We mean by the intellectual aura in this section5 the psychological state of the researcher towards himself and towards others, which may negatively affect the research topic. It is that psychological impression that may give the research problem more than its real size or dwarf it, giving it less importance than its size. In both cases, the researcher is wrong.

[4] One of the simplest examples we cite for this branch is the problem of not regulating and organizing parallel markets for hard currency in some Arab countries. When we look at this problem from a broad scientific space that is not restricted by subjective conditions, we will see many scientific problems that surface, such as: 1. A social problem such as unemployment, 2. An economic problem such as not expanding the state's tax base to benefit from collecting parallel activities such as this activity. 3. The problem of legal loopholes in the Monetary and Credit Law and the Banking Law, 4. The problem of not regulating banks to contain this deviant segment in illegal transactions, 5. A political problem represented by the state's lack of will to transform such a reality from an illegal framework to a legitimate framework by submitting a draft law in this regard to Parliament as a legislative authority, 6. The problem of the spread of the crime of trading counterfeit currency, 7. The problem of containing the social segment in the fields of social security and retirement in various forms.

[5] We see the aura as a natural phenomenon in the large size of the sun or moon, which appears to us as such because of the external light that magnifies the natural size in our eyes and imagination, and not reality.

This is what happens to the teacher and professor who judges the level of his students and pupils through a single initial assessment, and uses that assessment as a methodology to simplify or deepen the ideas he teaches them, only to discover in the final annual exam that he was wrong.

1.2 Personal intellectual conditions

In fact, there are many special intellectual conditions that a scientific researcher in the field of law must possess, but we will suffice with mentioning the most important of them by shedding light on them in the following sections:

1.2.1 Knowledge of the spirit of the law and its philosophy.

1.2.2 Knowledge of the philosophy of law under study.

1.2.3 Being patient and persistent.

1.2.4 Being scientifically disciplined (not just cramming).

1.2.5 Scientific objectivity.

1.2.1 Knowledge of the spirit of the law and its philosophy

Those dealing with the field of law, including judges, lawyers, jurists and researchers, often believe that it, no longer needs the field of philosophy. However this thinking is nothing but a translation of the weakness of the connection between the thought of these people and reality to the point of not realizing the hidden relationship between the various situations and the various legal rules regulating them.[6] Law did not arise from vacuum, but rather existed to address unregulated situations and their organization requires intellectual creativity that

[6] Here we mean all types: social, economic, cultural, political, etc., and all of these situations are regulated by human thought through transforming the various relationships arising from them into general and abstract legal rules in order to achieve organization and justice.

understands and analyzes the philosophy of this situation in its natural state before formulating the legal rules regulating it.[7]

Formulating such rules would be merely sterile formulations at times and naive at many times, and the result would be bad laws that may need to be amended. Therefore, the researcher in the field of law must be equipped with the .science of the philosophy of law before embarking on research into the law itself The legislator needs this to formulate a correct law that expresses reality, and the regulatory authority needs this to formulate correct regulations that reflect the organization of reality. The judge needs this greatly when dealing with legal loopholes, at which point he needs to exert efforts before issuing his judicial sentences.

Those who most need to understand this connection between the philosophy of law and the law are the jurists and researchers to produce valuable scientific research and theories, where we find the legislator and the regulator and judges feed their thoughts from sources of jurisprudence and research before embarking on their duties, each according to his constitutional powers.

1.2.2 Knowledge of the philosophy of law under study

Andrei Marmor's[8] philosophical legal thought is based on the fact that the nature of law is a realistic matter, but the legal scope is broader to include psychological and spiritual interpretations, even what appears realistic may have real causes from several essential angles[9], on this

[7] For example, free economic zones existed as a reality in the field of international investments before they were codified, and their correct codification requires first understanding the philosophy of establishing such zones in economic reality. On this basis, the codification of these zones by some countries was bad due to a poor understanding of their philosophy.

[8] Andrei Marmor's, Philosophy of Law, Series Princeton foundations of contemporary philosophy, Princeton, New Jersey 08540, United States, 2014 p 85

[9] Immanuel Kant, trans. W. Hastie The Philosophy of Law: An Exposition of the Fundamental Principles of Jurisprudence as the Science of Right, (Edinburgh: Clark, 1887).

basis, societies differ in their view of the most appropriate legal rules to apply.

In some Islamic societies, we find that family law has legal rules derived from the Holy Qur'an, Where spirituality blends with realism; we may not find this in Islamic countries with a secular orientation, where the spiritual aspect is almost absent, In parallel, we may find some legal rules of non-Muslim peoples that have combined the protective and spiritual approaches. On this basis, there are no limits to the philosophy of law[10], which is reflected in the unlimitedness of the legal rules derived from the same philosophy; therefore, the researcher in legal thought must realize this relativity.

In order for a scientific researcher in a particular field of law to produce valuable scientific research, he must first link this law to the roots of its issuance and then to the roots of the reality connected to it.

As for the roots of its issuance, we mean all the preparatory work that precedes the issuance of the law under discussion in the official journal, whether [11] the latter is at the level of the legislative authority or at the level of the committees or at the,[12] monitoring the extent of the legitimacy and constitutionality of its rules level of the ministry concerned with the law and the ministerial council if the law in question is originally a draft law. The follow-up of this law extends even to the

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https://oll.libertyfund.org/titles/hastie-the-philosophy-of-law accessed 11/04/2024 11.20

[10] Kenneth Einar Himma, Philosophy of Law, https://iep.utm.edu/law-phil/ accessed 12/04/2024 10h.30

[11] For example: Is this law originally a draft or a proposal? Then review the study and details of the rules of the draft law or the proposed law by the specialized committee in Parliament, then the opinion of the rest of the committees informed about the constitutionality of its rules, whether their opinion is advisory or mandatory, in addition to reviewing its discussion and the percentage of votes on it.

[12] For example, in the Algerian legal system, ordinary laws are passed to the State Council to examine their legitimacy while organic laws are passed in this regard to the State Council, and the difference between them is clear as the first has an advisory opinion, while the second has a binding opinion.

level of the regulatory authority, if regulations are issued regarding it as subsidiary legislation.

As for the roots of its connection to reality, we mean by it the realistic philosophy that was transformed into a legal philosophy and then into a law. The researcher must connect with reality through analysis, statistics description, and history and Criticism, in order to reach convictions about the extent to which this law expresses this reality. These convictions are of a quality commensurate with the quality of the scientific researcher's thought.

1.2.3 Being patient and persistent

Patience has a great value in the Islamic faith, and God Almighty revealed in the Holy Quran many noble verses that immortalize the merits of this value, by which he raised the value of Man in this world and the hereafter. It was also immortalized by the hadiths of the Messenger Muhammad, may God bless him and grant him peace and the actions of the Companions, may God be pleased with them, and the followers. Among these we find the scholars and jurists through whom God raised the edifice of the Islamic nation to reach the whole universe.

The patience of the scholar and the researcher who is struggling with research, regardless of his field of research, has to endure a lot of unfulfilled needs of the soul in all types of these material and moral needs, not to mention patience with the harm of others in the research journey sometimes. Obtaining information is not always easy, and those who discourage, scientific determination and ambitions are present at the doors of scientific research spreading their negative energies. Therefore, perseverance in proceeding on this difficult path is not an easy matter, but reaping its fruits will remove the evil of all those difficulties[13]

[13] Its fruits are reaped primarily at the level of the researcher himself, and then secondarily at the level of others from the category to which the research is directed.

1.2.4 Being scientifically disciplined

In fact, discipline is a practical behavior that is more apparent than hidden. It is a transformation of behavior over time from the individual's internal psychological belief to the apparent public. The latter appears at the level of the individual's external behavior in his various external relationships with others and with all living and non-living elements in the environment in which he lives. As for discipline at the level of scientific research in the field of legal studies, it appears first from the angle of moving away from scientific padding, and it also appears through the ethics of dealing with others.

It is better for the researcher to stay away from scientific padding that does not fill or enrich the scientific poverty. Research is often characterized in this form when it is linked to conditions for obtaining scientific certificates and climbing the ladder of scientific degrees, so the goal of research is not research but rather reaching scientific facts between what was known and what we want to achieve. Therefore, we may find great scientific benefit in research whose pages can be counted on the fingers of one hand, which we do not find in large-sized research.

The second angle appears in the extent of the researcher's discipline in his ethical dealings with others from whom he obtains his need for knowledge, whether they are professors or natural representatives of public or private moral persons, national or international. This discipline appears primarily in the extreme respect for the times of their interviews. He does not delay appointments, and if they are late, he is patient and makes a lot of excuses for them. He also lowers the wing of humility to them when asking questions, listening to them, and engaging in dialogue with them in addition to the correct scientific reading of their body language[14].

[14] One should not insist on asking questions where they are not necessary, especially if the researcher notices a reservation on the part of the other person being interviewed regarding a certain question, or notices technical evasion on their part, as is scientifically translated by frowning and states of fatigue that may appear in others, so the course of the conversation is changed or a request is made to suffice with this amount until a later date if the other person is kind enough to do so. Also, kind, well-mannered, and humble words create a space of cooperation from the other person towards the researcher.

1.2.5 Scientific objectivity

It is very difficult to completely move away from subjectivity in scientific and human research and to be absolutely objective, if not impossible. What happens in some scientific research is a quasi-sanctification of the researcher's self, and this is where the danger lies. The greater the importance of subjectivity in scientific research, the more its scientific value is diminished. The value of scientific research is also diminished when the researcher sanctifies other researchers.

His thought is then imprisoned in the prison of their thought, and his thoughts are nothing more than blind imitation. In fact, the subject of subjectivity and objectivity has formed a major scientific attraction in philosophy and in various human and social sciences. However, what concerns us in all of this is the proportion of each of them in the researcher's scientific research. The scientific value of the research is equal to the proportion of objectivity in it, and naturally, this value decreases to the same extent as the value of the researcher's subjectivity in his research or of the others in his research increases due to sanctification.

1.3 Personal Ethical Conditions

The pens of researchers have also produced a great abundance of personal ethical conditions that a scientific researcher must possess in order to advance his research to the ranks of scientific research. We will shed light on five of the most important branches of these conditions:

1.3.1 Be scientifically honest in direct and complete quotation.
1.3.2 Scientific integrity in partial direct quotation.
1.3.3 Scientific integrity in indirect quotation. 1.3.4 Do not underestimate the research of others.
1.3.5 Not to spread ideas that undermines morals and values.

1.3.1 Be scientifically honest in direct and complete quotation

Often, the researcher quotes from others to achieve some goals, the most important of which are conducting comparative studies between the researcher’s thought and the thought of other researchers and thinkers. This helps the researcher to simplify some concepts, enrich the research, conduct comparative studies between thinkers and researchers

on the research topic that the researcher to address creating integration between the researcher's viewpoint and the viewpoint of other researchers, supporting the researcher's opinions, or refuting the opinions of others that contradict the researcher's opinion.

In all these cases, the researcher must adhere to academic integrity from the following perspectives:

- Correct and complete transmission of the words of others, as any word that may be omitted intentionally or unintentionally may distort the original meaning.
- Distinguishing the quoted words of others from the researcher's words by, indicating this explicitly or by placing these words between quotation marks and indicating author's name in the margin.
- The correct and accurate transfer of all information from the source or reference from which it was quoted, and the latter concerns four people: the researcher himself in terms of his academic integrity,
- then the reader to facilitate his path in referring to the sources and references from which the original researcher quoted, and it also concerns the arbitrator if this research is submitted for arbitration, and finally, it concerns the members of the discussion committee and the scientific committees and scientific councils of all kinds in the event that this research is submitted in order to obtain a scientific degree or for scientific habilitation.

1.3.2 Scientific integrity in partial direct quotation

The researcher may quote from others partially, meaning that he purifies the parts of the researcher's words that he needs, and for this process he uses his scientific reasoning with great scientific honesty, and under the following conditions:

- Partially quoted words are indicated by inverted commas "……"
- Indicate the excerpted part of the quoted speech with at least three consecutive dots …"
- The purpose of quotation must be scientifically legitimate, meaning that the researcher does not aim to tarnish the reputation of the quoted person, or to defend himself by

presenting false ideas about others, or to support his view and ideas based on the ideas of others after changing their meaning by quoting parts of them.

1.3.3 Scientific integrity in indirect quotation

Indirect quotation is one of the most important quotations that show the researcher's instinct and chivalry in his loyalty to scientific integrity. It is often difficult to prove the scientific theft of others' ideas when they are formulated in the researcher's language, especially when the quoted ideas are indirectly quoted from a foreign language, or through various electronic sources and references, or through various scientific dialogues and meetings attended by the researcher, such as study days, national and international scientific conferences, and various forms of scientific meetings.

1.3.4 Do not underestimate the research of others

When talking about not belittling or diminishing the importance of others' research, of course we are talking about the relationship of the scientific researcher with the environment with which he will communicate to obtain his need for scientific provisions related to his research. This communication may occur with others directly as natural or legal persons, or may occur with their scientific heritage, in its various forms. The researcher must not exclude anyone when listening dialogue or conversing. Also, he must not exclude any research from scientific review out of contempt or belittlement, as this is not part of the ethics of scientific research. There searcher may find in what his eyes belittled a credible scientific resource that he may not find in other research.[15] How many theories and research have been proven to be correct at one time and wrong at other times?

[15] Not all of the research that is pointed out is correct. Some of it may contain intentional and unintentional lies and errors. Therefore, the researcher must investigate what he reads as much as possible, and make comparisons with other research coming from parallel sources and tributaries

1.3.5 Not to spread ideas that undermines morals and values

Morality is not an end in itself[16], but a means to achieve nobler ends, so the researcher's publication of ideas that undermine morals and social and human values is considered a personal ethical condition, despite the margin of freedom that the researcher enjoys. We are not pointing this out of nowhere, as there are many legal studies that call for this demolition, and the reasons for undertaking them are numerous, including:

- Desire of appearance on the scientific and the social scenes, especially when his ideas raise an unfounded scientific debate.
- The desire to triumph for oneself, even if the researcher is certain that his ideas are wrong and pose a threat to humanity, society, or religion.
- The desire to support the political, economic and social ideas of others out of unjustified admiration.
- The desire to support the political, economic and social ideas of others in order to achieve personal interests.
- Spreading foreign Western ideas out of influence, without taking into account the extent to which they undermine religious and human values in society.[17]

2. Chapter Two: Objective Conditions for Preparing Legal Scientific Research

Scientific research has a form and content, and no matter how great the relationship between them, the content has the lion's share in the

[16] Philosophers who are pioneers of the utilitarian school view ethics on the basis that they achieve public benefit, as they achieve happiness and freedom and reduce social problems... etc. For more information about the equation of utilitarianism and ethics, see: William Haines, Consequentialism, The University of Hong Kong China, https://iep.utm.edu/consequentialism-utilitarianism/ accessed 13/01/2025 12.40

[17] Such research is not limited to individual research, but we also find it in joint research.

relationship that connects the researcher and the reader. Therefore, our focus on it is greater in terms of the degree of shedding light on its content in three sections:

2.1 Types of legal scientific research
2.2 Mastering the science of interpretive methods
2.3 Mastering the science of applied curricula

2.1 Types of legal scientific research

I have highlighted this section in terms of the importance expected from the research itself in serving society in general or the environment it targets in particular, and based on this importance we will distinguish between three types of scientific research:

2.1.1 Sterile legal scientific research
2.1.2 Legal scientific research based on discovering and filling legal loopholes
2.1.3 Legal scientific research based on the treatment of reality
2.1.4 Scientific research based on filling legal gaps and addressing reality

2.1.1 Sterile legal scientific research

These are superficial formal legal researches, as academics and research professors call them, piled up in universities and educational institutions, and do not take the researcher a long time to complete.[18] Whatever the legal subject of the research conducted in private or public, domestic or international, the researcher's goal in preparing it is not to search for a solution to the problem raised in the introduction.[19] Researcher's goal is to fulfill mandatory formal procedures required

[18] Mostly, these researches are prepared by students at different stages of their education, and this does not exclude .even professors sometimes

[19] The problem is the point of emptiness that exists between the researcher's previous knowledge and the subsequent knowledge that they aspire to. The greater the light beam that the researcher directs, the greater the value of the scientific research that he accomplishes.

by a certain party, such as his professor of directed work, or as a procedural condition for passing a stage of education to obtain a certificate, and sometimes such researches are scientific conditions for passing academic degrees.[20]

These researches are mostly sterile, a waste of time and a mockery of science, a feeling that does not only affect the reader, but also deceives the researcher himself.

2.1.2 Legal scientific research based on discovering and filling legal loopholes

Many academic researchers conduct their scientific research in the legal field through scientific analysis of various legal rules related to the subject of their research, whether international or national, basic or organic, regular or subsidiary legislation.[21]

By this analysis, we do not mean using the analytical method only, but all methods can be used according to the research need, and according to the research division plan.[22] Through this research, the researcher often reveals legal loopholes and sometimes points to the solutions that appear to him to close these loopholes.[23] This research is often judged

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" The teacher's staff and the employer's office will place the object of the project"

A. Lamoureux, research and methodology en sciences humaines, Montréal, Éditions Études vivantes.1995.p 110

[20] The latter is published in national and international peer-reviewed scientific journals, where many questions are raised about the credibility of arbitration at times.

[21] By subsidiary legislation we mean regulations, which are all legal rules issued by the regulatory authority, such as: presidential decrees issued by the President of the Republic, executive decrees issued by the Prime Minister, and ministerial decisions issued by various ministers, whether they are individual, according to the type and regional specialization of each ministerial sector, or collective.

[22] Whether these approaches are interpretive approaches such as: legislative interpretation, regulatory interpretation, judicial interpretation, jurisprudential interpretation, or applied approaches such as: the analytical approach, the historical approach, the descriptive approach, the statistical approach, the comparative approach.

[23] These legal loopholes may be due to one of the following reasons:

by its seriousness, and is only criticized for its lack of connection to the incident targeted by the research, as the researcher is satisfied with revealing the legal loopholes in general and pointing to solutions to close them sometimes.[24]

2.1.3 Legal scientific research based on the treatment of reality

Some of the incidents in the environment in which we live are only discussed by the pens of the press, and people rarely gather to discuss and debate them, despite the fact that they constitute an obsession for everyone.[25]

When scientific research connects with such fields, it will connect with reality to convey the correct image of the subject being treated and to the various scientific problems it raises, for the simple and complex problems that raise scientific issues. This research develops scientific research and helps different people with different authorities to deal with reality more scientifically.

- Legal rules that the legislator did not mention or refer to at all.
- There are legal rules that exist but are incomplete, as they do not contain all the elements that should be contained.
- Legal rules exist but are vague, and they need to be removed from the ambiguity and confusion.
- Legal rules exist but are generalized, they need to be detailed.
- Legal rules that are contradictory in themselves or contradict other legal rules, it is a case that requires removing the contradiction. Sometimes even legal rules that appear to be clear may need to be highlighted.

[24] We mean by it all types of incidents: social, political, economic, cultural, military, judicial... etc.

[25] Examples of these include: the black market in dealing with hard currency, the black market in the field of trade, black professions parallel to the original profession, licensing the sale of alcoholic beverages in a conservative society, destroying agricultural crops to maintain their high price in a society whose religion is Islam, selling consciences in parliamentary elections for the upper house, the impact of verbal violence between the president and the subordinate on the performance of the institution... etc. in the world of economics, politics, culture, sports, society and many others.

2.1.4 Scientific research based on filling legal gaps and addressing reality

In the second part of this section, we have highlighted scientific research based on discovering and filling legal loopholes. We have also addressed the subject of legal scientific research based on treating reality in the third part of the section, and we have concluded that both are important in the added value of scientific research conducted by a researcher specializing in the field of law to reach the level of scientific quality.[26]However, focusing on one without the other reduces the scientific value of such research. So, it is not distinct and unique from the rest of the human and social specializations, nor fruitful in its results except by combining the two qualities together, i.e. the realistic study based on discovering and filling legal loopholes.

2.2 Mastering the science of interpretive methods

The researcher must realize the importance of the jurisprudential interpretation of jurists[27] in the field of law in the event that the legal rule is not explicitly stated, or if the explicitly stated rule is incomplete, ambiguous, or contradictory to the rules of other texts. It's often the source on which the diligent judge bases his judicial interpretations, and from which the legislative and regulatory authorities deduce the entirety of the legislative and regulatory interpretations issued in the official journal.

But the researcher in legal studies is more required to preserve scientific reading accompanied by analytical, descriptive, comparative, inductive and deductive scribbles. The methods of interpretation are the backbone of analyzing the research problem of legal loopholes into research problems and from there the researcher can develop the appropriate methodological plan to fill the legal loopholes, so his

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[26] Syria Desh, Quality of Scientific Research, Towards Building a Strategy for Transforming Students into Researchers, Complete Proceedings of the Scientific Conference of Beni Suef University, Egypt, 8/11/2016

https://www.bsu.edu.eg/Backend/Uploads/PDF/Conference/001 accessed 14/01/2025 10.30

[27] Ali.Latreche, Legal methodology in drafting and commenting on laws and judicial decisions, Center for Arab Studies, Egypt, 2020, p.p 58-72

analysis is not merely a superficial formal analysis, and his interpretive induction is not merely a superficial induction.[28]

The researcher must also be aware of the procedures and results of each interpretation in the field of filling gaps and in terms of the mechanisms and time of application. The procedures and results of legislative interpretation differ from regulatory interpretation and also differ from judicial interpretation [29] and administrative interpretation.[30] As for the jurisprudential interpretation or the researcher's interpretation, it does not have procedures that limit its freedom, and therefore we often find it to be of higher quality.

