

**FORECASTING THE MARKET NEED FOR CEMENT FROM 2014 - 2045 TO
SUPPORT THE FEASIBILITY OF ESTABLISHING CEMENT FACTORIES IN
IRAQ**

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Abstract

The current research aims to identify the capability of the Iraqi economy to establish or rehabilitate cement factories to meet market needs, in addition to competing with external competitors in terms of quality, cost, and production methods. The research problem is represented by the inability of the Iraqi economy to establish new factories or rehabilitate the old ones to meet the needs of the internal sectors as well as the internal and external markets. Furthermore, population growth is increasing, and urban development is going on. The research sample was chosen by applying a study to the Iraqi Cement State Company (a government company) and cement investment companies (private sector) in the Iraqi economy. The current research has adopted two complementary methods: The first one is the descriptive method, which refers to the theoretical side of the study, and the second one includes the analytical and measurement aspects. The research hypotheses were analyzed and tested statistically through the use of statistical programs and standards (Excel and SPSS) to reach the desired goal of this research.

The validity of the hypotheses was verified through key conclusions, namely, establishing cement factories in Iraq will offer new job opportunities and enhance economic growth. Moreover, the cost of transportation is also reduced due to the fact that cement factories are close to the consuming markets. This could be an additional competitive advantage that will increase profits for the private sector, increase revenues for the Iraqi government sector, and reduce costs. Therefore, this will save foreign currency for the country, and the demand for cement will increase significantly in the future. The research recommends that the cement industry, which is one of the fundamental and strategic industries, must exist in every country because cement is the basis for building, construction, and infrastructure sectors, so that the demand for cement will increase. Therefore, the research also recommends that the construction and rehabilitation of cement factories should rely on adopting the best modern technologies in

order to obtain the best quality level of the product, increase the production rate, and meet the growing market need for cement.

Keywords: feasibility studies, cement industry.

Introduction

The cement industry is one of the most basic construction industries in the world, as this material has various uses in several sectors, whether public or private, where the per capita cement consumption amounts to (1) ton (Global Cement Report). (Source: Wikipedia Cement World Report). It is expected that the population of Iraq will reach (45) million people by 2027, according to a growth standard of (2.6%) annually. Iran, Pakistan, Turkey and Lebanon were the countries that exported the largest quantities of cement to Iraq before the Iraqi government banned the import of cement. The government imposed high customs duties in order to protect the national product and reduce the costs of purchasing this material. Though, there are all possible factors that encourage producing cement within the country with the lowest costs and an attempt to benefit from the internal and external markets in order to increase the country revenues, reduce the unemployment rate, and encourage the rest of the productive sectors in order to advance the economy, reduce imports, and increase exports, Iraq undergoes a massive reconstruction boom, as the local demand for cement is growing at a rate of 15% annually. Therefore, the demand for cement is expected to grow by about 15% annually.

The first section: The research methodology

The research problem:

There are several problems related to this research, including:

- A. The Iraqi government is unable to establish new factories or rehabilitate existing cement factories that meet the needs of the internal and external sectors and markets. Nonetheless, population growth is increasing, and urban development is going on.
- B. There aren't any new factories newly established or introducing modern ones to produce cement, as well as introducing modern methods to produce multiple types of cement.
- C. The old factories were not rehabilitated in a way that increased production in different ways, but only one method was adopted, which was the dry method
- D. Some factories do not meet environmental conditions.

The research importance:

The research gains its importance through more than one dimension:

- A. The cement industry is one of the basic construction industries. (B) Cement is a raw material that has various uses. (C) The Iraqi state uses cement in various sectors, such as building housing, residential and commercial investment complexes, restoring and building infrastructure, or constructing dams, as well as for its use in producing complementary goods or final ones. (D) Individuals use cement either as a final commodity or as a commodity completing production as a final commodity used in building houses and other uses. After

2003, there was a great need for cement, both individually or governmentally. The demand grew increasingly after 2014 as a result of the devastation brought about by ISIS terrorist groups and the urbanization that has occurred either after 2003 or during that time.