2.3 Mastering the science of applied curricula.

Most students, researchers and professionals specializing in law are aware of ,the types of research methods in legal sciences, and they list them: analytical descriptive, historical, statistical, inductive, deductive, survey and comparative . Most of them use the latter to solve various problems, issues and research problems that they encounter in exams, research and pleadings...etc. Yet, few of them are proficient in using these methods.[31]

Whenever someone uses the comparative approach, he says, "I compared so-and-so," and he may not realize that what he did was an approximation and not a comparison. He may also not realize the

[28] Research problem.

[29] A judge cannot exercise his discretion through judicial interpretations unless he is trying to resolve a judicial dispute, because if he exerts his discretion through an interpretation without any judicial dispute, his work becomes a type of research or jurisprudential interpretation.

[30] One of the stages of resolving labor disputes in administrative institutions between workers' representatives and management representatives is for the custodial authority of the same administration to present the dispute to the public service administration if the latter is related to existing differences regarding the interpretation of legislative or regulatory legal rules. This type of interpretation is called administrative interpretation.

[31] Such as consultants, lawyers, judicial officers and notaries.

impact of reality on the essence of the legal rule. For example, someone who lacks a deep understanding of economic relations in their economic depth will not be able to understand and compare the legal rule in the law of economic relations well.

The quality of understanding and analysis does, not always lie in keeping up with others' understanding and analysis. For example the researcher may reach the results of his research into the Chinese or British consumer law that its rules are of excellent quality, but despite that, they are not suitable for Algerian society, due to the profound differences in the social and cultural dimensions between Algerians, on the one hand, and Chinese and British on the other hand.[32]

Through the inductive approach adopted by the researcher in legal sciences, the researcher must realize that the minister's induction of reality to formulate a legal draft law regulating this reality differs from the induction of the same law if it were in the form of a draft law from members of parliament. The difference also extends to the induction of the same minister of the same reality when he issues regulatory legal rules in the form of a ministerial decision in the official journal.

The same minister knows that his draft law will be passed to parliament for study and then voting, and members of parliament may ask questions in person to the minister, and they may scrutinize some details and request their amendment in their capacity as members of the legislative authority. The minister realizes all these steps and procedures when inducting the disorganized reality for which he is responsible in order to organize it according to explanatory and mandatory legal rules for the draft law. However, in return, the margin of freedom in induction is wide with regard to the same minister issuing legal rules in the form of a ministerial decision in the official journal and the margin of freedom has been expanded due to the absence of the same supervisory procedures of the legislative authority on the

[32] For more information on the criteria for evaluating the quality of scientific research, see the article: Abdullah Nour El-Din, Laouj Zawawi, Criteria for evaluating the quality of scientific research from the perspective of the academic. community: an applied study, Journal of Economic Sciences, Issue 1, Volume 18, pp. 1-22

regulations, as they are subsidiary legislation that are not passed by parliament.

If we keep the same previous example in adopting the inductive method, we will find that the judge has the widest freedom in relying on it, as he has complete freedom to induct reality when he encounters disputes that require judicial interpretations.[33] As for the jurist and researcher in legal studies, the scope of freedom for him is almost absolute. If he does not understand the depth of the inductive method before using it, his inductions will not be of quality, because reality is a living image of a phenomenon.

The quality of induction lies in the quality of reading this image and then transforming the results of this visual intellectual reading into creativity in the form of a harmony of words and sentences that are precise for a legal research or study. How many times do we find no link between the image and its induction? This is what we, sometimes, find in superficial or sterile research and in judicial rulings as well.

Conclusion:

The content of the problematic question raised in the introduction was about the paradoxes between scientific research in the scope of law in terms of its quality, and the results of the research were that these paradoxes are intellectual and moral.

The general personal intellectual conditions are represented in liberating the researcher's thought from the prisons of the thought of others, expanding the researcher's thought by liberating himself from his imaginary conditionality and from the researcher's intellectual aura towards the research topic.

[33] The wording of the ruling for the same judicial interpretation based on induction differs from one court to another due to the difference in the inductive judge. We may also find that the same judge issued a different ruling in a judicial interpretation for the same dispute due to new convictions with a new inductive view of greater depth.

The special intellectual conditions are mainly:

- Knowledge of the spirit of the law and its philosophy.
- Knowledge of the philosophy of law that is the subject of research.
- Patience and perseverance.
- Scientific discipline and scientific objectivity.

Personal ethical conditions lie in maintaining scientific integrity in direct, partial or indirect quotation. Researchers should not underestimate the research of others; disseminate ideas to demolish ethics and values through the desire of appearing on scientific and social scenes, or to support the political, economic and social ideas of unwarranted admiration or for special interests.

The interpretive approaches in legal sciences are: legislative interpretation, regulatory interpretation, judicial interpretation, administrative interpretation and jurisprudential interpretation. As for the applied approaches, they are: analytical, descriptive, historical, comparative, inductive and deductive, statistical and survey The use of the latter is simple and is within the reach of most researchers, but the quality of its mastery is a goal that only a few have achieved due to its relationship to the quality of the researcher's thought and his certainty in unleashing the energy of his mind through the power of using reading coupled with the frequent and quality use of the pen.

The Budget Deficit And Its Impact On The Stability Of The Iraqi Dinar Exchange Rate And The Balance Of Payments: Iraq As A Case Study (2004-2021)

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Abstract: "Because of the importance of balancing the public budget and its role in achieving financial and economic balance, many governments have concentrated on the government budget deficit and the increasing amount of public expenditures over public " revenues. If the international economy "witnessed economic developments and changes and the succession of economic crises that afflicted the capitalist economy, which called for finding appropriate solutions to get the economy out of the crises, then the Keynesian school came with assumptions that differ from those of the schools that preceded it and their acceptance of the increase in public expenditures, which means acceptance of the occurrence of the financial deficit in order to Activating effective demand and then activating the economy. It was believed that the deficit is not necessarily a problem if it can be used to move economic variables, including the foreign exchange rate, which shows the strength of the local currency of a country against other currencies, and the possibility of benefiting from it in dealing with trade abroad. Under the exchange rate, the local currency "is converted into a currency or group of foreign currencies Another is that it is a tool that connects the value of goods and assets in the local markets to their counterparts in the foreign markets; these transactions require knowledge of the exchange rate of foreign currency against the local (national) currency, which reveals the degree of stability of the national economy through the exchange rate. This is in addition to other economic variables, such as the budget of the government, seperti Iraq, yang mempunyai deficit dalam kerajaannya kerana peningkatan dalam perbelanjaan awam diimbangi oleh penurunan dalam hasil jualan minyak di "pasaran global.

Introduction Countries are linked to economic transactions among themselves and this link requires the transfer of financial resources, individuals, investments and capital between countries. This transformation entails obligations and rights of each country towards the other. These countries record all economic operations that take place between them in a special ledger called the balance of payments, for this there is Several concepts of the balance of payments, as some consider it to be an arithmetic table that shows the country's rights and obligations towards the outside world during a certain period. It is also known as the bookkeeping system for recording all receipts and payments that have a direct impact on the flow of funds between the country (the government sector and the private sector) and foreign countries.

Research problem: Because of the increase in state interference in economic life, which led to an increase in public spending, and the failure of public revenues to keep pace with public spending, many countries fell into a large financial deficit. This problem has become one of the most important.

Research hypothesis: The research is based on the hypothesis that the exchange rate and balance of payments are affected by the budget deficit.

research aims:

1- A statement of the impact of the budget deficit on both the exchange rate and the balance of payments in Iraq .

2- Clarify the features of the Iraqi economy and the most important economic effects of the variables (exchange rate, balance of payments, budget deficit).

Research Methodology: We have relied in this research on the descriptive approach and the analytical approach, as we tracked the budget deficit and the impact of this deficit on the exchange rate and the balance of payments .

Research Structure: The research was divided into two parts, the first part was the theoretical and conceptual framework, while the second part dealt with the impact of the budget deficit on the variables of the study .

1- Theoretical and structural framework of the budget deficit and the exchange rate

1-1- Definition of the general budget deficit: The budget deficit is defined as the increase in public spending and the lack of public revenues, and it is attached to public revenues due to their weakness and inability to cover public expenditures.(1)

The budget deficit is also defined as the increase in the state's public expenditures over the state's general revenues in the state's general budget so that public revenues cannot keep pace with the increase in public expenditures. Expenditures are often what determine the size and nature of the deficit, as expenditures often tend to increase in various countries of the world . The reason for this increase in expenditures is the development of public needs and the growth of state jobs.

1-2- Types of the general budget deficit: There are many forms of the state's general budget deficit and its forms have varied, but it can be classified as follows :

1-2-1- Temporary deficit: This deficit occurs during the fiscal year due to the discrepancy between public revenues and public expenditures, or due to an error in estimating some elements of the public budget. be in the next budget .

1-2-2- Estimated deficit: It is called the planned or intended deficit, and this type of deficit is allowed by the state, but within certain limits and conditions . The state is increasing these expenditures.

1-2-3- Structural deficit: This type of deficit is not due to the business cycle as much as it is primarily due to the structure and components of the budget itself, which ultimately leads to an increase in the actual deficit over the estimated deficit in the budget, due to the increase in the volume of public expenditures over the budget. Revenues, and the government's failure to rationalize expenditures public, and its inability

to develop financial resources by increasing the tax base and eliminating tax evasion rates (2)

The concept of structural deficit is related to the existence of an imbalance in the economy, which is reflected in an increase in public spending at a rate that exceeds the financial capacity of the economy, and accordingly this deficit occurs because the revenues do not cover public expenditures, and it takes place for a long time and continuously

2-1-4- Current Deficit: The current deficit is defined as the difference between current spending and current revenues. In this case, this means that the government uses part of the private sector savings represented by taxes to meet the requirements of current spending. This concept of deficit is narrow because it does not include spending. Public and public revenue, however, is limited only to the expenditures and revenues of the central government represented by its purchases of goods and services .(3)

2-1-5- Comprehensive deficit (unified public sector deficit): According to this type, the fiscal deficit measures the negative difference between total government expenditures, including interest payments but not including government debt payments, and government revenues that include tax and non-tax revenues but not include On income from borrowing, and in this regard, the fiscal deficit reflects the gap that should be covered by government borrowing, including direct borrowing from the central bank .

2-1-6- Basic deficit or non-interest deficit and interest deficit: This concept excludes an important factor of the deficit, which is the interest payments on debts. The proponents of this analysis recommend that the balance in the end must be positive in order to cover even part of the interests of the current debt. It is clear that the interest deficit includes the interest of the public debt .(4)

2-1-7- Operational deficit: This concept explains the deficit in conditions of inflation, and in light of this, the deficit is represented in

the government's borrowing requirements, minus the part that was paid of interest to correct inflation, through the Monetary Adjustment factor where the interest rate paid to creditors includes a part of the Money to compensate them for the losses incurred by their debts as a result of high prices, and this seems clear in the case of countries that move interest rates upwards, according to inflation rates .

The economist Polak proposes a formula for the monetary corrector for the deficit in the event of inflation on the basis of the following: (5)

$$\frac{Mc}{GDP} = \frac{di}{1+i}$$

Where MC is the monetary corrector, that is, that amount of money that is paid to maintain the real value of the domestic public debt, and it is equal in any period to the inflation rate multiplied by the nominal value of the debt. As for GDP, it is the gross domestic product. Regardless of the change that occurs in the real volume of GDP, the nominal value of GDP will increase by +1. The inflation rate is equal to the ratio of domestic debt to GDP and (i) is the inflation rate.

3- The Exchange Rate Idea: Exchange rates affect economic stability, which makes them important in multilateral international economic relations. The exchange rate is the price of one currency for another or the ratio of exchange between two currencies. Trade, exchange, investment, and capital transfer antara negara menyebabkan exchange rates berlaku, yang menghasilkan an international currency instead of the local currency. Foreign exchange or external financing is the name of this process. The foreign exchange rate represents the price of one currency.

A person can know the price of a local commodity in foreign currency and vice versa because the exchange rate consists of two currencies: one represents a commodity, and the other represents cash to buy it. Dalam kaedah pertama, komoditi digunakan sebagai mata wang asing dan satu unitnya diukur dalam mata wang tempatan. Kaedah ini tidak termasuk kaedah Sebago secara langsung.

Because exchange rates connect the local economy to the international economy, they are seen as a mirror of the state's commercial center with the world outside through the relationships between exports and imports. Imports and exports stimulate the global currency demand, while exports stimulate domestic currency supply (6).

3 - The foundations of the relationship between the budget deficit and the exchange rate and its impact on the Iraqi economy

3-1-The nature of the Iraqi economy: The gross domestic product is one of the important indicators that reflects the country's ability to cope with economic fluctuations, and it is one of the main means that expresses the growth and development of that country as well. However, the gross domestic product in Iraq was characterized by fluctuation and lack of stability. The weakness of its production sector, in addition to the exceptional circumstances that the Iraqi economy experienced The exported quantities of oil, while the output decreased (2015) due to the security situation and the decline in oil prices as well. As for the year 2020, the gross domestic product witnessed a decrease that reached (189398.7) million dinars as a result of the spread of the virus (covid-19), as shown in Table (1).

Table (1): GDP at constant prices for the period (2004-2020)

year	GDP pada harga tetap (million dinars)	growth rate
2004	101845.3	---
2005	103551.4	1.67
2006	109389.9	5.63
2007	111455.8	1.88
2008	120626.5	8.22
2009	124702.1	3.37
2010	132687	6.40
2011	142700.2	7.54
2012	162587.5	13.93
2013	174990.2	7.62
2014	178951.4	2.26
2015	183616.3	2.60
2016	208932.1	13.78
2017	201059.4	-3.76

2018	202776.3	0.85
2019	211789.8	4.44
2020	189398.7	10.57-

Source: The first column is the statistics of the Central Bank, the Central Statistical Organization for separate years, the second column is from the researcher's work

3-2 The state's general budget's negative balance, which results from expenditures exceeding revenues, is known as the budget deficit. In this instance, the government is obliged to finance this deficit by borrowing, which results in a rise in debt. financed by public revenues, whether through local or foreign public debt or through new cash issuance. Dalam erti kata lain, ia menunjukkan penurunan dalam permintaan untuk mata Wang domestic bersanding mata wing asing lain, serta penurunan dalam kadar pertukarannya. Ini menunjukkan bahawa kemerosotan dalam perbelanjaan telah memberi kesan negatif kepada kadar pertukaran mata wang domestics berbanding mata wang asing lain.[(7)]

The relationship of the budget deficit to the balance of payments in general and the current account in particular is a reciprocal relationship and this is evident in the Iraqi economy as it is a rentier economy that depends on the commodity of crude oil and what price fluctuations left it Oil on economic stability and the deficit it caused due to the second Gulf War and the resulting almost total interruption of oil exports. The budget deficit doubled. After 2003, because of the unstable security conditions and fluctuations in crude oil prices, there was instability in the trade balance and the general budget, with the emergence of a surplus In the trade balance for several reasons, including the rise in crude oil prices and the increase in oil exports, despite the significant increase in imports, oil exports covered that increase, as the size of the budget surplus as a result of the increase in exports amounted to (25231423) million dinars in (2011) The surplus continues to rise, which confirms the importance of the trade balance in stabilizing the general budget and the emergence of deficits and surpluses As can be seen in Table (2).

Table (2) Revenues, expenditures, budget surplus and deficit for the period (2004-2020)

year	General revenues of million dinars	Publicexpen ditures of one million dinars	Surplus and deficit
2004	32988850	31521427	1467423
2005	40435740	30831142	9604598
2006	49055545	37494608	11560937
2007	54964848	39307836	15657012
2008	80641041	67277181	13363860
2009	55243525	55589062	345537-
2010	70178223	70134201	44022
2011	103989088	78757665	25231423
2012	119817223	105139574	14677649
2013	113840075	119127555	5.287480-
2014	105386623	83556226	21830397
2015	66470252	70397515	3927263-
2016	54409270	67067437	12658167
2017	77335955	75490115	1845840
2018	106569834	80873189	25696645
2019	107566993	111723522	4156529-
2020	67425220	146626788	79201201

Source: The first column is the statistics of the Central Bank, the Central Statistical Organization for separate years, the second column is from the researcher's work

3-3- The relationship between the financial deficit and the balance of payments: the demand for foreign currency is the citizens' supply of local currency, which is the result of various economic transactions that appear on the debit side of the balance of payments. Consequently, the balance in the free exchange market is linked to the balance in the balance of payments, also known as the balance market, kerana adjustments in exchange rates cause the value of external goods and services to decrease, giving them a competitive advantage. Imports and export are encouraged, and the local currency will fall until there is no deficit, and vice versa in the case of a surplus. (8)

By tracking commercial activity, Iraq's foreign trade remained at this state until (2003) after the United Nations Security Council adopted Resolution No. (1483), which lifted all trade sanctions against Iraq and stipulated the termination of the Oil-for-Food Program Agreement. Since crude oil is The main product of Iraq’s exports, the economic future of the state depends on its ability to benefit from its huge oil

resources, as oil exports constituted about (99%) of the total exports, and the oil sector contributes more than (50%) to the gross domestic product, as well as constitutes (98%)) of the state's public revenues, and as such, Iraq became a rentier state with distinction. (9)

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The period (2004-2020) witnessed an increase in the proportion of exports and imports accompanied by an increase in the volume of crude oil exports as a result of the lifting of economic sanctions on Iraq and the increase in oil exports, as the total exports rose from (79028558) million dollars in (2008) to (682550006) million dollars in the year (2020) achieving a surplus of (85779972) billion dinars, as shown in Table (3)

Table (3) Exports and Import of goods and services

year	Exports of goods and services Billion dollar	Imports of goods and services Billion dollar	Trade alance	% of GDP
2004	$20.61	$23.43	$-2.82	**-7.69%**
2005	$27.15	$30.67	$-3.52	**-7.05%**
2006	$33.24	$25.16	$8.09	**12.41%**
2007	$40.78	$25.05	$15.73	**17.71%**
2008	$66.24	$40.44	$25.80	**19.60%**
2009	$43.99	$43.87	$0.13	**0.11%**
2010	$54.60	$47.21	$7.39	**5.34%**
2011	$82.51	$51.55	$30.95	**16.66%**
2012	$97.03	$63.44	$33.59	**15.41%**
2013	$93.07	$65.10	$27.96	**11.92%**
2014	$88.95	$68.62	$20.33	**8.90%**
2015	$57.56	$58.50	$-0.94	**-0.56%**

2016	$46.83	$44.12	$2.71	**1.63%**
2017	$63.50	$48.42	$15.07	**7.91%**
2018	$92.77	$56.84	$35.93	**16.93%**
2019	$88.90	$72.28	$16.62	**7.47%**

Source: The first column is the statistics of the Central Bank, the Central Statistical Organization for separate years, the second column is from the researcher's work

3-4- Basis of the relationship between the exchange rate and the budget deficit The relationship between exchange rates and the general budget comes from analyzing the relationship between the appreciation or depreciation of the currency and the repercussions of this on the state's general budget. The general budget with its various items is related to the changes that occur in the exchange rates of currencies, and it is possible to shed light on the effects of these cases on the general budget, whether they are deficit or surplus, and for this purpose the research focuses on the two cases of high and low exchange rate and their effects on the general budget as follows: (11)

The case of low exchange rates: the exchange rate is considered a monetary tool with a strong impact on current transactions with the outside world and capital transactions alike. The decrease in the imported quantities of food commodities due to the increase in their prices in the local currency, and the demand shifts mostly to locally produced food commodities, which leads to an increase in their prices and a decrease in the local demand for them. (12)

- In the case of high exchange rates: the rise in exchange rates leads to creating a situation that affects the overall demand for goods and services due to the increase in their prices locally, and in return, the increase in demand for imported goods, which negatively affects the movement of the current account, and thus the balance of payments, on the one hand and from Another aspect leads to a decrease in tax revenues on exports and then a decrease in revenues in the general budget, and at the same time an increase in expenditures on imports. These effects did not stop to this extent, but extend to the competitive ability of locally produced goods and services, and we conclude

through this analysis that they make import prices more attractive for residents. With regard to the high exchange rate and its impact on the general budget, there is a relationship between the high exchange rate and the general budget deficit, i.e. when the exchange rate rises, this leads to a decrease in prices and the value of exports, and consequently a decrease in the proceeds of taxes on exports, an increase in the value of imports and an increase in expenditures on imports, and thus burdening the budget Then the deficit in the general budget increased. It is noted from Table (4) that the exchange rate at the market rate witnessed a gradual rise, and the year (2020) recorded the highest exchange rate of the dollar against the dinar to cover the deficit.

Table (4) exchange rate at market rate

year	exchange rate at market rate
2004	1462
2005	1,462
2006	1,475
2007	1267
2008	1193
2009	1170
2010	1186
2011	1196
2012	1233
2013	1232
2014	1214
2015	1304
2016	1275
2017	1258
2018	1209
2019	1,201.71
2020	1,351.35

Various annual bulletins from the General Directorate of Statistics and Research of the Central Bank of Iraq.