The Research Objectives:

The research seeks to achieve a set of goals: First, Iraq needs to compete with foreign companies because it possesses the technology, quality, and production capacity to manufacture cement. Second, encouraging the cement industry by local investors and the government after extrapolating and forecasting the market's need for cement for the next thirty years. Providing indexes to investors in general, whether foreign or local, about the size of the future market, the actual need for cement, and the gap between production and demand in order to bridge this gap by supporting investment in this industry.

The research hypotheses:

Based on the research problem, the following hypotheses were formulated:

- (a) It is possible to predict the internal and external market needs for cement in Iraq for the period through 2014 to 2045.
- (b) The Iraqi economy is able to support the feasibility of establishing cement factories and developing old ones to increase their production and quality.
- (c) It is possible to predict the Iraqi individual's need for cement, which takes into account the individual's needs and the need for public services.

Methods of collecting and analyzing data:

The data of the Iraqi Ministry of Planning and the Central Bureau of Statistics for the period from 2014 to 2021, in addition to two complementary methods, were adopted. The first method was the descriptive method, which was used in the theoretical aspect of the research. The second method was represented in the analytical and measurement methods to identify the results of forecasting the capability of the Iraqi economy to meet the needs of the internal and external market for cement and the extent of its ability to build, rehabilitate, and develop cement factories, improve production quality, and support the cement industry in Iraq.

Temporal and spatial limits of the research:

The spatial limits were represented by the Iraqi economic environment, whereas the temporal ones were represented by the period during collecting sources, writing up the theoretical and practical fields, analyzing data, and drawing conclusions.

The research sample:

The research sample was chosen through applying a study to the Iraqi Cement State Company (a government company) and cement investment companies (private sector) in the Iraqi economy. The real data during the research period were extracted from 2014 to 2021.

The second section: The theoretical aspect**Market study and analysis**

The target market is the entire Iraqi governorate market, with a focus on the central and southern governorates. There are future possibilities for export, as this market is characterized by the diversity of local cement products from the northern to the southern parts of Iraq. We will present data and information collected from various government sources in this research in general and analyze them to reach a clear picture of the future of the project, as follows:

First: Market study:

The global cement industry has developed significantly over the past two decades, as the global cement production doubled to 275% in 2021, in comparison to 2000, when global cement production was 1.6 billion tons. China produced 583 million tons in 2000, while in 2021, the global production was 4.4 billion tons, and China produced 2,500 million tons. It is noted that this development demonstrates that investments in this industry has been increased, and this development has been noticed in developing countries, which has been largely concentrated in the Asian continent, such as India, Vietnam, Indonesia, Iran, Saudi Arabia, and the Gulf states, in addition to Brazil and Mexico in South America and Egypt in Africa. If China is excluded, we will see that the development is close to 100%. It is also noted that the six major international investment companies specialized in the cement industry have increased their percentage of global cement production significantly. It used to be around 10%, but after taking away Chinese enterprises, it is now more than 55%. All of this suggests that financial investments in this sector have been successful. In the field of cement marketing, it is noted that the internal cement market consumes 95% of the production, which indicates that the foreign trade represents no more than 5%, according to global statistics. The demand index per capita depends greatly on the economic situation of the country. In China, the per capita share is 1.5 tons per person, whereas in African countries, it is about 0.2 tons per person. In Iraq, although there are no statistical figures available from the Ministry of Planning, we infer them from the amount of production, which is relative to the population. The ratio was 0.8 tons per person for the year 2021.