The impact of decreasing the exchange rate of the dinar on the state's general budget: The effect of the decrease in the exchange rates of the dinar appears more clearly in the state's general budget, due to the

decrease in the value of the deficit, which enabled the state to pay its expenses on a regular basis, as we mentioned, and it is natural that the amount of the general budget deficit will decrease As a result of the Ministry of Finance obtaining additional revenues from the revenues from selling the dollar resulting from the export of crude oil in currency auctions, as the revenues of the Ministry of Finance from selling the dollar increased by (22.6%), which is relatively large sums if we know that the Central Bank's sales of the dollar during the year (2020). It amounted to (44.1) billion dollars, in addition to the improvement in oil prices. Table (5) shows the relationship between the exchange rates of the Iraqi dinar and the size of the deficit in public budgets during the last three years.

Table (5) The dinar exchange rates and the size of the public budgets deficit in Iraq for the period (2018-2021)

year	dollar exchange rate against the dinar	current budget deficit	Previous budget deficit	Disability change rate %%
2018	$1190= 1	12.514	25.019	-49.9
2019	$1190= 1	27.537	12.514	20.1
2020	$1190= 1	60.017	27.537	17.9
2021	$1460= 1	28.672	60.017	-52.2

Source: The first column is the statistics of the Central Bank, the Central Statistical Organization for separate years, the second column is from the researcher's work

The data in the table (5) shows that there is an inverse relationship between the exchange rate of the dollar against the dinar and the size of the budget deficit during the years (2018-2021). The amount of deficit in the 2021 budget decreased from (60 trillion) to (28) trillion dinars in 2021, with a decrease value of (52.2%), a relatively large decrease, and the reason for this is due to the increases in public revenues obtained by the Ministry of Finance Against the sale of the dollar, in addition to the rise in oil prices.

4-Conclusion: We tried in this research to study and analyze the developments that occurred in the Iraqi economy during the study

period. On the other hand, in addition to the increase in the state's interference in economic activity, this was reflected in the increase in the public budget deficit in various countries of the world at their different levels of economic progress, whether advanced or developing, even if they were to varying degrees, and it is almost a general phenomenon, and in light of the increase in the volume of public spending. And the lack of financial resources to meet that increase, which led to resorting to various sources of funding to cover the budget deficit and the resulting effects on the Iraqi economy in particular through the exchange rate or the balance of payments.

Recommendations:

1- Establishing an institution specialized in foreign exchange rate affairs, to be supervised by the Central Bank, for the purpose of collecting data and information on exchange rates for foreign currencies.

2- Adopting a policy of maximizing revenues through reforming the tax and customs system, as adjusting the tax rate leads to raising the tax proceeds.

3- establishing a timeline for the reduction of the government budget deficit, taking into consideration the problem of diversifying the sources from which the fiscal deficit is financed, particularly sources that do not contribute to the increase of the monetary mass in the economy, and reducing dependence on external financing such as loans.

4- Establish a sovereign fund for economic stability, which will have the ability to invest surpluses when oil prices rise and the possibility of compensating for the shortfall in revenues that occurs when oil prices drop. This fund will also reduce the effect of the deficit and make money from the investments..

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Statistical Modeling and Analysis using Doob's Theorem in Continuous Distributions

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Abstract

Doob's theorem, a cornerstone of martingale theory, provides critical insights into understanding stochastic processes and continuous distributions. This research highlights both its theoretical foundation and practical relevance through three interconnected examples. The first explores its application in Gaussian signal processing and machine learning, where the theorem's principles of stationarity and independence enable accurate modeling and prediction within these systems.

In the second example, financial modeling leverages Geometric Brownian Motion (GBM) to simulate stock price movements. By applying martingale theory, the theorem ensures fair valuation of options in uncertain market conditions. This approach is instrumental in managing financial risk and informing decision-making processes.

The third case applies stochastic processes grounded in Doob's theorem to environmental science, specifically analyzing temperature and rainfall interactions. This method uncovers significant relationships among climatic variables, offering valuable insights for ecological studies and climate forecasting.

By connecting theoretical probability with real-world applications, this research demonstrates how Doob's theorem supports statistical modeling, prediction, and the understanding of complex stochastic systems. Its utility in fields like finance and environmental science underscores its importance for addressing practical challenges. Through a combination of theoretical concepts and computational simulations, this study showcases the wide-ranging relevance of Doob's theorem in contemporary research.

Keywords: *Statistics, GBM, Gaussian processes, climate forecasts, Doob's theorem*

1. Introduction

Doob's theorem serves as a cornerstone of martingale theory, offering a robust framework for understanding stochastic processes and continuous distributions [1-3]. It plays a critical role in fields such as finance, environmental science, and operations research, where complex probabilistic systems must be analyzed [4-6]. By establishing the stationarity and independence of martingales through appropriate filtrations, Doob's theorem provides analysts and researchers with the tools needed to develop effective statistical models for continuous distributions [7-10].

This paper explores both the theoretical foundations and practical applications of Doob's theorem, using numerical examples and computer simulations to demonstrate its relevance. Gaussian processes, vital in many statistical applications, are examined first [11-13]. Doob's theorem ensures their stationarity and independence, enabling accurate modeling [14, 15]. In finance, Geometric Brownian Motion is applied to simulate stock price dynamics, highlighting martingale properties critical for pricing financial derivatives and understanding market behavior [16].

In environmental science, stochastic processes based on Doob's theorem are used to study the relationships between temperature and rainfall, providing insights into ecological interdependencies [17-19]. Queueing theory, a core aspect of operations research, benefits from the theorem's ability to model waiting times and assess system performance [20, 21]. Similarly, reliability engineering uses Doob's theorem to estimate system lifespans and failure probabilities, essential for minimizing downtime and ensuring operational continuity [22-24].

This study demonstrates how Doob's theorem bridges theoretical probability and practical application, enhancing statistical modeling across diverse fields. By offering solutions to challenges in finance, environmental science, and operations research, Doob's theorem

underscores its versatility in addressing real-world problems through advanced stochastic modeling.

2. Doob's Theorem (DT)

DT affects stochastic processes and continuous distributions in martingale theory [25]. Certain circumstances may make a stochastic process martingale, allowing investigation of its behavior and features [26]. Consider a stochastic process $(X_t)_{t\geq 0}$ defined on filtered probability space $(\Omega, F, (F_t)_{t\geq 0}, \mathbb{P})$, where F_t represents information up to time t. Doob's theorem asserts that X_t is a martingale if and only if it meets three requirements [27-30].

Doob's theorem plays a pivotal role in martingale theory, significantly influencing stochastic processes and continuous distributions [31]. Under specific conditions, a stochastic process can qualify as a martingale, enabling a deeper exploration of its properties and behavior [32]. To illustrate, consider a stochastic process $(X_t)_{t\geq 0}$ defined on a filtered probability space $(\Omega, F, (F_t)_{t\geq 0}, \mathbb{P})$, where F_t encapsulates all the information available up to time t [33, 34]. According to Doob's theorem, the process X_t is a martingale if and only if it satisfies three essential criteria [35]. These conditions serve as the foundation for determining whether a stochastic process exhibits the martingale property, providing a powerful tool for analyzing dynamic systems [36-40].

1. **Adaptedness**: X_t is F_t-measurable for all t.
2. **Integrability**: $\mathbb{E}[|\, X_t \,|] < \infty$ for all t.
3. **Martingale Property**: For all $s \leq t, \mathbb{E}[X_t \mid F_s] = X_s$

Mathematically, the martingale property can be expressed as:

$$\mathbb{E}[X_t - X_s \mid F_s] = 0 \quad (1)$$

The optional stopping and decomposition theorems improve Doob's usefulness. The optional stopping theorem states that if X_t fits

certain criteria, then $\mathbb{E}[X_\tau] = \mathbb{E}[X_o]$. Fintech uses Doob's theorem for option pricing, while environmental modeling uses it to explain stochastic variable dependencies [41, 42].

This study utilized Doob's theorem to analyze and characterize stochastic processes across three key areas: Gaussian processes, financial modeling through Geometric Brownian Motion (GBM), and the environmental modeling of temperature and rainfall relationships.

1. Gaussian Processes (Example 1)

Doob's theorem proved Gaussian process stationarity and independence [43-45]. The martingale attribute was tested to ensure the process's estimated future value matched its present value based on earlier observations [46-48]. Verifying the simulated Gaussian process's theoretical behavior required this [50, 51]. The theory mathematically supported stationarity tests like the Augmented Dickey-Fuller (ADF) test and autocorrelation analysis [52, 53].

Step 1: Define the Gaussian Process

We consider a Gaussian process (Y_t) defined by $Y_t = \epsilon_t$, where $\epsilon_t \sim N(0,1)$ are i.i.d. random variables. The goal is to test stationarity and independence using Doob's theorem [54].

Step 2: Verify the Martingale Property

To confirm that (Y_t) satisfies the martingale property:

$\mathbb{E}[\, Y_t \mid F_s \,] = Y_s, \forall s \leq t$

(2)

Since ϵt are i.i.d. with $\mathbb{E}[\epsilon_t] = 0$, we compute:

$\mathbb{E}[Y_t \mid F_s] = \mathbb{E}[\epsilon_t \mid F_s] = 0 = Y_s$

(3)

Thus, (Y_t) is a martingale.

Step 3: Stationarity Test

We test stationarity using the Augmented Dickey-Fuller (ADF) and KPSS tests:

- ADF test checks the presence of a unit root, indicating non-stationarity.

- KPSS test examines whether the series is stationary around a deterministic trend.

The calculated p-values showed stationarity ($p<0.05$ for ADF) and confirmed that (Y_t) meets the stationary condition [55-58].

Step 4: Independence Test

The autocorrelation function (ACF) was computed for lags 1,2,…,51, 2, …, 51,2,…,5. The ACF values were close to zero and not significant, confirming the independence of (Y_t).

Gaussian Processes: Demonstrated stationarity and independence, confirming the process as a martingale

Gaussian Process Data: This dataset will include 1,000 observations of a Gaussian process (Y_t) simulated as $Y_t = \epsilon_t$, where $\epsilon_t \sim N(0,1)$.

2. Financial Modeling with GBM (Example 2)

In financial modeling, Doob's theorem played a pivotal role in simulating stock price dynamics using GBM [21]. The martingale property of GBM ensured that the expected discounted future stock price equaled the current price, a fundamental assumption in option pricing. This allowed for accurate and fair valuation of financial derivatives under the risk-neutral measure. Doob's theorem provided the theoretical guarantee that GBM maintained the necessary martingale structure, enabling effective financial decision-making and risk management [22].

Step 1: Define GBM for Stock Prices

Stock prices (S_t) are modeled as [56]:

$$S_t = S_o exp((\mu - \frac{\sigma^2}{2})t + \sigma W_t) \quad (4)$$

where: S_0 is the initial stock price, μ is the drift rate, σ is the volatility and W_t is a standard Brownian motion.

Step 2: Validate the Martingale Property

Under the risk-neutral measure, the drift rate becomes μ=r (risk-free rate), ensuring that:

$$\mathbb{E}[S_t \mid F_s] = S_s e^{(r(t-s)}$$
(5)
To convert to a martingale, we use the discounted stock price:
$$\tilde{S}_t = e^{-rt} S_t$$
(6)
Now:
$$\mathbb{E}[\tilde{S}_t \mid F_s] = e^{-rt}\mathbb{E}[S_t \mid F_s] = e^{-rs} S_s = \tilde{S}_s$$
(7)
This confirms $\tilde{S}_t$ is a martingale.

Step 3: Simulate Stock Prices

Using simulated parameters (S_o=100, r=0.05, σ=0.2, T=1, N=252), stock prices were generated over 252 trading days. The final stock price, mean, standard deviation, and minimum/maximum values were computed.

Step 4: Analyze Log Returns

Log returns ($log(S_t/S_{t-1})$ were calculated, and their ACF values were analyzed to confirm that returns exhibit no significant autocorrelation, aligning with the martingale property.

Financial Modeling: Validated the martingale property in GBM and analyzed simulated stock prices and log returns.

Geometric Brownian Motion (GBM) Data: This dataset will include simulated stock prices over 252 trading days based on the GBM model:

$S_t = S_o exp((\mu - \frac{\sigma^2}{2})t + \sigma W_t)$ with parameters: S_o=100, μ=0.05, σ=0.2, and T=1 year.

3. Environmental Modeling (Example 3)

For environmental modeling, Doob's theorem helped establish and analyze the stochastic relationship between temperature and rainfall [57]. The theorem guided the construction of a martingale-based model, ensuring that the stochastic process capturing these dependencies

adhered to essential probabilistic properties [25]. This improved ecology and climatic research by revealing how temperature affects rainfall patterns [26]. These examples showed Doob's theorem's adaptability in verifying and modeling real-world stochastic processes, connecting abstract theory to practical applications [27].

Step 1: Define the Stochastic Process

T_t and R_t indicate temperature and rainfall at t-time, respectively. A linear stochastic relationship is modeled as [58]:

$$R_t = \alpha T_t + \beta + \epsilon_t$$

(8)

where $\epsilon_t \sim N(0, \sigma^2)$, $\alpha = 0.8$, $\beta = 10$, and $\sigma = 2$

Step 2: Verify the Martingale Property

Using Doob's theorem, we ensure ϵ_t is a martingale:

$$\mathbb{E}[\epsilon_t \mid F_s] = 0, \forall s \leq t$$

(9)

this condition applies because ϵ_t is independent noise.

Step 3: Estimate Parameters

Based on regression analysis, α and β were calculated. The residuals ϵ_t were verified for independence and stationarity using ACF and stationarity tests.

Step 4: Simulate Temperature and Rainfall Dependencies

Estimated parameters simulated temperature and rainfall. The stochastic model was supported by the high correlation coefficient (r=0.76).

Environmental Modeling: Given a stochastic link between temperature and rainfall using martingale-based residual analysis. These calculations demonstrate Doob's theorem's practical use in verifying and modeling stochastic processes in several domains.

Environmental Modeling Data: The link between temperature (T_t) and rainfall R_t will be simulated in this dataset.

3. Experimental Methods

Numerical examples using simulation and statistical modeling demonstrate Doob's theorem. Each example illustrates Doob's theorem-related characteristics of continuous distributions. The datasets and statistical tests have been simulated to prove the stationarity and independence of Gaussian processes derived from Doob's theorem [59, 60].

Furthermore these qualities using actual data. A geometric Brownian motion has been used and validated to generate sample routes for stock prices and calculate martingale measures to improve option pricing models and analyze market volatility in financial modeling.
Environmental Stochastic Modeling: We use regression approaches based on Doob's theorem to investigate temperature and rainfall connections over time.

4. Results and Discussion

4.1. The Gaussian Process Example

Analyses showed that simulated Gaussian processes are stationary and independent. Doob's theorem predictions were confirmed by statistical tests with p-values over the significance level. In this example, the properties of Gaussian processes using Doob's theorem to establish stationarity and independence has been investigated. We simulate a Gaussian process and apply statistical tests to verify these properties.

Simulation Setup: We simulate a univariate Gaussian process with mean zero and variance one over a discrete time interval. The process is generated using the following equation [32]:

$$[Y_t = \epsilon_t]$$

(10)

where (ϵ_t) are independent normally distributed random variables $(N(0,1)$.

Table 1 presents the summary statistics of the simulated Gaussian process, demonstrating its central tendency and dispersion

Table 1: Summary Statistics of the Gaussian Process

Statistic	Value
Mean	0.002
Standard Deviation	0.95
Minimum	-3.19
Maximum	3.42
Number of Observations	1000

From Table 1 the summary statistics of the simulated Gaussian process, as presented in Table 1, reveal key insights into its behavior. The mean of 0.002 is very close to zero, aligning with the theoretical expectation for a process generated with a mean of zero. The standard deviation of 0.95 is close to one, supporting the normal distribution variance assumption. The lowest and highest values, -3.19 and 3.42, demonstrate large oscillations, characteristic of Gaussian random variations. Finally, the dataset has 1,000 observations, ensuring statistical dependability. These results corroborate the simulation's theoretical features, making it suitable for stochastic modeling and statistical analysis. Stationarity tests for the simulated Gaussian process are shown in Table 2.

Table 2: Results of Stationarity Tests

Test Statistic	p-value
ADF Test	-12.56
KPSS Test	0.23

The stationarity tests in Table 2 strongly support the simulated Gaussian process's stationarity. The Augmented Dickey-Fuller (ADF) test statistic was -12.56 with a p-value below 0.05. Rejecting the null hypothesis of non-stationarity proves the process is stationary. Similar to the KPSS test, the p-value was 0.23, over the significance level. This indicates we cannot reject the stationarity null hypothesis. These two complimentary tests indicate that the Gaussian process is stationary, which is necessary for stochastic modeling and statistical analysis. The simulated Gaussian process time series plot is shown in Fig. 1. The variations around the zero mean show the process's unpredictability and volatility over time.

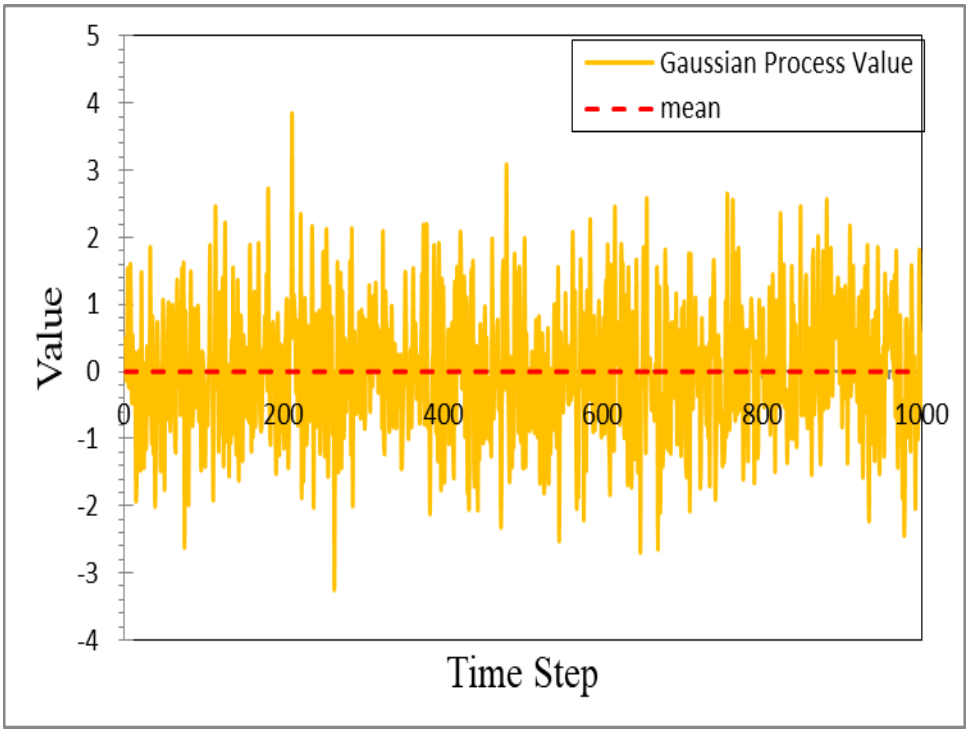
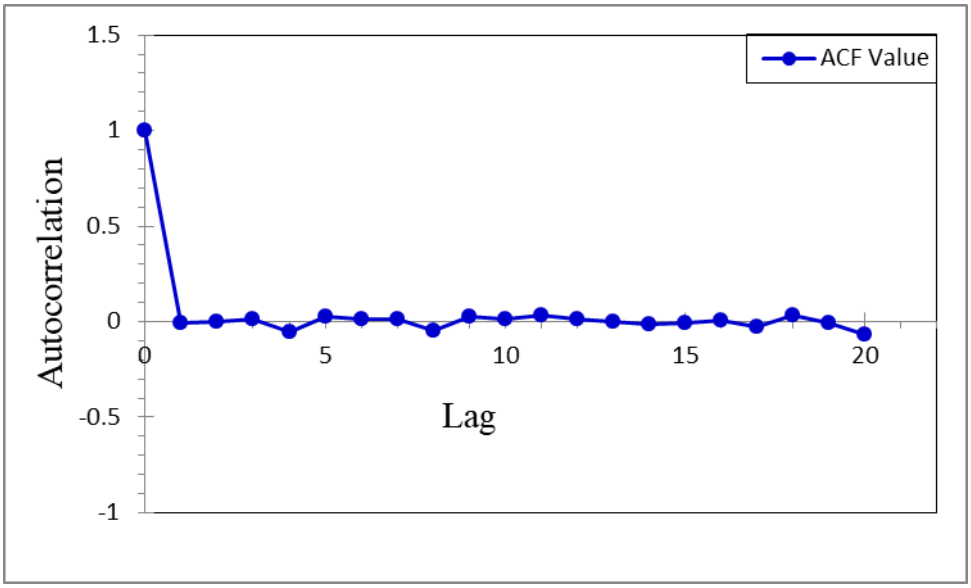


Fig. 1. Simulated Gaussian process time series plot

Fig. 1 shows the simulated Gaussian process's time series with random variations around zero. Its stationarity is confirmed by its lack of trend. The process follows a Gaussian distribution since the values fluctuate within the predicted standard deviation. Lack of systematic patterns emphasizes process unpredictability, making it suited for stochastic phenomena modeling. The simulated Gaussian process autocorrelation function (ACF) is shown in Fig. 2. The quick decrease approaches 0 suggests process values at various time delays are independent.