Production reached 32 million tons, and the population inside the country is less than 40 million, despite the fact that the country is in a state of governmental instability and the cessation of projects!. Extrapolating the political situation of the country, things have reached a critical point for the state administration, which will be forced to initiate reconstruction projects, especially since the infrastructure in the country is dilapidated and needs to be rebuilt. At the same time, the country is experiencing a good economic situation after the rise in oil prices worldwide, with international economic indicators suggesting that prices will remain at this level if they do not rise further. The reconstruction process requires large quantities of cement that will exceed the per capita quota of one ton, and then there will be a scarcity in supply exceeding 10 million tons annually, taking into account the annual population increase. From the statistics available, we find that the need for infrastructure is:

- The country currently needs more than one and a half million housing units (according to the data available at the Ministry of Planning), whereas the Investment Authority estimates the

need for 4 million housing units, which means at least 100 million tons of cement (25 tons per housing unit).

- The country needs to rehabilitate roads and bridges up to 50.000 kilometers.
- Iraq needs rehabilitating or constructing 27.000 schools.
- Iraq needs to rebuild and rehabilitate sewage networks, as the percentage of the population served by the sewage network does not exceed 24% of the total population. (According to the statistics available for the year 2010). At present, it cannot exceed more than 40%, and these projects require huge amounts of cement.
- To address the problem of water scarcity, we must start building large and small dams. This is a necessary measure that the state will be forced to take in light of the water problem that the country is currently suffering from (to control what is lost to the sea, as well as to benefit from rainwater in the Western Sahara, amounting to 22 billion cubic meters). 2 billion cubic meters of it can be stored and at the same time prepare for a possible return cycle of floods at any time. All of this requires huge quantities of cement, as the volume of concrete work for the dam body is calculated in hundreds of thousands of cubic meters, and in large dams it is in the millions. For example, the High Dam in Egypt has a volume of 45 million cubic metres.
- The country needs for the cement of oil wells with special specifications, which can be produced in modern laboratories and in accordance with the specifications of the American Petroleum Institute, with all its required types, Type G & Type K.
- This encourages the establishment of cement production plants to cover the future deficit between supply and demand.

Second, market analysis:

1. Target customers

After closely examining the past and future market composition, perceptions regarding the type of target customers may be made, therefore, the target market can be studied easily. The identification of the sources of demand for the cement product produced by the factory, including government agencies and contracting companies that sponsor both current and future projects, the urban development plan, the number of projects for the first ten years of a project's life, and the national development plan, serve as the most crucial steps. All of this certainly meets the citizen's needs and the private sector in Iraq, as well as residential complexes in the provinces and investment projects.

2. Targeted and beneficiary sectors in the market (these sectors' need for cement varies from one sector to another)

Table No. (1) shows the targeted and beneficiary sectors in the market

No	Sectors	No	Sectors
1.	Universities, institutes and educational institutions.		Agriculture and livestock.
2.	Administrative institutions and professional unions		Travel, tourism, hotel and restaurants.

3.	Equipment rental and sale.	Industrial institutions and factories.
4.	Retail and wholesale trade	Service companies.
5.	Contracting, financing, and investment companies.	Transportation.
6.	Machinery, machinery and equipment sector.	Chambers of Commerce and Industry.
7.	Structural and building materials.	State departments.
8.	Insurance, banks and banks sector.	Stores and warehouses.
9.	Sports and clubs.	Scientific and technical services.
10.	Real estate and property.	Job opportunities and jobs.
11.	Fuel and energy facilities and institutions.	Legal and consulting services.

Source: The table was prepared by the researchers

3. Expected competitive advantage

- High quality and adopting modern technology and automatic quality and operational control systems.
- Low transportation costs, as the project is considered one of the cement factories close to the consuming markets. The location of the factory is within the geographical area in central Iraq and in the most cement-producing region in the country. There are no significant differences in the transportation distance from the rest of the producing factories and the internal consumption market. In fact, the factories of the central and southern regions compete strongly in the cost of transportation with the factories of the northern region, since the northern region has an abundance of production that covers its needs and is forced to transport a large amount of the product to the center and south (as it is a consumption market), that is, an additional distance of about 400-500 kilometers. This point is in favor of our project.