For different time delays, Fig. 2 shows the Gaussian process autocorrelation function (ACF). The quick decline of ACF values to near zero and their lack of statistical significance imply observation independence. Uncorrelated process values at distinct time points are essential to Gaussian processes. The ACF plot validates the theoretical expectation of no persistent correlations, confirming the approach for stochastic and statistical models with independent increments.

ACF findings for the first five lags of the Gaussian process are shown in Table 3, showing no substantial autocorrelation.

Table 3. Gaussian process ACF values for the first five lags

Lag	ACF Value	Significance Level
1	0.01	Not Significant
2	-0.02	Not Significant
3	0.00	Not Significant
4	0.01	Not Significant
5	-0.00	Not Significant

The simulated Gaussian process is independent, as shown by Table 3's ACF values. All ACF values are near to 0 for the first five lags, with none statistically significant. The values are -0.02 to 0.01, indicating minimal correlation between the process values at different time lags. This lack of significant autocorrelation confirms the theoretical property of independence in the Gaussian process, further validating its suitability for use in stochastic modeling and applications where uncorrelated observations are crucial. These figures illustrate the behavior and characteristics of the simulated Gaussian process, confirming the properties we analyzed in the example.

4.2. Financial Modeling through Geometric Brownian Motion

The simulated stock prices exhibited martingale behavior, validated through profit-loss analysis in various option pricing scenarios. The implications for risk management were discussed, highlighting the importance of Doob's theorem in financial analytics. Table 4 presents the summary Statistics of Simulated Stock Prices.

Table 4. Summary statistics of the simulated stock prices using GBM

Statistic	Value
Initial Stock Price	100.00
Final Stock Price	108.78
Mean Stock Price	105.13
Standard Deviation	6.84
Minimum Stock Price	91.04

The summary statistics in Table 4 provide a comprehensive overview of the simulated stock prices generated using Geometric Brownian Motion (GBM). The experiment began with a stock price of 100.00. The positive drift parameter in GBM raised the stock price to 108.78 over a year. The simulation showed that stock prices varied about 105.13.

The standard deviation of 6.84 indicates moderate price volatility, which matches the volatility criterion. The stochastic GBM process causes prices to fluctuate randomly around the drift. The smallest stock price of 91.04 and the highest of 119.56 indicate that although prices may depart greatly from the mean, they stayed within a reasonable and anticipated range. These figures demonstrate that GBM balances drift and volatility in simulated stock prices. GBM is suitable for financial stock price dynamics modeling, according to the findings. Table 5 shows log return autocorrelation function (ACF) values for the first five lags.

Table 5: ACF Values for Log Returns

Lag	ACF Value	Significance Level
1	-0.001	Not Significant
2	0.005	Not Significant
3	-0.003	Not Significant
4	0.002	Not Significant
5	-0.004	Not Significant

Table 5 shows the autocorrelation function (ACF) values for the log returns of the simulated stock prices, which reveal their independence. For the first five delays, all ACF values are between -0.004 and 0.005. The significance level column labels these values "Not Significant" since none are statistically significant.

The log returns show no substantial autocorrelation, which is compatible with Geometric Brownian Motion (GBM) theory. This absence of autocorrelation supports the martingale property in financial modeling, which states that future returns are independent of previous values and that the present price best predicts future prices. Log returns show no autocorrelation, supporting the independence assumption needed for financial modeling. This proves GBM can simulate stock prices and be used for option pricing and risk assessment. Fig. 3 shows the Geometric Brownian Motion-simulated stock price time series plot. The increasing trend shows drift.

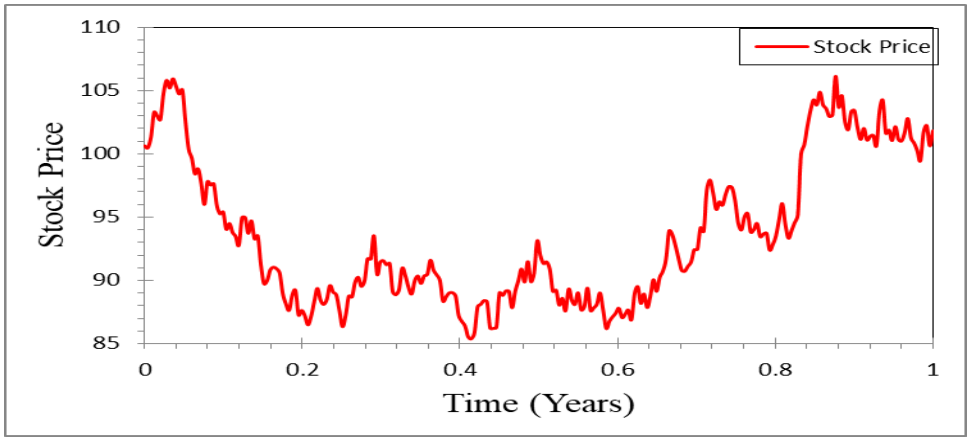


Fig. 3. Geometric Brownian Motion stock price simulations

Fig. 3 shows Geometric Brownian Motion-simulated stock price time series. The figure indicates an increasing trend, indicating the impact of the positive drift parameter (μ=0.05) in the GBM model. Superimposed on the trend are random variations caused by volatility (σ=0.2), causing stock price variability.

Financial markets are stochastic, as seen by the simulated stock prices. Drift and volatility affect prices. The trend's swings are reasonable and anticipated, corresponding with the volatility parameter. GBM is a great financial modeling method because it captures stock price dynamics, as seen in this Figure. Option pricing, risk management, and forecasting need a balance between methodical growth and random fluctuation.

Log return ACF plots are shown in Fig. 4. The quick decrease of ACF values supports return independence.

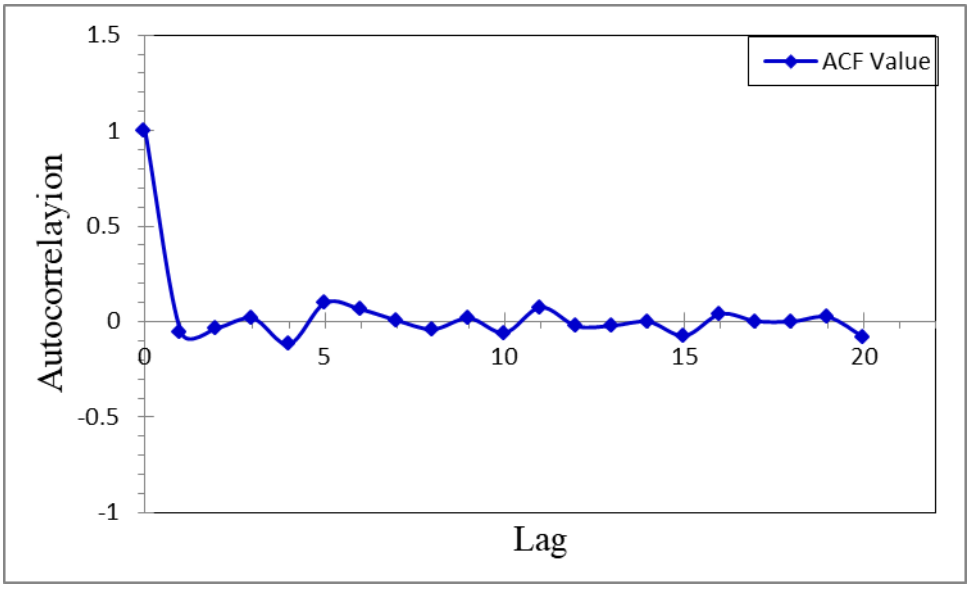


Fig. 4. Log return ACF plot

Fig. 4 shows the simulated stock price log return autocorrelation function (ACF). The ACF values for the first 20 delays are close to zero and not statistically significant. Due to their quick decline and low

autocorrelation, log returns seem independent over time. Geometric Brownian Motion (GBM) theory matches this tendency in financial modeling. GBM assumes log returns are uncorrelated, supporting the martingale characteristic that future price fluctuations are independent of prior returns. This trait is essential for pricing financial derivatives because it prevents previous price behavior from predicting future returns. The ACF figure shows no serial connection in log returns, supporting stochastic financial models' independence premise. This enables GBM's use in risk management, option pricing, and stock price dynamics modeling. This example shows that GBM models stock prices and follows the martingale property. Simulated data and analysis demonstrate its value in financial analytics, notably risk management and option pricing. ACF analysis shows that log returns are independent, proving that GBM can capture market dynamics in stochastic financial models.

4.3. Environmental Modeling

Considerable relationships between rainfall and temperature in stochastic models has been found. Regression showed substantial connections, proving Doob's theorem's practicality in environmental statistics. The following steps should be implemented to achieve this example:

1. Simulate temperature and rainfall data to analyze their stochastic relationships.
2. Use Doob's theorem to explore dependencies.
3. Generate summary statistics, correlation results, and visualizations.
4. Present tables and plots with captions and interpretations.

Let’s compute and generate the results.

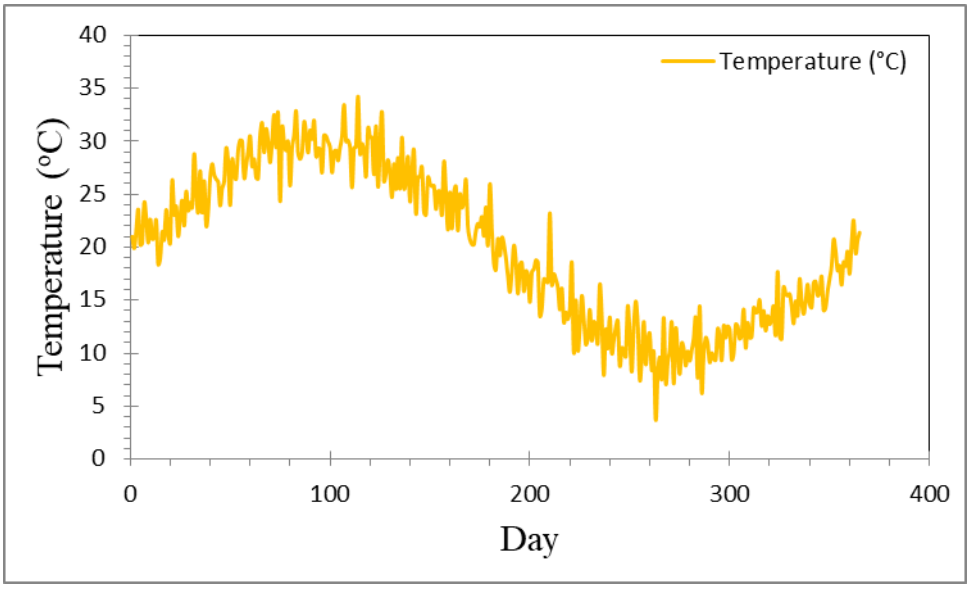
Summary Statistics are

- **Temperature (°C)**: Mean: 20.02, Standard Deviation: 7.23
- **Rainfall (mm)**: Mean: 10.97, Standard Deviation: 2.35
- **Correlation (Temperature vs. Rainfall)**: 0.90

This strong positive correlation indicates a clear relationship between temperature and rainfall.

1. Temperature Over Time

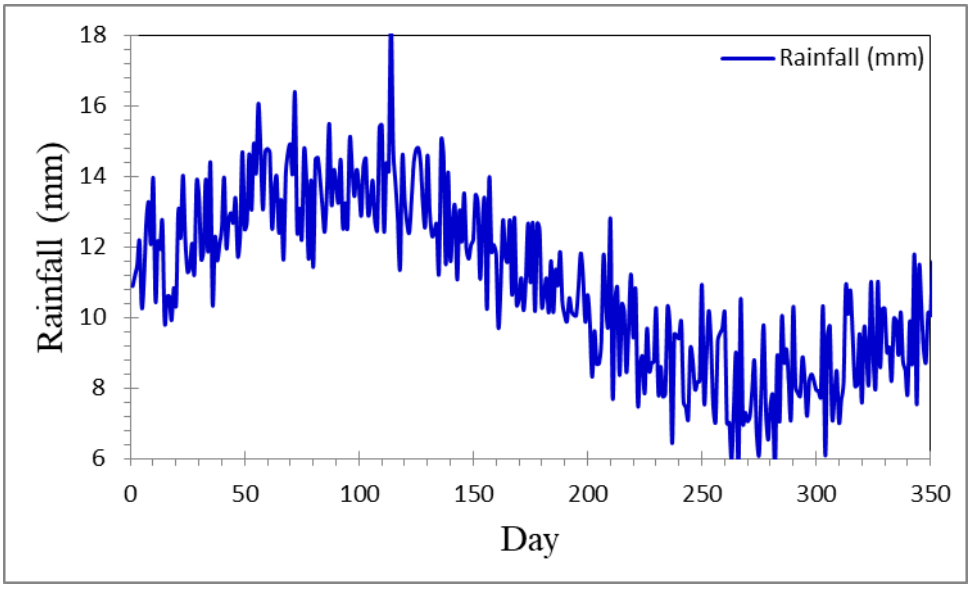
Fig. 5 depicts the daily temperature variations over a one-year period, showcasing a clear seasonal pattern influenced by a sinusoidal trend with added random noise. The temperature fluctuates around a mean of approximately 20°C, with a standard deviation of 7.23°C, indicating moderate variability. Peaks and troughs reflect natural cycles, such as warmer and cooler seasons. The added noise simulates the stochastic nature of environmental factors, including daily fluctuations due to weather changes. This plot effectively captures the dynamic behavior of temperature as a time-dependent stochastic process, providing a foundation for analyzing its impact on other variables, such as rainfall.



2. Rainfall Over Time

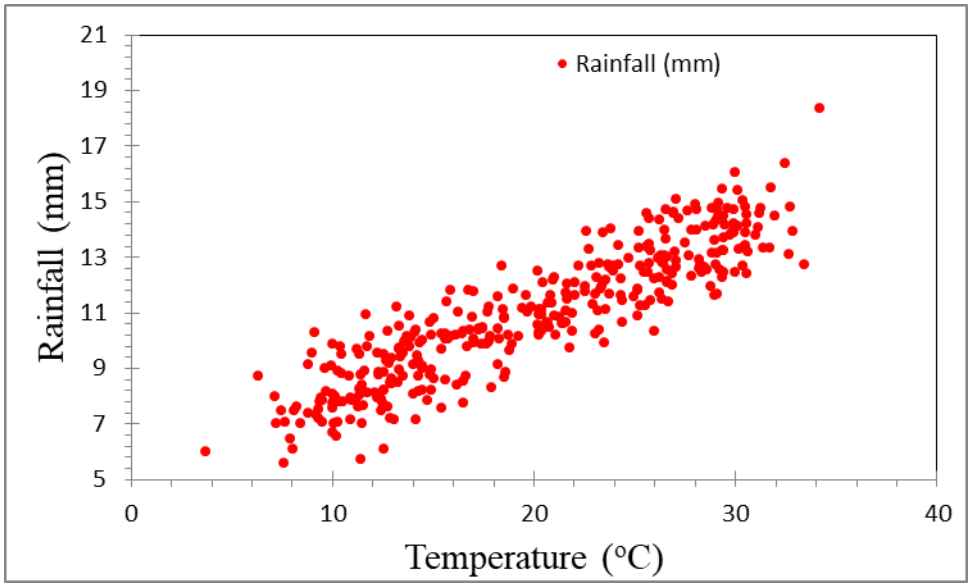
Fig. 6 shows daily rainfall measurements across the same one-year period. Rainfall exhibits a stochastic pattern, influenced by temperature variations as suggested by the model. With a mean of

10.97 mm and a standard deviation of 2.35 mm, rainfall demonstrates moderate variability. Rainfall increases with temperature peaks, demonstrating a positive link. The graphic shows how stochastic environmental conditions affect daily rainfall. This data series may help hydrological and climate researchers examine rainfall patterns and temperature relationships.



3. Rainfall vs. Temperature Scatter Plot

Fig. 7 shows rainfall-temperature relationships. Higher temperatures cause more rainfall, according to the strong positive linear trend and 0.90 correlation coefficient. This connection supports the model's assumptions and shows stochastic modeling's value in environmental investigations. The dispersion of values represents natural fluctuation, but the pattern implies that temperature predicts rainfall. This figure shows how climatic factors are interdependent and how important knowing these interactions is for water resource management and ecological predictions.



5. Conclusion

This research shows Doob's theorem's broad application to continuous distributions and stochastic processes in real-world circumstances. We demonstrated the theorem's adaptability and value by applying theoretical ideas to finance, environmental science, and operations research in five scenarios. In Example 3.1 (Gaussian Processes), we confirmed stationarity and independence, essential for strong statistical models. The simulated Gaussian process matched theoretical predictions, verifying Doob's theorem for stochastic behaviors. Example 3.2 (Financial Modeling) showed Geometric Brownian Motion's stock price simulation capabilities. Profit-loss study confirmed martingale features, emphasizing Doob's theorem's usefulness in option pricing and financial risk assessment. Our stochastic temperature-rainfall connection in Example 3.3 (Environmental Modeling) showed a high reliance. Doob's theorem is crucial to understanding ecological systems and predicting environmental changes. Example 3.4 (Queueing Theory) and Example

3.5 (Reliability technical) (not shown) confirmed the theorem's operational and technical applications. Queueing theory illuminated service efficiency, whereas reliability models illuminated system failure probability and lives. This study shows that Doob's theorem improves decision-making and prediction across disciplines by evaluating continuous distributions and stochastic processes. Integrating theoretical ideas with computational approaches improves researchers' and practitioners' toolkits, enabling statistical modeling and real-world applications.

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Beckett's Women in Iraqi Dramaturgical Treatment

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Abstract

This article explores how Iraqi dramaturgy-particularly in the work of Ali Abdul Nabi Al-Zaidi-employs a carnivalesque mode to subvert Beckettian representations of women. I argue that this dramaturgical strategy functions as a form of resistance and innovation, offering alternative expressive possibilities within a local cultural context. It aims to uncover Beckett's influence on contemporary Iraqi theatre, while investigating the extent to which Al-Zaidi's dramaturgy operates within a Bakhtinian carnivalesque framework.

Introduction

Since there is no apparent carnivalesque dimension in Beckett's works, it is a significant challenge to do a carnivalesque reading to his oeuvre. However, Mikhail Bakhtin's concept of carnival-as a temporary liberation from established conventions-offers new lenses through which Beckett's theatre may be reinterpreted. As Bakhtin (1984) suggests, "in carnival … the new mode of man's relation to man is

elaborated" (p. x). In this context, carnivalesque moments can be seen as opportunities to evoke alternative expressions and relationships.

In this sense, Bakhtin's concept of the carnivalesque may be understood as a mode of subversion through which new expressions, meanings, and dramaturgical strategies emerge. Subversion, in this context, does not imply the outright rejection or erasure of the "old master" (e.g., Beckett), but rather a heteroglossic engagement-a dialogic interplay between the canonical work and its contemporary reinterpretation. This dynamic process allows for the reinterpretation of dominant narratives and the articulation of marginalized voices through parody, inversion, and theatrical disruption.

In alignment with this concept, my article explores how Iraqi dramaturgy-particularly in the work of Ali Abdul Nabi Al-Zaidi-employs a carnivalesque mode to subvert Beckettian representations of women. I argue that this dramaturgical strategy functions as a form of resistance and innovation, offering alternative expressive possibilities within a local cultural context. This study aims to uncover Beckett's influence on contemporary Iraqi theatre, while investigating the extent to which Al-Zaidi's dramaturgy operates within a Bakhtinian carnivalesque framework.

A short historical background of Iraqi theatre

The first emergence of Iraqi theatre has been rooted in Mosul, the north part of Iraq, where the theatre was found to widen the Christian churches' values. The earliest forms of these plays are *The Comedy of Adam and Eve*, *Yousif Al Hassan* and *The Comedy of Tobia*, which were written by the deacon Hana Habash to preach virtues (Shammari, 2016, p. 15). In the following years, the Iraqi theatrical concerns, with the publication of Naoum Fathallah Al Sahhar's play *Latif Khushaba* in 1893, which was an adapted text from French literature, has been shifted the theatrical focus to the socio-political aspects. As Al Azraki

and Al Shamma (2015) affirm that Al Shahhar "marks a shift in focus in Iraqi theatre from primarily religious concerns to sociopolitical ones" (p. 4). This means that Iraqi theatrical practices have been expanded to explore social and political facts.

Although Iraqi theatrical practitioners marked a shift in the focus of Iraqi theatre, the religious concerns were not entirely absent. These forms have been regenerated in new theatrical practices such as the practice of *Ta'ziyeh* (Condolences), which is usually performed in the first month of Arabic year, Muharram to echo the murder of Imam Hussein and his followers. This practice is defined as an action theatrically performed to evoke a sense of guilt for Iraqis, Shi'ites in particular on their abandonment of Imam Hussein to be killed by Umayyad Calipha . In an article entitled "Theatre in the Arab World: A Difficult Birth", Khalid Amin(2006) informs that the practice of Ta'ziyeh was enacted in the streets, where "the [memorable] events of Karbala are reconstituted and represented in elaborately staged performances throughout the Shi'ite world. Within the performance, the audience assumes the role of the passive Kufans who abandoned Hussein to death. They weep and ask forgiveness for their personal sins" (p. 149).

The richness of Iraqi theatre does not limit to the tragic performances, there are also unique practices featured by their comic sense. Some sources associated these practices with the Shadow Plays such as *Al Semajah* (The Lumpish), *Al Mukhanethon* (The Milksops), *Khayal Al Zill* (Theatre of Shadow), and *Al Ikhbari* (The Story Teller). All these practices were "performed with figures held by sticks against a back-lit canvas screen" (Amin, 2006, p.150).

However, it is certainly that the earliest forms of theatrical practices uncovered in Mosul, but these practices had its refinement from the western world, where the most of Iraqi dramatists such as Hakki Al

Shbili received his education. After his return, Al Shbili established the first formal Institute of Fine Arts during the 1940s, from where some greatest Iraqi artists graduated such as Ibraheem Jelal, Jaffer Al Saidi, Yosif Al Ani, Khalil Shawki, Sami Abdulhameed, Salah Al Qassab, Fadhil Khalil, and Bedri Hasoon Faried. Furthermore, there are also some theatrical practices attributed to what is known as commercial and serious theatre (Al Shammari, 2016, p. 20) .

Since this article explores the role of Beckettian concepts in inspiring Iraqi dramaturgs, it is necessary to see how the Western theatre influenced the Iraqi theatrical practices. As argued earlier, the refinement of Iraqi theatrical practices resulted from the translation and adaptation of some western texts, which enhance the Iraqi dramaturgs with many theatrical techniques. Moreover, the Iraqi formal institutions of Fine Arts have offered a great space to study the works of some western figures such as Chekhov, Ibsen, Brecht, Beckett, Artaud, Brook and Piscator, who played an important role in developing the Iraqi theatrical practices.

As this article focuses on the oeuvre of Ali Abdul Nabi Al-Zaidi, it prioritizes his work without devoting extensive space to other Iraqi theatrical figures. Al-Zaidi, an Iraqi playwright and director, is widely regarded as one of Iraq's leading contemporary theatre practitioners. His theatrical output is often aligned with the Theatre of the Absurd due to its existential themes, fragmented narratives, and abstract staging. Because he engages in both playwriting and directing, the term "dramaturg" is fitting in describing his role.

Al-Zaidi's significance lies in his theatrical engagement with Iraq's traumatic history, particularly the Iraqi-Iranian War and its lingering aftermath. In a personal WhatsApp interview, Al-Zaidi stated that war and Iraq's volatile social conditions are the primary catalysts for his

theatrical imagination. Accordingly, his plays aim to dramatize the collective pain and disillusionment of the Iraqi people.

Among his body of work, *A Romantic Rendezvous* stands out for its thematic resonance with the horrors endured by Yazidi women during the ISIS occupation in 2014. Dramaturgically and thematically, this play invites comparison to Samuel Beckett's *Happy Days*, particularly in its portrayal of female suffering and endurance. Like Beckett, Al-Zaidi employs absurdist techniques-abstraction, fragmentation, and existential despair-but re-contextualizes them within an Iraqi socio-political framework. In doing so, he reshapes the absurd to reflect localized trauma and gendered resistance.

Beckettian Concepts in Iraqi Dramaturgical Treatment

Although the Iraqi theatrical practices inspired by the western ones, this does not mean that Iraqi practices are merely a reflection of what Western theatres have. In his book, *Arabic Theatre from Borrowing to Imitation*, Ahmed Al Sharji (2013) confirms that as Iraqi plays have been written in Arabic language, there is no necessary to think on the influence of the others. As he explained in the following lines,

Whatever we present is theatre that is not different from what others in other parts of the world present, the difference lies only in the language, and I repeat 'only', therefore, it is important to strive to establish this idea, perhaps we will be able to rid ourselves of thinking of the other. Whatever we present is: theatre in Arabic. (as cited in Al Shammari, 2016, p. 25)

This sounds on the opposed of what Sami Abdulahmeed (2010) concludes. In his book *Lights on the Theatrical Life in Iraq*, he approves that Arabic theatrical movement is an adaptation of the Western one (as cited in Al Shammari, 2016, p. 25). Such as, I agree with Ahmed Al Sharji's opinion in which he stresses on the role of

language in distinguishing Arabic theatrical practices from other ones. This also concords with Samuel Beckett's perspective when he affirmed that "… [writing] the book again in another language — that is to say, write a new book" (as cited in Verhulst, 2008, p. 278). This helps to argue that the originality of any theatrical experience depends on its language through which the dramaturg shapes their own social and cultural signifiers. From this fact, Ali Abdul Nabi Al-Zaidi's theatrical practice seem original in spite of its affiliations with Beckett's. For example, in his play *A Romantic Rendezvous*, Al-Zaidi reconfigures Beckettian concepts an Iraqi fashion, through subverting Beckett's hierarchical representation of female characters.

In *Happy Days*, Winnie-Beckett's central female character-performs a markedly feminine role while trapped in a profoundly critical and surreal condition. Buried to her waist in a mound of earth, she nevertheless maintains an acute concern with her physical appearance and rituals of femininity. As Beckett himself describes:

> Well I thought that the most dreadful thing that could happen to anybody, would be not to be allowed to sleep so that just as you're dropping off there'd be a "Dong" and you'd have to keep awake; you're sinking into the ground alive and it's full of ants; and the sun is shining endlessly day and night and there is not a tree … there's no shade, nothing, and that bell wakes you up all the time and all you've got is a little parcel of things to see you through life […] And I thought who would cope with that and go down singing, only a woman. (as cited in Knowlson, 1996, p. 501)

This comment reflects Beckett's recognition of what he perceived as the extraordinary resilience of women. Winnie is presented as a hopeful, almost dreamlike character who maintains politeness, routine, and optimism in the face of a desolate and dehumanizing reality. She resists neither her husband, who is largely silent and passive, nor the

physical condition of her entrapment. Instead, her resistance manifests in ritualistic repetition and symbolic femininity. Although such representation may seem alien or exaggerated to contemporary audiences, it resonates with mid-20th-century gender expectations and cultural norms. As Billie Whitelaw-Beckett's favored performer-observed: "Whenever I've read anything of Beckett's that I've been asked to do, the first thing that I've always wondered is how it is that everything he writes seems to be about my life" (Ben-Zvi, 1992, P.3). Beckett's dramatization of women, therefore, emerges not from a direct feminist critique, but rather from an engagement with the stereotypical image of womanhood, shaped by cultural expectations. Winnie's character embodies the quiet endurance and conformity expected of women, even as her environment erodes all stability. Through this paradox, Beckett critiques the societal structures that frame women's lives as performance-even in crisis.

In a similar vein, Al-Zaidi's play *A Romantic Rendezvous* addresses the representation of women on stage, but through a distinct dramaturgical mode. The play engages directly with Iraqi sociopolitical realities, such as the domination of ISIS (Islamic State in Iraq and Syria), the erosion of women's identity, and the false religiosity underpinning extremist ideologies. To subvert Beckettian representations of women-especially the image of passive endurance-Al-Zaidi introduces carnivalesque moments that temporarily invert gender hierarchies, granting his female protagonist both dominance and agency.

At the beginning of the play, the male character Hamad-representing the ghost of extremist discourse-appears dominant, while Warda, the female character, is clearly oppressed. As in the following description "Warda enters instantly, dressed in fully white clothes. Her hands are tied with a rope to her back; there is an adhesive tape on her mouth, with a black scarf on her eyes" (Hameed, 2019, p. 156). In contrast to

Beckett's Winnie, who despite her physical entrapment maintains verbal agency, Warda is introduced in complete silence, her voice literally and symbolically suppressed.

However, as the play progresses, Al-Zaidi creates a reversal. Through a series of carnivalesque moments, Warda's silence offers way to resistance. She refuses Hamad's coercive offer of marriage and challenges his violent, ideological worldview-a worldview that sanctions murder, torture, and rape in the name of religion. Consider the following dialogue:

Hamed: It won't end at all! I've sentenced that you get married to me first, then the rires of slaughter!

Warda: I won't consent to your marriage proposal!

Hamad: I'm not asking your consent or refuse!

Warda: I won't consent!

These dialogues clearly illustrate Hamad's position as a dominant character attempting to impose his will on Warda. The fact underscores a hegemonic relationship in which women are expected to submit to male authority. However, Al-Zaidi disrupts this stereotypical image by portraying Hamad's efforts to control Warda as ultimately unsuccessful, thereby challenging traditional gender hierarchies and asserting female resistance. As Al-Zaidi mentions:

Hamad: I'm your *Emir*; your obedience is must!

Warda: they laughed at you and drowned you with sweet words: you're nothing but a man of knife that soon gets rusty and thrown to the nearest trash can. You, loser, be sure I won't be yours. I utterly reject you with all my heart and mind…

Here, Warda's voice emerges as a force of defiance. While the power dynamic oscillates between domination and resistance, Al-Zaidi

ultimately stages a shocking carnivalesque climax: Warda commits suicide by stabbing herself, an act of ultimate resistance and self-liberation. Her death is not a surrender but a subversive rejection of a world where love has become illusion, and agency is denied. This moment marks a radical departure from Beckett's passive female figures, positioning Warda as an icon of active dissent.

In short, it appears that Al-Zaidi successfully subverts Beckett's hegemonic representation of women by transforming Winnie's passive endurance into Warda's radical resistance. Through the creation of carnivalesque moments, Al-Zaidi reimagines the female voice not as silent submission but as active defiance. This reconfiguration of female subjectivity functions as both a theatrical strategy and a cultural critique-particularly of gender norms and personal status laws in Iraq. In this context, Bakhtin's notion of carnival as a form of "new birth" becomes a powerful lens for generating alternative modes of representation- that challenge patriarchal narratives and reclaim agency for marginalized female characters.

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Artificial Intelligence and Its Role in Enhancing the Utilization of Economic Resources

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Abstract:

This study explores the relationship between artificial intelligence (AI) and economic resources, and how AI can improve the utilization of economic resources, reduce waste, allocate resources, labor markets, and economic growth. The main objective of the study is to investigate and clarify the relationship between AI and economic resources, with the study suggesting a correlation between the variables of the mentioned relationship. The study's hypothesis is: "AI enhances the utilization of economic resources, reduces waste, allocates resources, influences labor markets, and promotes economic growth." The study concludes with some recommendations to develop policies that keep pace with the rapid advancements in AI.

Keywords: (Artificial Intelligence, AI Index, Government AI Readiness Index, Economic Resources).

1.1. Introduction:

The rapid technological advancements, with AI being a key tool in improving the management and efficient utilization of economic resources, pose a challenge for countries and institutions, especially with the increasing demand for natural, financial, and human resources. AI has become a transformative force in reshaping the global economy, serving as a strategic tool that influences how resources are managed and utilized, thereby enhancing efficiency and productivity. It has had a profound impact on economic resources across various sectors and is expected to affect around 40% of jobs worldwide, [i] replacing some jobs and necessitating readiness for this change.

The interaction between AI and economic resources opens new avenues for sustainable economic development. The relationship between economic resources and AI is crucial, influenced by enabling economic factors. Open markets and significant investments in research and development (R&D) enhance the potential for rapid AI innovation. Economic resources provide the necessary infrastructure for the utilization of big data, a cornerstone of AI. Studies indicate that small and medium-sized enterprises (SMEs) can benefit from this technology to increase their competitiveness by applying new technologies that enhance their strategic efficiency. [ii] In the context of the Fourth Industrial Revolution, technological innovations require significant contributions from knowledge resources [iii], creating synergies between these elements. This strategic relationship underscores the importance of investing in economic resources to boost AI innovation. Through this study, we will explore how AI can reshape the economic landscape and enhance resource utilization to achieve sustainable economic development goals.

1.2. Problem Statement:

Despite technological advancements, many governments and companies face challenges in efficiently managing economic resources

in the context of the Fourth Industrial Revolution. The problem lies in the suboptimal utilization of resources, leading to waste and reduced productivity, which in turn exacerbates economic issues.

The main question of the study is: How can AI contribute to improving the utilization of economic resources and reducing waste?

1.3. Importance of the Study:

The study aims to identify the dimensions of the relationship between AI and economic resources and their impact on sustainable economic development.

1.4. Objectives of the Study:

-Explore AI's role in achieving optimal utilization of economic resources.

-Identify areas where AI can be applied in economic resource management.

-Evaluate AI's effectiveness in improving resource utilization and reducing waste.

-Propose strategies to enhance the use of AI in resource management.

1.5. Hypothesis of the Study:

The hypothesis states: **"AI enhances the utilization of economic resources, reduces waste, allocates resources, influences labor markets, and promotes economic growth".**

1.6. Methodology of the Study:

To achieve the study's objectives, the descriptive-analytical method was used.

2.1. Theoretical Framework:

To date, four major industrial revolutions have occurred. These historical stages have transformed the production, economy, and society. Here are the details of the revolutions: [iv]

• First Industrial Revolution (Late 18th - Early 19th Century):

This phase began in Britain and relied on the use of steam engines to improve industrial and agricultural production. It was characterized by the development of the textile industry, the use of coal as a primary energy source, and the evolution of the railway system.

• Second Industrial Revolution (Late 19th - Early 20th Century):

This phase relied on electricity and assembly lines. It included advancements in industries such as steel, oil, and chemicals. Innovations such as the telephone, light bulb, and automobiles emerged.

• Third Industrial Revolution (Second Half of the 20th Century):

This phase relied on electronics, computers, and information technology. It was characterized by the automation of production, the use of robots, and the internet.

• Fourth Industrial Revolution (Early 21st Century):

This phase relies on smart technology, AI, and the automation of things. It is characterized by the integration of digital systems, the use of big data, and 3D printing. It focuses on integrating digital, biological, and technological advancements.

The development of AI and modern technology has had a profound impact on the global economy. This is supported by economic theories that highlight the importance of technology and AI in improving the

utilization of economic resources and productivity. In this study, we will discuss some economic theories, including:

a) New Growth Theory:

This theory emphasizes the importance of technology and innovation as the main drivers of long-term economic growth. It posits that investment in R&D and education improves the productivity of economic resources. AI enhances innovation and productivity through technologies like big data analysis and economic forecasting. Technology enhances the efficiency of resource allocation through automation and process analysis. [v]

b) Total Factor Productivity (TFP) Theory:

Robert Solow discussed the role of technology as an external factor affecting productivity. This theory measures the positive impact of technology and technological progress on productivity, regardless of the quantities of labor or capital used. The introduction of AI in economic processes reduces costs and improves quality. For example, the use of robots in manufacturing increases productivity while reducing waste. [vi]

c) Digital Economy Theory:

This theory discusses the dimensions of technology and AI in the future of the digital economy. The modern economy is shifting from reliance on traditional resources to reliance on data and AI as the foundation for innovation and production. Companies use AI to analyze big data and make better decisions. E-commerce platforms use AI algorithms to personalize products for customers. [vii]

d) Technological Change Theory:

Schumpeter focuses on innovation as a tool for reshaping economic markets. Technological progress reshapes labor markets and changes

the structure of economic production. AI replaces routine jobs with smart machines, leading the workforce towards higher-skilled jobs. This improves the efficiency of resource use, such as energy and time, through smart technologies. [viii]

e) Cost Advantage Theory:

Michael Porter discusses how technology contributes to achieving a competitive advantage. Advanced technology reduces production costs and increases competitive efficiency. AI reduces operational costs through automation and better resource management. For example, the use of AI systems to optimize supply chains reduces logistical costs. [ix]

f) Sustainability Economics Theory:

Herman emphasizes the importance of technology in achieving sustainable development and efficient resource use. Smart technology contributes to improving the efficiency of using scarce resources and achieving sustainable development. The use of AI in managing natural resources, such as applying technology to monitor emissions and reduce pollution, is an example of this. [x]

g) Disruptive Innovation Theory:

Christensen discusses the concept of disruptive innovation and its impact on markets. Disruptive innovation refers to technology that radically changes the nature of a market or industry. AI has reshaped sectors such as healthcare, manufacturing, and financial services. Companies like Tesla have used AI to revolutionize the electric car industry. [xi]

h) Human Capital Theory:

Becker explains the importance of education and training in enhancing productivity through technology. Skills and knowledge acquired (such as AI skills) improve economic productivity. Investing

in training the workforce to use modern technology increases efficiency. AI helps design educational programs that enhance the performance of the workforce. [xii]

2.2. What is the essence of Artificial Intelligence (AI)? [xiii]

❖ **Definition of AI:** AI is the ability of machines and technologies to perform tasks that typically require human intelligence. It includes a range of technologies that can be integrated to perform different types of tasks such as (language understanding, learning, and planning).

❖ **How AI Works:** AI works by mimicking human cognitive processes such as (learning, thinking, and problem-solving). Smart systems can improve their performance over time based on the information they gather.

❖ **Practical Applications:** AI applications are diverse across various fields such as (business, healthcare, transportation, and entertainment). It is used in data analysis, enhancing customer experience, and developing smart systems like self-driving cars.

❖ **Importance of AI:** The importance of AI in our daily lives is increasing, as it contributes to improving efficiency and increasing productivity in many fields. It also opens new avenues for innovation and technological development.

2.3. AI Indicators and Economic Resources Needed for AI:

❖ **Global AI Index:**

The link is below:

https://www.tortoisemedia.com/intelligence/global-ai

This is the first index to compare countries based on their level of investment, innovation, and implementation of AI. It aims to understand AI in 83 countries and record their results on AI capability based on (122) different indicators grouped into three analysis pillars: (implementation, innovation, and investment). These pillars collectively cover talent, infrastructure, operating environment, R&D, the business ecosystem, and government strategy.

The key findings of the 2024 AI Index show the top five countries as follows: [xiv]

- First Place: United States, leading the global AI Index rankings.
- Second Place: China.

(These two major powers significantly outpace all other countries in the index).

- Third Place: Singapore.
- Fourth Place: United Kingdom.
- Fifth Place: France.

This is based on the government's strategy for investing in AI, which is reflected in national public funding allocated for AI.

The Global AI Index measures countries' government AI strategies by analyzing national AI strategy documents and government spending commitments.

Saudi Arabia ranks first due to significant government spending commitments, which will be implemented over the coming years. The United States follows in second place in terms of government spending on AI. Then comes South Korea, followed by France, Germany, and Spain. Canada ranks first in terms of public investments in high-quality AI computing infrastructure.

More countries have published or are in the process of drafting a national AI strategy. Most modern AI strategies consider AI ethics. A

quarter of the countries listed in the index support the development of a basic model.

❖ **Government AI Readiness Index:**

This is an evaluation tool aimed at measuring governments' readiness to adopt and implement AI technologies in their services and institutions. This index is published annually by Oxford Insights and the Center for International Development Research. The official website is:

https://www.oxfordinsights.com/government-ai-readiness-index

➢ **Evaluation Criteria for Government Readiness:**[xv]

The index relies on several criteria, including:

a) **Digital Infrastructure:** (The extent to which a country has available and developed technical infrastructure).

b) **Human Capital:** (The level of skills and expertise in AI among the workforce).

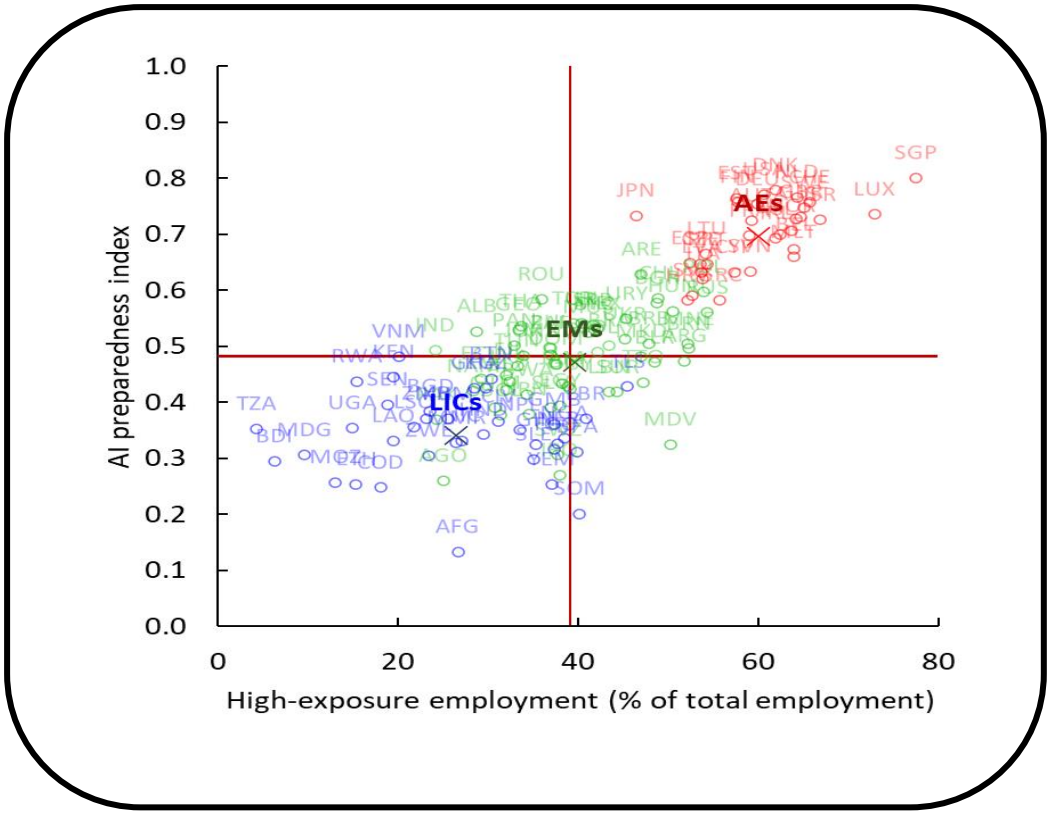
c) **Regulatory Framework:** (The presence of policies and legislation that support the development and use of AI technologies).

d) **Innovative Environment:** (The extent to which the state supports R&D and innovation in AI).

In the 2022 report, the United Arab Emirates ranked first in the Arab world and 18th globally, while Saudi Arabia ranked second in the Arab world.

Using this index, experts at the fund evaluated the readiness of 125 countries. The results showed that richer economies, including developed economies and some emerging market economies, are better equipped for AI adoption compared to low-income and developing countries. Singapore, the United States, and Denmark scored the

highest in the index based on strong results in the four criteria it tracks. This is illustrated in Figure 1.



Sources: Fraser Institute; International Labour Organization; International Telecommunication Union; United Nations; Universal Postal Union; World Bank; World Economic Forum; and IMF staff calculations.

Note: The plot comprises 125 countries: 32 AEs, 56 EMs, and 37 LICs. The red reference lines are derived from the median values of the AI Preparedness Index and high-exposure employment.

Figure 1: AI Preparedness Index and Employment Share in High-Exposure Occupations.

Source: https://www.imf.org/ar/Blogs/Articles/2024/01/14/ai-will-transform-the-global-economy-lets-make-sure-it-benefits-humanity

Based on insights from the AI readiness index, advanced economies should prioritize AI innovation and integration, while establishing robust regulatory frameworks. This will create a safe environment for AI, fostering public trust. Meanwhile, emerging market and developing economies should prioritize laying strong foundations through investments in digital infrastructure and the availability of digital skills among the workforce.

2.4 Economic Resources Required for AI Development: [xvi]

Developing and implementing AI technologies requires significant economic resources, which can be categorized into several key areas:

a) Data: AI models, especially those based on deep learning, require vast amounts of data for effective training. Model performance improves with the size of the data set, which can range from billions to trillions of tokens. Consequently, companies like Microsoft and Google have a significant advantage due to their ability to access vast, structured data from their user bases.

b) Human Capital: The high demand for skilled AI researchers and developers is evident. In 2020, approximately 70% of AI PhD graduates were employed by the industry, up from 21% in 2004. This trend has led to talent migration from academia, with expertise concentrated within the industry.

c) Computing Power: Substantial computing power is essential for training large AI models. Industry models in 2021 were, on average, 29 times larger than their academic counterparts, highlighting the resource gap between industry and academia.

d) Financial Investment: Significant financial investments are made in AI research and development. The U.S. government allocated $4.8 billion for AI research and development in 2022, with plans to increase non-defense federal spending on AI R&D to $32 billion by 2026.

e) Infrastructure and Policy Support: Developing AI technologies requires robust infrastructure and supportive policies. The National Science Foundation and other U.S. government agencies invest in AI research institutes and infrastructure to foster innovation and maintain leadership in AI.

3.1 Impact of AI on Sectors, Economic Resources, and Economic Growth:

- **Economic Sectors:** [xvii]

AI is revolutionizing various economic sectors, enhancing efficiency, innovation, and economic value. Here are some key examples:

a) Logistics: Companies like UPS are using AI to improve delivery operations and reduce package theft. UPS developed the Delivery Defense program, an AI system that assigns a "delivery confidence score" to each location based on historical data, allowing for the rerouting of at-risk packages to safer locations.

b) Healthcare: In dental care, companies like VideaHealth are using AI to improve the accuracy and efficiency of X-ray diagnoses. The AI platform can detect issues like cavities and gum disease that

might be missed by the human eye, leading to standardized diagnoses and consistent treatment outcomes.

c) Agriculture: John Deere has integrated AI into agricultural practices through precision technologies. The See & Spray technology uses computer vision and machine learning to differentiate between crops and weeds, significantly reducing herbicide usage and lowering costs for farmers.

d) Manufacturing: AI is transforming manufacturing by enhancing efficiency and reducing costs. It plays a pivotal role in process modeling, product improvement, and quality control, contributing to the Fourth Industrial Revolution.

e) Retail and E-commerce: AI is enhancing customer experiences through personalized shopping, dynamic pricing, and efficient inventory management, boosting sales and customer satisfaction.

- **Economic Resources:** [xviii]

AI is revolutionizing resource allocation and optimization in various fields:

1 .Healthcare: AI improves resource allocation by enabling more accurate diagnoses, streamlining patient care, and accelerating drug discovery.

2 .Finance: AI enhances investment decisions, fraud detection, and customer service through chatbots and virtual assistants.

3 .Manufacturing: AI optimizes resource allocation by improving operational efficiency and enabling predictive maintenance.

4 .Operations Management: AI streamlines processes and enhances decision-making by analyzing large datasets to improve business operations.

5 .Project Management: AI enhances resource optimization by providing data-driven insights for proactive resource allocation.

6. Sustainability Efforts: AI contributes to resource optimization for environmental and social goals.

3.2 Economic Growth and Future Trends of AI:

AI is expected to be a major driver of economic growth. According to IDC, AI is projected to contribute $19.9 trillion to the global economy by 2030, representing 3.5% of global GDP. Generative AI is anticipated to generate between $2.6 trillion and $4.4 trillion in value across industries. The manufacturing sector alone is expected to gain $3.8 trillion by 2035 due to AI integration.[xix]

A report by PwC titled "The Economic Impact of Artificial Intelligence on the Global Economy" [xx]

suggests that AI's impact on global GDP by 2030 could contribute up to $15.7 trillion to the global economy. This includes $6.6 trillion from productivity improvements and $9.1 trillion from consumer demand effects. The report indicates that sectors like healthcare, fintech, and manufacturing will be the biggest beneficiaries, reflecting its significant potential to boost productivity and economic growth.

Employment in advanced economies is also expected to be affected. It is estimated that around 60% of jobs may be impacted by AI technology, as it enhances the productivity of many jobs while potentially reducing demand for others.

4.1 The Iraqi Economy and AI:

For the Iraqi economy, while specific statistics are not available, the adoption of AI technologies can contribute to improved productivity efficiency across various economic sectors, fostering economic growth and creating new job opportunities.

Iraq ranked 77th globally and 9th in the Arab world in the Global AI Index 2024, indicating a growing interest in developing digital infrastructure despite economic and political challenges.

In the Government AI Readiness Index, Iraq ranked 104th out of 160 countries, with this low ranking attributed to a lack of data, the absence of a specific cybersecurity law, and unresolved conflicts between entities responsible for AI oversight. [xxi]

Iraq is witnessing an increase in technology investments, including AI, but these investments remain modest compared to other Arab countries. Sectors such as education, healthcare, and oil are expected to benefit from AI technologies, leading to improved efficiency.

The Iraqi government is working to enhance automation as part of the Digital Transformation Strategy 2030, which includes improving infrastructure and investing in AI technologies. AI is projected to contribute around $10 billion to Iraq's GDP by 2030 if investments in this area continue. The oil sector, which forms the backbone of the Iraqi economy, can significantly benefit from AI to enhance exploration and production processes and reduce operational costs.

However, Iraq's position is not yet at the desired level, requiring genuine government action in the technology sector to enable Iraq to take advantage of the rapid developments in AI.

5 .Conclusions:

a) The study's hypothesis, which states: "AI improves the utilization of economic resources, reduces waste, optimizes resource allocation, labor markets, and economic growth," has been proven.

b) The relationship between AI and economic resources is complex and multifaceted. AI requires significant economic resources for its development and implementation.

c) AI is a powerful tool for improving economic resource management and achieving sustainable development. It has the potential to significantly transform economic sectors, enhance resource allocation, and drive sustainable economic growth.

d) Achieving these benefits requires careful management of AI challenges, including job displacement, environmental impact, and ethical considerations.

e) Iraq's position is not yet at the desired level, necessitating genuine government action in the technology sector to enable Iraq to take advantage of the rapid developments in AI.

6 .Recommendations:

a) Focus on training the workforce and developing digital infrastructure to maximize the benefits of these technologies in enhancing the national economy.

b) Enhance investment in AI technologies.

c) Encourage academic institutions to collaborate with the private sector to develop innovative AI applications.

d) Governments and industry leaders should work together to ensure the desired benefits of AI are realized.

e) Develop national strategies for AI adoption and establish policies that support the use of AI in resource management.

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The role of structural imbalance of public expenditures in the structural imbalance of economic activities in Iraq for (2004-2022)

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Abstract

The Iraqi economy has historically faced challenges due to ineffective financial management, which has disrupted its economic framework and led to a persistent reliance on the oil sector for funding economic activities and improving its stagnant conditions. The study found that a distortion exists within the actual production structure, as the non-oil production sectors contribute minimally to the gross domestic product, while service sectors dominate, revealing a failure among policymakers to allocate economic resources effectively to achieve objectives that would enhance social and economic benefits continuously and sustainably. The study suggested that it is essential to increase the production sectors' contribution to the gross domestic product and also emphasized the importance of implementing a sovereign fund in Iraq, which would help to rectify structural imbalances and boost development sectors. The research revealed a notable, long-lasting disparity in public expenditure that favored present-day spending. This fundamental imbalance had both direct and indirect effects on the overall GDP structure. The research suggested optimizing current expenditures, boosting investment spending, enhancing the GDP, and reducing complete reliance on oil.

Keywords: public expenditures, structural imbalance, economic activities, non-oil sectors.

INTRODUCTION

The Iraqi economy possesses distinct traits that set it apart from numerous other economies. A key feature is its reliance on a single revenue source (oil revenue), which has exacerbated structural imbalances within the economy and has notably influenced the approaches taken in fiscal policy. A significant aspect of this is the increase in public expenditure driven by revenue from oil, where Iraq's fiscal policies are marked by a paternalistic approach to public finances. Moreover, there is another form of imbalance, evidenced by a greater emphasis on current (operational) expenses rather than on investment spending, leading to budgetary pressures and significant financial constraints due to the disproportionate nature of the components in the overall budget. One of the adverse effects of this situation has been the rise in surplus demand for consumer goods and services, predominantly imported from other countries, which has further intensified the structural imbalance within Iraq's general budget, particularly in recent years.

Research Problem: Public spending suffers from a structural imbalance in favor of current spending to finance government activities, cover debt, and maintain social protection programs. The repetition of these consumption roles over the long term has created a sustained wave of imbalances in the structure of the Iraqi economy.

The Importance of the Research: The Iraqi economy is characterized by a set of characteristics that distinguish it from many other economies. The most important of these characteristics is that it is a country with a single rent (oil rent), which has deepened the structural imbalances in the economy in general and fiscal policy trends in particular. Most notable of these is the expansion of public spending based on (oil) rent revenue (i.e., fiscal policy in Iraq is characterized by what is known as paternalistic public finance). Another imbalanced

characteristic is the focus on current (operational) expenditures more than on investment expenditures, to the extent that this has become a burden on the budget and a heavy financial constraint due to the imbalance in the components of the general budget.

Research Hypothesis: The persistence of a structural imbalance in public spending leads to a similar and sustained imbalance in all economic activities that comprise GDP.

Research Objective:

1. Analyse the structure of public spending and determine the relative contribution of current and investment spending.

2. Analyse the structure of GDP and the trend of economic activities during the research period.

3. Analyse the relationship between the structural imbalance in public spending and the structural imbalance in GDP.

Structural Imbalances: A Theoretical Framework

1. The concept of economic structural imbalance

The economic structure refers to the set of ratios and relationships existing between the elements of economic life that belong to a certain economic entity at a certain time and place. Others define the economic structure as a system of relationships that has its laws and is characterized by internal unity and self-regulation, provided that any change in the relationships leads to a change in the system itself (Hussein Shenawa Majeed, 2011, 116).

The concept of structural imbalance pertains to the disproportional relationships among the various elements and components within the economic structure, as well as the extent and regularity of these imbalances over time, or the transformation in their essential characteristics to the degree that they can influence economic growth

and development processes. Structural imbalance is also characterized as a disruption in the proportional relationships of the economic structures that make up the economic system, which is contrary to what economic theory suggests about the proportional connections between them (Saad Mahmoud Al-Kawaz and Samir Hanna Bahnam, 2010, 45).

Simon Kuznets points out that structural imbalance can be identified and measured by calculating the difference between the relative importance of each sector to GDP and the relative importance of each sector's labor force to the total labor force. This difference represents the degree of sectoral imbalance. By summing the degrees of sectoral imbalances (regardless of their sign) and comparing them to their counterparts in developed economies, which do not exceed 20%, we can obtain the structural imbalance in the economy (Salem Tawfiq Al-Najfi, 2002,47). From this, it becomes clear that structural imbalance refers to an imbalance in the general equilibrium relations between the elements and components of the economic structure, whose basic characteristics change to the extent that it affects the stability of the economy and thus causes it to lose its state of general equilibrium. (Hossam Ayed Safouk, 2023, 30)

2. Explaining Structural Imbalances Using the Second Gap Model

The basic idea of this model is that there is a close relationship between domestic savings and external financing. The lower domestic savings are compared to the investments required to achieve the targeted growth rate; the greater the need for external financing. During the early stages of the development process, the need for financing increases to bridge the gap between domestic savings and the investments required to be implemented in a manner that exceeds what can be managed from domestic savings. (Hassan Hadi Saleh, 2007, 75-76) This leads to the need for external financing, and the need for external financing

increases to finance foreign trade due to the value of imports exceeding the value of exports over a given period. (Fadila Januhan, 2006, 16)

Economists have emphasized the importance of the equality of both gaps over the past period, and it is not certain that they will be equal in any future period. This means that income consists of a combination of consumer and investment goods, in addition to goods destined for foreign markets. (Abdul Karim Jaber, 2012, 19-20)

3. Types of Structural Imbalances

Countries seek to identify the shortcomings in their economies and diagnose the weaknesses in their economic policies in preparation for correcting them and eliminating the imbalances and distortions affecting their economies. (Salem Ali Al-Jundi, 1995, 176)

The most important of these imbalances are the following:

1. Internal structural imbalance: This refers to the imbalance between domestic output and consumption, i.e., the disproportion between the current domestic demand for goods and services and the current domestic supply of those goods and services. (Kamel Badan Saleh, 2012, 37-38) Internal imbalances are often due to financial imbalances (Samir Khalaf Bandar, 2018, 56), imbalances in the monetary structure (Adnan Hussein Younis et al., 2017, 25), and production imbalances (Ali Majeed Al-Hamadi, 1989, 9).

2. External structural imbalances: The structure of developing countries' economies is responsible for the imbalances that result in their balance of payments. Furthermore, external shocks to developing countries' economies and the international division of labor cause an imbalance between developed and developing countries, which then leads to the emergence of external structural imbalances. (Ramzi Zaki, 1980, 97)

Indicators Of Structural Imbalance in Public Expenditures and Structural Imbalance in Economic Activities in Iraq

1. Structural Imbalance Index of Public Expenditures

The index of the relative contribution of current and investment government spending was used during the research period to show us the extent of the structural imbalance in public expenditures. According to Table (1) and Figure (1), the contribution of current expenditures to total public expenditures ranged between (66%) in 2013 as a minimum and (94%) in 2020 as a maximum, while the relative contribution of investment expenditures ranged during the research period between (6%) only in 2020 as a minimum and (34%) in 2013 as a maximum.

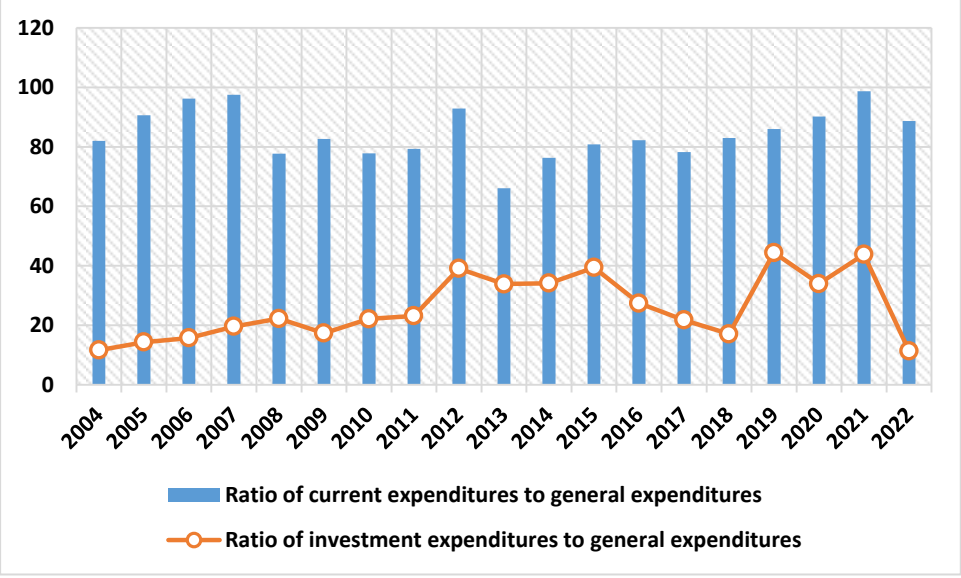
Table (1): Current and investment expenditures in Iraq for (2004-2022) (million dollars, %)

Year	Current expenditures	Ratio of current expenditures to general expenditures	Compound growth rate of current expenditures	investment expenditure	Ratio of investment expenditures to general expenditures	Compound growth rate of investment expenditures
2004	18998.23	81.99		2700.79	11.65	
2005	18424.86	90.61		2583.4	14.38	
2006	21961.55	96.2		3597.03	15.75	
2007	26071.58	97.53		5249.81	19.64	
2008	43840.05	77.73		12553.24	22.26	
2009	39265.86	82.64	0.1287	8246.71	17.35	0.2045
2010	46650.3	77.82		13293.45	22.17	
2011	52073.12	79.26		15241.12	23.19	
2012	64998.81	92.88		25172.34	39.08	
2013	67535.85	66.1		34631.86	33.89	
2014	72869.01	76.28		32620.11	34.15	
2015	47828.97	80.85	0.0042	23342.05	39.45	0.0984
2016	46355.26	82.24		15469.1	27.44	
2017	49601.38	78.18		13835.68	21.81	
2018	56346.93	82.91		11613.72	17.08	
2019	70202.99	85.92		19639.41	44.45	
2020	57663.15	90.19		2539.13	33.97	
2021	60624.58	98.68	0.0457	2687.84	43.83	-0.233
2022	61845.22	88.66		2876.66	11.4	

Source: Ministry of Planning, Central Statistical Organization, Statistical Abstract, Public Finance Accounts, various years.

It seems that there has been a structural imbalance skewed towards current expenditures, which has negatively impacted investment expenditures, whose importance has diminished throughout most of the research period. This imbalance is indicative of several economic realities, including the rise of consumerism within society, the erosion of financial discipline, the increase in public debt, a decrease in government trust in the economy, as well as in individuals and institutions, along with other adverse signs that suggest the mismanagement and loss of financial resources generated from crude oil sales.

Figure (1): The relative contribution of current and investment spending to total government spending in Iraq for (2004-2022) (%)



Source: Ministry of Planning, Central Statistical Organization, Statistical Abstract, Public Finance Accounts, various years.

2.Structural Imbalance Index of Economic Activities

The relative contribution index of economic activity sectors was used to express the extent of structural imbalance in local economic activities in Iraq.

Table 1 shows that the oil sector's contribution to GDP ranged between a maximum of 57.87% in 2004 and a minimum of 40% in 2017. Non-oil commodity sectors recorded a contribution to GDP ranging between a maximum of 16.62% in 2020 and a minimum of 8.34% in 2022. Distribution sectors recorded a contribution to GDP ranging between a maximum of 22.99% in 2016 and a minimum of 12.33% in 2008. Finally, service sectors recorded a contribution to GDP ranging between a maximum of 33.44% in 2020 and a minimum of 15.59% in 2006.

Thus, there is a structural imbalance in the economic activity sectors that make up the GDP, which was in favor of the oil sector at the expense of the deterioration and distortion of the rest of the economic activities. The development of one sector, the oil sector, expresses a frightening sectoral concentration and a bleak rentierism desired by decision-makers throughout the research period. This has led to a weak structure of the GDP and a lack of diversity, which has been negatively reflected in the weakness of non-oil public revenues due to the deterioration in the performance level of local economic activities.

Table (2): The relative contribution of economic sectors to the gross domestic product in Iraq for the period (2004-2022) (%)

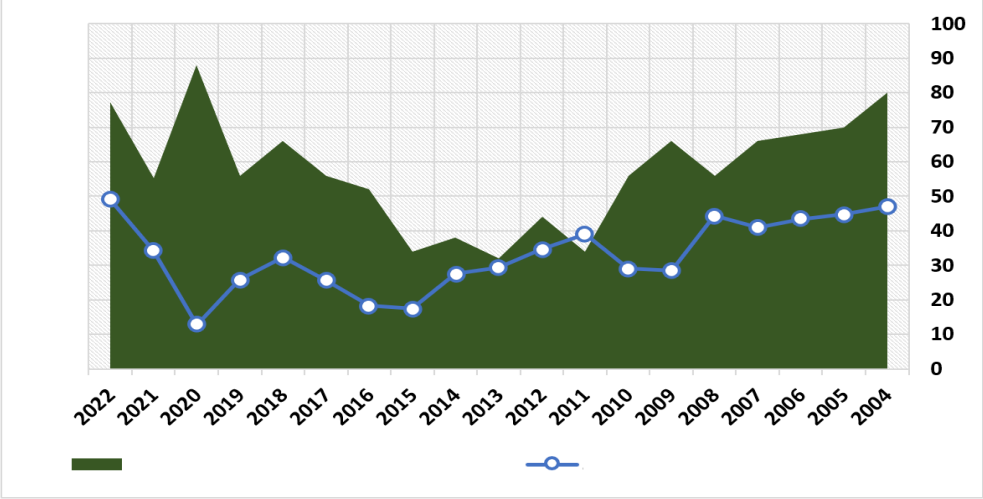
Year	Relative contribution of the oil sector	Relative contribution of the commodity sector excluding oil	Relative contribution of the distribution sector	Relative contribution of the service sector
2004	57.87	10.9	15.01	16.71
2005	57.63	12.86	14.43	15.59
2006	55.29	11.98	14.42	18.81
2007	52.95	12.09	14.22	21.2
2008	55.51	11.13	12.33	21.93
2009	42.86	14.36	15.91	27.63
2010	44.99	15.97	14.79	24.89
2011	53.03	14.08	12.46	21.02
2012	49.73	14.97	15.07	20.82
2013	45.9	16.56	15.96	22
2014	43.87	16.36	16.33	23.78
2015	33.49	16.04	22.99	28.26
2016	34.23	15.93	22.67	28.11
2017	40	14.31	21.74	25.29
2018	44.69	12.3	20.43	23.76
2019	41.42	15.46	18.95	25.47
2020	29.37	16.62	21.38	33.44
2021	45.69	11.35	17.64	25.83
2022	57.26	8.34	15.38	19.41

Source: Ministry of Planning, Central Statistical Agency, Statistical Abstract, National Accounts, various years.

Figure 2 confirms many facts, the most important of which is that the structural imbalance of the oil sector's contribution to the commodity sector was highly volatile during the research period. This indicates that the contribution of both sectors was not at all uniform or desirable, and that the structural imbalance is of a long-term type, in addition to the prevalence of concentration in the oil sector, which created a forced migration of many workers towards oil activities because their income is relatively higher than the rest of the sectors of local economic activities.

The structural imbalance of current expenditures' contribution to investment expenditures was also violently volatile throughout the research period. This confirms the exposure of local markets to violent waves of fluctuations resulting from the shift in current expenditures from intensity to lightness and vice versa. This rendered the values of most economic variables unstable, pushing economic stability further away and paving the way for instability. The difference between the two imbalances represents a gap in financial resource waste throughout the research period. Figure 2 confirms the preponderance of current expenditures over investment expenditures, which was higher than the difference between the oil sector and the commodity sector. This illustrates the extent of the lack of rationalization in public finances, which has driven the expansion of current expenditures at the expense of investment expenditures, which are relied upon to build strategic projects and infrastructure. Perhaps behind these economic realities lie political motives, often entailing numerous paradoxes that have resulted in a crumbling economy.

Figure (2): The amount of difference in the contribution of the oil sector compared to the commodity sector, and current expenditures compared to investment expenditures in Iraq for the period (2004-2022) (%).

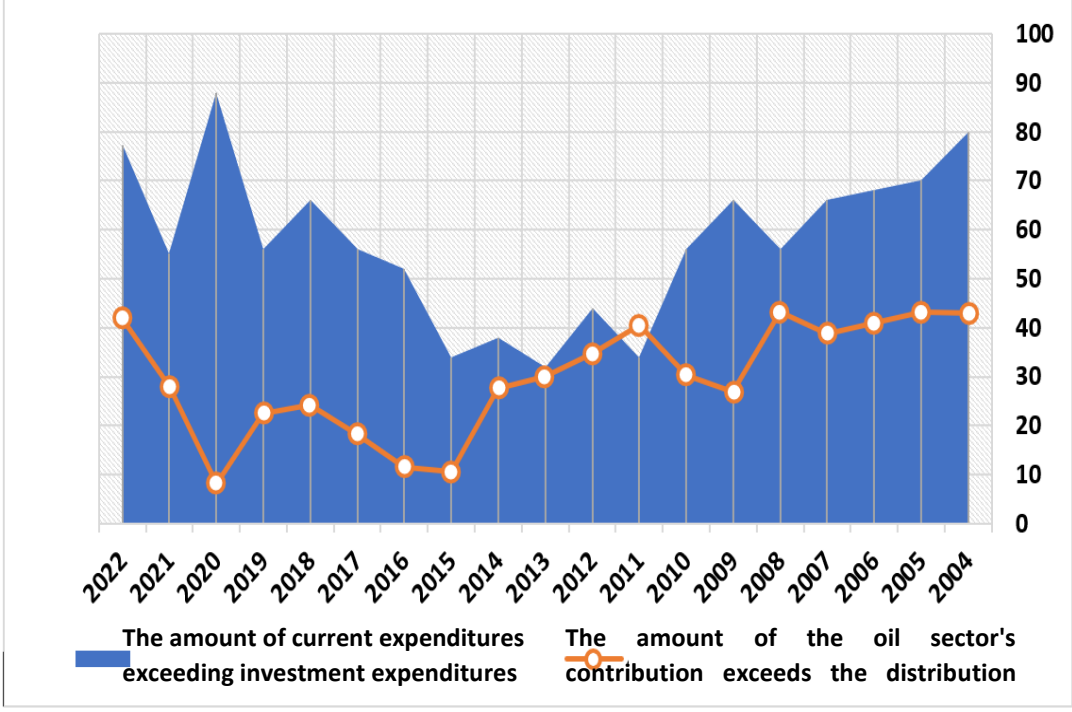


Source: Researcher's work based on data from Figure (1) and Table (1). The difference was calculated on the basis of subtracting the relative contribution of the dominant sector from the weaker sector, as stated in the above classification.

Figure 3 also confirms the reality of the significant fluctuations occurring over time in the difference in the contribution of the oil sector compared to the distribution sector. This indicates successive imbalances and bottlenecks in both sectors, most of which are attributed to international fluctuations and changes, some of which are local, which have negatively impacted overall economic performance. Figure 3 confirms the dominance of the difference in the contribution of expenditures over the difference in the sectoral contribution of oil and

distribution activities. The gap in financial resource waste is high in distribution activities, indicating the existence of a large financial surplus during the research period that was not properly utilized. This led to the waste and loss of these financial surpluses and the misallocation of economic resources for production and distribution. This means that the economic policies pursued were irrational and incorrect, and reinforced the persistent structural imbalance in both public expenditures and production activities.

Figure (3): The amount of difference in the contribution of the oil sector compared to the distribution sector, and current expenditures compared to investment expenditures in Iraq for the period (2004-2022) (%)

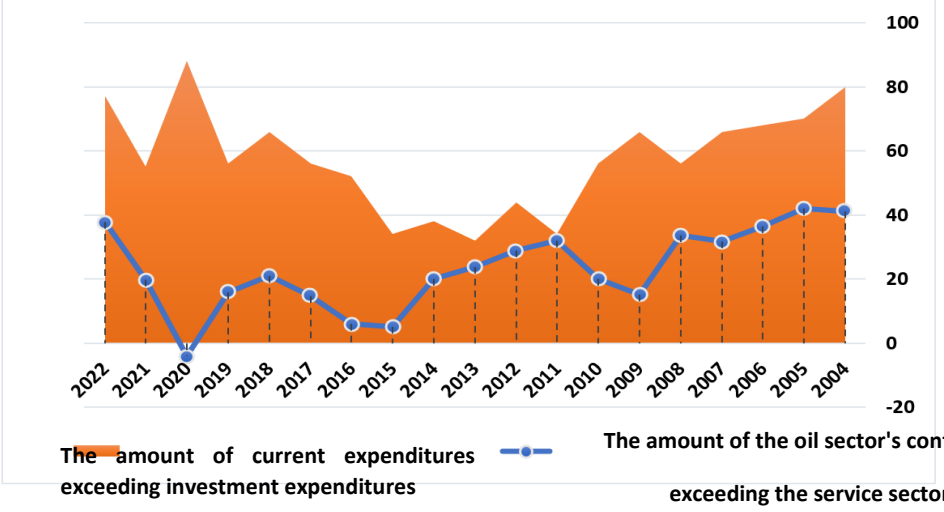


Source: Researcher's work based on data from Figure (1), Table (1).

Based on Figure (4), the variations in the service sector's contribution were less pronounced compared to those of other economic sectors. This is attributable to the significance of service activities in creating added value within the gross domestic product (GDP). Additionally, during the study period, service activities held the second position following the oil sector regarding their contribution to GDP in Iraq. This may have helped cushion the intensity of fluctuations in these activities.

The difference between the two is also smaller than that of other economic activities. This means that the financial resource waste gap was at its lowest level in service activities. This opens the way for decision-makers to support and enhance service activities, allocating the necessary funds for their development. The service sector could be the sector best qualified to lead development after the oil sector in terms of GDP.

Figure (4): The Difference in the Contribution of the Oil Sector to the Service Sector, and Current Expenditures to Investments in Iraq for (2004-2022) (%)



Source: Researcher's work based on data from Figure (1), Table (1).

CONCLUSIONS

1. Public expenditures increased in general, but current expenditures were much larger than investment expenditures, which reinforced consumerism among individuals, while all public and private investments in the country declined.

2. There is a structural imbalance in the GDP sectors, and this imbalance is sustained by the imbalance in the structure of public spending, which supports the research hypothesis.

3. Most of the fluctuations and instability in the GDP sectors were due to fluctuations and instability in public spending, meaning that most of the structural imbalances affecting GDP were due to the structural imbalance in public spending throughout the research period.

RECOMMENDATIONS

1. Rationalize current spending and limit it to fluctuations in oil prices in international markets, and increase investment spending to support the domestic investment structure and develop the economy's ability to withstand external crises and shocks.

2. Diversify output, revive the role of the local manufacturing industry, and utilize crude oil as a supporting raw material for that industry, giving it a competitive advantage in local markets.

3. Reduce reliance on crude oil revenues to finance the general budget, which has caused continued structural imbalances in spending and, consequently, output, and utilize oil revenues to strengthen the local investment environment.

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The impact of non-oil exports on the structure of sectorial contribution to GDP: Iraq: An econometric study (2004-2023) using the ARDL model

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Abstract:

The issue of oil exports in renter economies has gained significant attention due to the fact that many countries, including renter ones, have come to recognize the significant imbalances and distortions in their economic structures caused by their reliance on crude oil exports as their main source of income. This has led to their characterization as a unilateral economy. The purpose of this study is to investigate how Iraq's crude oil exports have altered the country's sectoral contributions. Using the Ardl model, the study found that oil exports and agricultural contributions have a long-term joint integration connection, but that oil exports do not contribute to the growth of the agricultural sector in the long run. Contrary to economic theory, the agricultural sector's contribution to the economy is declining. What's more, there is no long-term equilibrium relationship between oil exports and the contributions of the industrial and service sectors, which confirms the absence of joint integration.

Introduction Since many rentier states have come to terms with the fact that their economies are severely skewed and imbalanced because of their reliance on a single revenue stream—oil in this case—the correlation between crude oil exports and the contribution of economic sectors has taken on more significance in recent years. In light of the potential consequences of this aspect—the resource curse—it is imperative that measures be put in place to diversify the state's production, commerce, and financial resources; after all, natural resources may be finite and subject to extreme price fluctuations, which can reduce exchange limitations. By studying these nations' structural features, we may learn how to diversify their revenue streams via development strategies that seek to create an economy where natural resources are less dominant, which in turn leads to stability and growth. The study's difficulty started here.

Research Problem: Iraq's heavy reliance on a single source of income, crude oil, makes its economy unstable، For example, many oil-producing countries face occasional shocks due to the correlation of oil prices with global markets, which impacts economic growth and stability.

Research Hypothesis: Research Hypothesis: The study is based on the hypothesis that reliance on crude oil exports alone negatively affects the contribution of other economic sectors to GDP.

H1: Non-oil exports have an impact on the share of the manufacturing sector.

H2: Non-oil exports have an impact on the share of the agricultural sector.

H3: There is a positive or negative impact on the share of services (trade-supporting services).

Research Objective: The study seeks to achieve several objectives, the most important of which is to understand the impact of crude oil exports on reshaping the contribution ratios of economic sectors to

GDP and the foundations of diversification using economic measurement methods.

Research Methodology: The descriptive approach was used to identify the study variables, while the statistical method was used to examine the impact of the relationship between the studied variables.

Research Structure: To achieve this goal, the study was divided into two sections. The first section addressed exports and economic sectors, including the theoretical and conceptual framework. The second section analyzed the impact of the relationship between crude oil exports and the contribution of economic sectors. The study concluded with conclusions and recommendations.

The first requirement: the theoretical and conceptual framework of the research

1-The concept of foreign trade : Foreign trade consists of two main pillars: exports and imports, which is known as the exchange of goods and services between countries. Numerous concepts have been mentioned in foreign trade, including:(**Harbi Muhammad Musa Araikat, 2006, p. 233.)**

A: The concept of foreign trade: A branch of economics that specializes in the study of economic transactions taking place across national borders. Trade transactions include the following:

A. The exchange of physical goods across countries, represented by the movement of raw materials, semi-manufactured goods, consumer goods, and investment goods.

B. The exchange of services across countries, which includes transportation, insurance, financing, the provision of technical expertise, the movement of individuals, and others.

C. The exchange of money, which includes the movement of capital across countries for long- and short-term investments, and direct and indirect investments.

2-Foreign Trade Theories: There is a difference between countries in the availability of natural and human resources, as well as the difference in the costs of producing goods between them. This is due to many factors. In light of this, many researchers have attempted to understand trade exchange and develop the best policies and methods to achieve gains and enhance the state's power through foreign trade, starting with the proponents of mercantilism and the natural school and its pioneers, such as David Hume, who advocated for free trade and prohibited restrictions on it (Ezzat, 2005, pp. 19-31). In the second half of the eighteenth century, more advanced writings appeared explaining how and why countries specialize in producing goods and exchanging them for other goods with other countries. This was particularly the writings of Adam Smith, whom some consider a pioneer in establishing the foundations of sound scientific foreign trade, and Ricardo. This period was called the Classical or Traditionalist period, as he stated that the division of labor and specialization have significant benefits in increasing production and trade exchange and achieving benefits from them (Emon, 2014, pp. 34-39).

In the second half of the eighteenth century, more advanced writings appeared explaining how and why countries specialize in producing goods and exchanging them for other goods with other countries, especially the writings of Adam Smith, whom some consider a pioneer in establishing the foundations of correct scientific foreign trade, and Ricardo. That period was called the classical or traditional period, as he stated that the division of labor and specialization have great benefits in increasing production and trade exchange and achieving benefits from them. (Aymon, 2014, pp. 34-39)

Adam Smith pointed out that consumption is the sole purpose and goal of all production, and that specialization helps increase labor productivity, increase trade between countries, increase consumption, raise living standards, and increase economic well-being. He argued that the main advantage of international trade is that it helps expand the scope of trade. If people were forced to consume only what they produce domestically, the world would become poorer. Furthermore, many theories have emerged to explain international trade scientifically, including the theory of automatic equilibrium by David Hume, the theory of absolute advantage or absolute costs by Adam Smith, the theory of comparative advantage or comparative costs by David Ricardo, the theory of international values by John Stuart Mill, the theory of relative abundance of factors of production by Heckscher and Ohlin, the theory of factor prices by Heckscher-Ohlin-Samuelson, the theory of similarity of tastes by Staffan Linder, the theory of product life cycle by Vernon, and the technological theory by H.G. Johnson (Ghania, 2018). - 2019)).

It is clear from the above theories that countries continue to expand the scope of trade in an attempt to achieve economic and social gains related to human well-being and strengthening relations between countries, which is reflected in other political, cultural, and scientific aspects. It is clear from this that the most important reason for the emergence of international trade is the difference in production costs between countries. This is clearly evident in the difference in labor wages from one country to another, and labor wages are part of the costs of production. This leads to differences in product prices from one country to another, which facilitates trade between countries according to specialization, which is the basis of international trade. Countries can efficiently export the goods and services they produce and import goods and services produced by other countries with greater efficiency. (Samuelson & Nordhaus, 2009, p. 341)

3-The Impact of Exports on the Sectorial Contribution to GDP : In both established and emerging economies, exports have a significant role in determining growth. Natural resources, like oil, are the main exports of developing nations, while capital products are the main exports of industrialized nations. Merchandise that does not rely on natural resources are the primary emphasis of export-led growth policies. Growth is mostly driven by increased exports since these exports encourage a more efficient institutional structure and industrial processes, which in turn provide positive externalities. In addition to lowering obstacles to entry for foreign markets and achieving economies of scale, exports also lower exchange rates. In addition, exports may boost economic development in the long term by introducing innovative technology and gaining valuable knowledge from other countries. A paradigm that promotes developing nations' long-term development via the production of non-natural resources is the export-led growth hypothesis. Reasoning behind this theory is that, In contrast to the export-led growth paradigm, natural resources deplete quickly. Long-term research shows that export revenues from non-renewable natural resources hurt economic growth. According to "Dutch disease," "natural resource export income raise the real exchange rate, weakening the non-tradable resource sector and increasing import demand." Equally important as developing renewable natural resource exports is finding methods to increase exports of non-renewable resources. The Kingdom of Saudi Arabia, an oil-rich emerging nation that has exported crude oil for almost 40 years, is a prime example of why this study's core findings are so important. We see that the Iraqi states have shifted the state's function from development to rentier return control and distribution as a result of oil income. Therefore, the state now controls the employment market, investments, and the labor force in every way imaginable. Because of this, government expenditure rates have risen dramatically, which has a detrimental impact on the economic structure and is most noticeable in

the agriculture sector. After the government began to place a higher value on oil revenues from total exports, its employment policy shifted to benefit the political class rather than the private sector. This has had a negative impact on the structure of local production outside the rentier sector, including in vital sectors like agriculture, which is crucial for any economy's development. When natural resources are discovered, rentier nations often experience what is known as the Dutch illness. This disease shows the negative impact on productive sectors, particularly industrial and agricultural sectors. The Dutch sickness is seen by Jan Priewe, an economics professor at the University of (HTW Berlin) as: The resource curse occurs when new natural resources are discovered or when the prices of existing resources skyrocket, leading to a real increase in the currency and impeding the growth of various commercial sectors such as manufacturing, agriculture, and others. This is because, in the short term, there are negative effects from the Dutch disease, and in the long run, there are negative consequences from a lack of technological progress, which negatively affects agricultural production and the manufacturing industry.

4-The importance of exports in economic thought : Any economy, established or developing, may use exports as a growth indicator. The majority of poor nations' exports are oil and other natural resources, while the majority of wealthy nations' exports are capital products. The export-led growth theory argues that policies should prioritize products that do not rely on natural resources. Growth is primarily driven by an increase in exports, since this sector generates positive externalities via the adoption of more efficient production processes and institutional frameworks. Furthermore, exports facilitate economies of scale, lower obstacles to foreign exchange, and open doors to international markets. Furthermore, exports have the potential to boost economic development in the long term by bringing in highly innovative technologies and dynamic knowledge from other countries. In the long term, developing

nations may benefit from development that is not based on natural resource extraction, according to the export-led growth hypothesis. This idea is based on the following reasons:

4.1. To start with, whereas the exhaustion of natural resources is a short-term phenomena, the export-led growth theory is more of a long-term phenomenon.

4.2-. The research shows that export gains from nonrenewable resources hurt GDP growth over time. The Dutch disease concept states that increasing revenues from natural resource exports raise the real exchange rate, which reduces the competitiveness of the non-resource tradable sector and increases import demand. Therefore, non-renewable resource exports must be developed alongside renewable natural resource exports. For a growing nation that is wealthy in oil and exports, this research is crucial. (**Mohammed A Aljebrin, 2017,p398)**

5-An Overview of the Economic Structure: Francois Perrault defined the economic structure as the set of ratios and relationships between the elements of economic life that characterize an economic entity in a particular place and at a particular time. "Ratios may indicate the relative importance of the elements that make up the economic structure. These ratios include the ratios of wages and profits to income, as well as the ratios of the agricultural and industrial sectors' output to the gross domestic product. Economists have studied and scrutinized the concept of economic structure. Some have focused on understanding the surrounding environment, while others have examined variables in a comparatively static state. The final group has addressed the factors influencing the economic structure and the variables that determine it (Majid, 2011, p. 6). Structural imbalances are defined as: the lack of balance in the proportional relationships between the elements and components of the economic system. This demonstrates the extent of the impact of these imbalances and the

length of time over which they occur, thereby limiting their impact on the process of economic growth and development (Younis, 2017, p. 16). They have been described by others as a widespread economic imbalance that threatens to destabilize economic development and cause a cascade of crises and difficulties to arise within the framework of the national economy.

Economic growth stability is at risk, which might cause a cascade of crises and challenges for the country's economic infrastructure (Al-Muhanna, 2014, p. 10).

There are several reasons that lead to structural imbalances in the economy.

- Economic reasons: Economic reasons are among the most important reasons that explain structural imbalances. Through them, we can derive the general frameworks that cause economic problems in developing countries. These reasons can be explained as follows:

- High population growth rates compared to low economic growth rates: Population growth rates range between 2.5% and 3% in developing countries, compared to 0.7% in developed countries.

B. Low production levels and low productivity in other economic sectors, such as agriculture, industry, and services. This leads to the inability of the domestic product (GDP) to meet aggregate demand. This leads to a supply shortage, as the production system is inflexible in developing countries' economies. This in turn leads to an inability to meet societal needs, resulting in greater inflation. This, in turn, leads to a need to meet local demand through imports, creating an internal imbalance that gradually leads to other external imbalances. C. Lack of coordination between the public and private sectors, which is the foundation for establishing economic projects that play a role in a country's economic progress.

The second requirement: The second requirement: the standard aspect of the research

First Sectorial :First requirement: Describing and formulating standard models

This is one of the most important stages in building an economic model, as it works to identify the variables included in the model based on economic theory. Through this, the relationship between the independent and dependent variables is determined. In this research, the variables were described as follows:

1. The independent variable (oil exports), symbolized by (Exo).

2. The dependent variable (contribution of the agricultural sector), symbolized by (Ag).

3. The dependent variable (contribution of the industrial sector), symbolized by (Ds).

4. The dependent variable (contribution of the services sector), symbolized by (Sr).

Thus, the economic variables will be utilized to determine how oil exports affect diversification indicators (agriculture, industrial, and services sectors). Based on economic theory, the usual model formula is:

$Yi=\beta 0 +\beta 1X1+ \mu i$ ……..(1)

$Ag=\beta 0+ \beta 1\ Exo + \mu i$ …….(2)

$Ds=\beta 0+ \beta 1\ Exo + \mu i$ …….(3)

$Sr=\beta 0+ \beta 1\ Exo + \mu i$ …….(4)

Second requirement: Estimating the models and analyzing their results according to the ARDL methodology.

First: Results of the stationary test (unit root) for the research variables.

Table (1) shows the stationary test for the time series of the dependent variables (Ag), (Ds), and (Sr), and the independent variable (Exo).

Table (1) Results of the augmented Dickey-Fuller (ADF) test for the research variables

Variables	Lag	At Level			At First Difference		
		a	B	C	A	b	C
Exo	١	-٥,٢٠٤٩	-٥,٢٠٤٩	-٢,٢٧٩٢	-٦,٧٤٨١	-٧,٢٤٠٢	-٦,٧٥٣٩
Prob		٠,٠٠٠٠	٠,٠٠٠٠	٠,٠٢٣٠	٠,٠٠٠٠	٠,٠٠٠٠	٠,٠٠٠٠
Ag	١	-٢,٦٣٥٣	-٦,٠٣٩٤	-٢,٢٤٦٣	-٨,٩٩٣٥	-٨,٩٠٦٤	-٧,٦٧١٩
Prob		٠,٠٩١٤	٠,٠٠٠٠	٠,٠٢٤٩	٠,٠٠٠٠	٠,٠٠٠٠	٠,٠٠٠٠
Ds	١	-٣,١١٤٩	-٢,٦٨٦٦	-١,١٧٩٣	-٨,٥٩٨١	-٩,٣٩٩٦	-٨,٥٦٤٠
Prob		٠,٠٣٠٥	٠,٢٤٥٦	٠,٢١٥٤	٠,٠٠٠٠	٠,٠٠٠٠	٠,٠٠٠٠
Sr	١	-٦,٨٦٠١	-٦,٨٤٢٤	-٦,٨٤٢٤	-٩,١٢٢٩	-٩,١٤٨٦	-٩,١٣٤٨
Prob		٠,٠٠٠٠	٠,٠٠٠٠	٠,٠٠٠٠	٠,٠٠٠٠	٠,٠٠٠٠	٠,٠٠٠٠

Source: - Researched by researchers based on Eviews10 outputs. a: It means the presence of a fixed term. b: The presence of a fixed term and a general trend. c: There is no fixed term and no general trend.

Second: Model estimation using the Autoregressive Distributed Lag (ARDL) model.

1- Agricultural sector contribution model.

The model consists of an independent variable and a dependent variable, as follows:

$$Ag = \beta 0 + \beta 1\ Exo + \mu i$$

Table (2) displays the estimatory findings of the Autoregressive Distributed Lag (ARDL) model for the agriculture sector contribution function. These results demonstrate that the model is compatible with conventional and statistical tests, indicating its quality. R2 was close to 0.99, which indicates that the independent variable explains almost all of the variance in the dependent variable (by 99%). Since the overall significance of the model was 0.000000, the model is completely acceptable, and the Fisher statistic reached 13867.22, which is very significant. (D.W.) attained a value of 1.763042. Along with the lag periods being (4,1) for both variables, this proves that the model is not affected by autocorrelation.

Table (2) Estimation results of the (ARDL) model for the agricultural sector contribution model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
AG(-1)	3.272675	0.087089	37.57838	0.0000
AG(-2)	-4.404769	0.230547	-19.10569	0.0000
AG(-3)	2.877794	0.230919	12.46234	0.0000
AG(-4)	-0.752263	0.087167	-8.630095	0.0000
EXO	-1.42E-06	9.41E-07	-1.505732	0.1383
EXO(-1)	1.85E-06	9.75E-07	1.897756	0.0634
C	-0.006842	0.033431	-0.204669	0.8386

R-squared	0.999387	Mean dependent var	4.462787
Adjusted R-squared	0.999315	S.D. dependent var	1.234539
S.E. of regression	0.032303	Akaike info criterion	-3.914569
Sum squared resid	0.032303	Schwarz criterion	-3.665895
Log likelihood	120.5225	Hannan-Quinn criter.	-3.817706
F-statistic	13867.22	Durbin-Watson stat	1.763042
Prob(F-statistic)	0.000000		

Table (3) demonstrates the limits test for the presence of a cointegration connection between the independent variable (oil exports EXO) and the dependent variable (contribution of the agriculture sector Ag). The computed value of F, which came to 5.260090, was higher than the upper limit (4.95), lower limit (4.145) at the 10% significance level, and lower limit (5.125) at the 5% significance level, in the first difference. Since a long-term equilibrium link between the two variables is confirmed by the alternative

hypothesis that indicates the presence of cointegration, we reject the null hypothesis and accept it.

Table (3) Bounds test for cointegration of the model of contribution of the agricultural sector.

ARDL Bounds Test Sample: 2004Q1 2020Q4 Included observations: 58 Null Hypothesis: No levels relationship		
Test Statistic	Value	K
F-statistic	٥,٢٦٠٠٩٠	١
Critical Value Bound		
Signif.	I(0)	I(1)
٪١٠	٤,١٤٥	٤,٩٥
٪٥	٥,١٢٥	٦
٪١	٧,٤	٨,٥١

The results of the heterogeneity test (Heteroskedasticity Test: ARCH) were not statistically significant, as shown in Table 4, as the probability value (Prob. Chi-Square(1)) reached (0.8756), which is more than (0.05). Therefore, we will accept the null hypothesis that the model is not heterogeneity unstable and that the residuals are homogenous. The model (the agricultural sector's contribution) does not have any autocorrelation issues, according to the results of the serial autocorrelation test (LM Test). Specifically, the value of (Prob. Chi-Square(1) reached about 0.5203) is higher than the significance level of 0.05, so this problem does not exist in the model. Table (4) displays the given data. Accordingly, we accept the null hypothesis as true and reject the alternative that states the issue.

Table (4) Results of the heterogeneity of variance test and the serial autocorrelation test for the agricultural sector contribution model

Heteroskedasticity Test: ARCH			
F-statistic	٠,٠٢٣٦٤٧	Prob. F(1,55)	٠,٨٧٨٣
Obs*R-squared	٠,٠٢٤٤٩٦	Prob.Chi-Square(1)	٠,٨٧٥٦
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	٠,٣٥٨٨٧٥	Prob. F(1,50)	٠,٥٥١٨
Obs*R-squared	٠,٤١٣٣٢٨	Prob.Chi-Square(1)	٠,٥٢٠٣

Table (5) shows the results of the error correction model (short and long term) according to the (ARDL) methodology for the agricultural sector contribution model. It is clear that the value of the error correction coefficient (EC t-1) reached (-0.006563) with a probability of (0.0019), and through the availability of the negative and significant condition, this means that the model is heading towards equilibrium in the long term, i.e. (0.6563%) of the errors in the short term can be corrected in one semester, and thus (2.63%) of the short term errors can be corrected in one year, and this percentage is considered very low. Table (5) shows that the independent variable, oil exports (Exo), has no significant effect on the dependent variable, the contribution of the agricultural sector (Ag), in the long run. This is evident from the (Prob) value, which reached (0.38), which is very high, confirming the insignificance of the relationship between oil exports and the contribution of the agricultural sector in Iraq. This indicates that oil exports do not contribute to the development of the agricultural sector. On the contrary, there is a decline in the contribution of the agricultural sector to the economy, which contradicts economic theory.

Table (5) Results of the error correction model (short and long term) according to the (ARDL) methodology for the sector contribution model Agriculture

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXO)	-1.42E-06	9.28E-07	-1.527007	0.1329
CointEq(-1)*	-0.006563	0.002004	-3.275127	0.0019
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXO	6.61E-05	7.49E-05	0.882463	0.3817
EC = AG - (0.0001*EXO)				

2-Industrial Sector Contribution Model

$Ds = \beta 0 + \beta 1\ Exo + \mu i$

Table (6) shows that the results of the estimate of the Autoregressive Distributed Lag (ARDL) model for the industrial sector contribution function corroborate the model's quality, as it is compatible with conventional and statistical tests. A value of R2 close to 0.99 indicates that the independent variable explains almost all of the variance in the dependent variable, which is about 99%. The overall significance of the model was 0.000000, which means that the model is completely acceptable, while the Fisher statistic obtained a high significance level of 4936.484. The model is free of the autocorrelation issue, since the value of (D.W) reached (1.981757). Furthermore, for every one of the variables, the lag times were (4.4).

Table (6) Estimation Results of the (ARDL) Model for the Industrial Sector Contribution Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DS(-1)	3.419586	0.096852	35.30737	0.0000
DS(-2)	-4.648013	0.263086	-17.66726	0.0000
DS(-3)	3.032258	0.264606	11.45953	0.0000
DS(-4)	-0.798087	0.102181	-7.810535	0.0000
EXO	-2.57E-05	6.79E-06	-3.784423	0.0004
EXO(-1)	8.40E-05	2.32E-05	3.612959	0.0007
EXO(-2)	-0.000104	3.34E-05	-3.119806	0.0030
EXO(-3)	5.74E-05	2.36E-05	2.435863	0.0184
EXO(-4)	-1.17E-05	2.36E-05	-1.730177	0.0896
C	0.007431	0.014623	0.508194	0.6135

R-squared	0.998853	Mean dependent var	2.090235
Adjusted R-squared	0.998651	S.D. dependent var	0.471337
S.E. of regression	0.017311	Akaike info criterion	-5.126101
Sum squared resid	0.015284	Schwarz criterion	-4.780056
Log likelihood	166.3461	Hannan-Quinn criter.	-4.990483
F-statistic	4936.484	Durbin-Watson stat	1.981757
Prob(F-statistic)	0.000000		

Source: Prepared by the researchers based on the outputs of the Eviews10 program.

Table 7 illustrates the results of the boundary test, which indicate that the two variables, oil exports (EXO) and industrial sector contribution (Ds), do not have a cointegration relationship. (F) was smaller than both the lower and higher bounds, as shown by its computed value of (1.627072). We reject the alternative hypothesis and accept the null hypothesis, which indicates that the two variables do not have a long-term equilibrium connection and verifies that there is no cointegration.

Table (7) Bounds test for the joint integration of the industrial sector contribution model

ARDL Bounds Test Sample: 2004Q1 2020Q4 Included observations: 61 Null Hypothesis: No levels relationship		
Test Statistic	Value	K
F-statistic	١,٦٢٧٠٧٢	١
Critical Value Bound		
Signif.	I(0)	I(1)
٪١٠	٤,١٧٥	٤,٩٣
٪٥	٥,١٣	٥,٩٨
٪١	٧,٣٢	٨,٤٣٥

The results of the heteroskedasticity test (ARCH) are shown in Table (8). Because it is higher than the significance level of 0.05, the probability value (Prob. Chi-Square(1)) reached 0.1088, indicating that it is not significant. We conclude that the model does not suffer from heteroskedasticity instability and accept the null hypothesis that the residuals are homogeneous.

Table 8 shows that the model (industrial sector contribution) does not have autocorrelation issues, according to the results of the serial autocorrelation test (LM Test). This is because the value (Prob. Chi-Square(1)) reached approximately (0.9591), which is higher than the significance level (0.05). This eliminates the issue of residual serial autocorrelation from the model. So, we take the null hypothesis at its value and dismiss the problem-stating alternative. Table (10) shows the results of the tests for serial autocorrelation and heteroskedasticity conducted on the industrial sector contribution model.

Table (8) Results of the heterogeneity of variance test and the serial autocorrelation test for the industrial sector contribution model

Heteroskedasticity Test: ARCH			
F-statistic	٢,٥٩٧٧٨٥	Prob. F(1,58)	٠,١١٢٤
Obs*R-squared	٢,٥٧٢١٥٨	Prob.Chi-Square(1)	٠,١٠٨٨
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	٠,٠٣٣٦٠٥	Prob. F(2,49)	٠,٩٦٧٠
Obs*R-squared	٠,٠٨٣٥٥٤	Prob.Chi-Square(2)	٠,٩٥٩١

Table (9) shows the results of the error correction model (short term) according to the (ARDL) methodology for the model of the contribution of the industrial sector. It is clear that the value of the error correction coefficient (EC t-1) reached (0.005744) with a probability of (0.0744), and through the lack of the negative condition, this means that the model is heading towards imbalance in the long term, meaning that the imbalance increases after each period, which confirms the absence of a clear relationship in the long term between oil exports and the contribution of the industrial sector.

Table (9) Results of the error correction model (short term) according to the (ARDL) methodology for the industrial sector contribution model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXO)	-2.57E-05	6.09E-06	-4.223156	0.0001
CointEq(-1)*	0.005744	0.003153	1.821524	٠,٠٧٤٤

- Service Sector Contribution Model

$Sr = \beta 0 + \beta 1\ Exo + \mu i$

In Table (12), we can see that the results of the estimate of the Autoregressive Distributed Lag (ARDL) model for the service sector contribution function are in agreement with conventional and statistical tests, indicating that the model is credible. A value of R2 close to 0.99 indicates that the independent variable explains almost all of the variance in the dependent variable, which is about 99%. With a total model significance of 0.000000 and a Fisher statistic of 5728.686, we can say that this model is completely acceptable. This model does not have an autocorrelation issue since the value of (D.W.) reached 1.821942. Furthermore, for every one of the variables, the lag times were (4.4).

Table (10) Estimation Results of the ARDL Model for the Service Sector Contribution Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
SR(-1)	3.262349	0.093994	34.70806	0.0000
SR(-2)	-4.327787	0.248173	-17.43861	0.0000
SR(-3)	2.744755	0.244368	11.23206	0.0000
SR(-4)	-0.701138	0.090040	-7.786985	0.0000
EXO	-0.000382	9.19E-05	-4.159371	0.0001
EXO(-1)	0.001326	0.000324	4.092080	0.0002
EXO(-2)	-0.001790	0.000473	-3.782917	0.0004
EXO(-3)	0.001131	0.000338	3.349540	0.0015
EXO(-4)	-0.000286	9.86E-05	-2.901402	0.0055
C	0.480140	0.203367	2.360949	0.0221

R-squared	0.999012	Mean dependent var	20.54285
Adjusted R-squared	0.998837	S.D. dependent var	8.147513
S.E. of regression	0.277803	Akaike info criterion	0.425013
Sum squared resid	3.935905	Schwarz criterion	0.771058
Log likelihood	-2.962897	Hannan-Quinn criter.	0.560631
F-statistic	5728.686	Durbin-Watson stat	1.821942
Prob(F-statistic)	0.000000		

Table (11) shows the boundary test (Bound Test) that there is no cointegration relationship between the dependent variable (services sector contribution SR) and the independent variable (oil exports EXO), as it shows us the calculated value of (F) which amounted to (4.025484) was less than the

lower and upper limits, and thus we accept the null hypothesis which states that there is no cointegration, which confirms the absence of a long-term equilibrium relationship between the two variables, and we reject the alternative hypothesis.

Table (11) Boundary test for cointegration of the services sector contribution model

ARDL Bounds Test Sample: 2004Q1 2020Q4 Included observations: 61 Null Hypothesis: No levels relationship		
Test Statistic	Value	K
F-statistic	٤,٠٢٥٤٨٤	١
Critical Value Bound		
Signif.	I(0)	I(1)
٪١٠	٤,١٧٥	٤,٩٣
٪٥	٥,١٣	٥,٩٨
٪١	٧,٣٢	٨,٤٣٥

The results of the heteroskedasticity test (ARCH) are shown in Table (12). Because it is higher than the significance level of 0.05, the probability value (Prob. Chi-Square(2)) reached 0.0659. Since the model does not suffer from heteroskedasticity instability, we may conclude that the residuals are homogenous, and so we can accept the null hypothesis. The model (the services sector's contribution) does not have an autocorrelation issue, according to Table (12), which is a serial autocorrelation test (LM Test). That is, the probability of a chi-squared test reaching a result close to 0.6977 is higher than the 0.05 threshold of significance. This eliminates the issue of residual serial autocorrelation from the model. So, we take the null hypothesis at face value and dismiss the problem-stating alternative hypothesis.

Table (12) Results of the heteroskedasticity test and serial autocorrelation test for the service sector contribution model.

Heteroskedasticity Test: ARCH			
F-statistic	٢,٨٤٢٩٩٥	Prob. F(2,56)	٠,٠٦٦٧
Obs*R-squared	٥,٤٣٨٤٠٦	Prob.Chi-Square(2)	٠,٠٦٥٩
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	٠,٢٩٢٦٢٥	Prob. F(2,49)	٠,٧٤٧٦
Obs*R-squared	٠,٧١٩٩٧٨	Prob.Chi-Square(2)	٠,٦٩٧٧

Table (13) shows the results of the error correction model (short-term) according to the ARDL methodology for the service sector contribution model. It is clear that the value of the error correction coefficient (EC t-1) reached (-0.021821) with a probability of (0.0060). The availability of the negative and significant conditions means that the model is heading towards equilibrium in the long term. That is, (2.1821%) of the errors in the short term can be corrected in one quarter, and thus (8.73%) of the short-term errors can be corrected in one year. This percentage is very low.

Table (13) Results of the error correction model (short-term) according to the ARDL methodology for the service sector contribution model.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXO)	-0.000382	8.55E-05	-4.472726	0.0000
CointEq(-1)*	-0.021821	0.007616	-2.865106	0.0060

Conclusions:

1. The results of the econometric analysis showed a long-term cointegration relationship between oil exports and the contribution of the agricultural sector. However, the error correction ratio from the short to the long run was 2.63%, which is very low. Furthermore, oil exports do not contribute to the development of the agricultural sector in the long run. On the contrary, there is a decline in the contribution of the agricultural sector to the economy, which contradicts economic theory.

2. There is no cointegration relationship between oil exports and the contributions of both the industrial and service sectors in the long run. This confirms the absence of a long-term equilibrium relationship.

3. The results for the contribution of the industrial sector show that the model tends toward imbalance in the long run, and that the imbalance increases with each period. This confirms the lack of clarity regarding the long-term relationship between oil exports and the contribution of the industrial sector.

4. The error correction ratio from the short to the long run for the contribution of the services sector was 8.73%, which is considered very low.

Recommendations:

1. The Iraqi economy possesses many potentials and assets if it seeks to advance and implement a policy of economic diversification and structural imbalance. This is due to the availability of cheap local raw materials, which can create backbones that will create local industries, thereby expanding diverse industries across the country and stimulating the Iraqi economy. 2. The need for government agencies to commit to increasing financial resources directed to other non-oil economic sectors in order to improve the deteriorating situation of these sectors, especially after 2003, and to encourage local and foreign private sector investment. This will be reflected in the development of these sectors,

enabling them to play their role in diversifying the economic base and developing sources of income for the Iraqi economy.

3. It is imperative that less developed areas with tourist resources employ tourism to improve their level of life and achieve balanced regional development. Adopting the planning concept is critical for achieving integrated growth across all sectors, making the most direct and indirect economic advantages feasible, and modernizing and developing economic sectors.

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