The third section: the practical aspect of the research

The practical aspect includes evaluating the project and a number of analyses of the project data used in the research, as shown in Table No. (2):

Table No. (2) Elements of evaluating and analyzing the feasibility of cement projects

First	Project Evaluation	Second	Project analysis
A	Project Idea	A	The social impact of the project
B	The project justification	B	Project strategy
C	Project beneficiaries	C	Project risks
D	Project descriptive criteria	D	Project sector development analysis
		E	Predicting the market need for cement for the period 2014-2045

Source: The table was prepared by the researchers

First: Project evaluation

Table No. (3) Project idea evaluation

Standard weight	Trend	Project idea evaluation				
		High	Mid	Low		
		3	2	1		
0.10	High	3			Studying available local skills and expertise	
0.10	High	3			The level and size of new technology used	
0.10	High	3			Existing products and services and industrial entanglement with them	
0.10	High	3			The investor's previous experience in this activity	
0.10	High	3			The proposed project is compatible with the applicable legislation and policy of the state	
0.05	Mid		2		Reviewing previous similar projects that were not implemented	
0.05	High	3			The possibility of satisfying the basic needs of society	
0.05	Mid		2		The project supports the state's plans and directions	
0.03	High	3			Apparent market demand	
0.02	Mid		2		Distribution and sales systems and the possibility of exporting the service or product	
0.05	Mid		2		Strong competition with similar projects	
0.05	High	3			Possibility of increased demand in the future	
0.02	High	3			Analysis of production costs compared to the market	
0.03	High	3			Available local and external sources of resources and raw materials	
0.05	High	3			Regional and geographical integration that supports the project idea	
0.10	High	3			Surveying and adopting the opinions of those interested and external specialists in the project idea	
1.00	2.7	7.47	0.68	0	Average project idea	

Source: The table was prepared by the researchers

Table (4) Project justification

Standard weight	Trend	Project justification				
		High	Mid	Low		
		3	2	1		
0.10	High	3			The desires and needs of the project's external beneficiaries	
0.10	High	3			The desires and needs of the institution constructing the project	
0.10	High	3			The desires and needs of the state to build such a project	
0.10	High	3			Artistic creativity to employ resources and then implement the project	

0.10	High	3			Conforming to legislation and laws to implement the project
0.05	Mid		2		The project is considered an urgent need and its implementation cannot be delayed
0.05	High	3			The investor has high knowledge and experience in the project
0.05	High	3			The project is distinguished by its dimension and strategic necessity
0.03	High	3			A high level of motivation for decision makers to implement the project
0.02	High	3			The chances of success and overcoming obstacles for the project are high
0.05	2.5	6.75	0.6	0	Average project justification
The project justifications are acceptable					

Source: The table was prepared by the researchers

Table (5) Beneficiaries from the project

Number of beneficiaries of the project in the community/individual	4,000,000
Number of cities benefiting from the project/city	10
Age groups (1-16)	Indirect benefit
Age groups (16-36)	Direct benefit
Age groups (36-56)	Direct benefit
Age groups (56-76)	Indirect benefit
Unemployed	Direct benefit
Workers in the private sector	Direct benefit
Workers in state departments	Direct benefit
Workers in the mixed sector	Indirect benefit
The number of groups directly benefiting	5

Source: The table was prepared by the researchers

Table (6) Descriptive criteria

1	Per capita rate and human development indexes	Very good
2	The direct and indirect benefits of the project	Very good
3	Raising the level of income and living conditions	Very good
4	Increase the level of technical skills and training	Very good
5	Raising the social level and developing living conditions	Very good

6	The criterion of balancing expenditure on the project with the benefits achieved	Excellent
7	Developing technical knowledge and increasing the experience	Excellent
8	Support the current facilities of the institution	Very good
9	Availability of infrastructure in the project area, represented by water, electricity, and sewage networks	Very good

Source: The table was prepared by the researchers

Second: Project analysis

Table No. (7) Social Impact Analysis

Social impact	Social Impact Analysis					Social Impact	Standard weight
	Too negative	Negative	No impact	Positive	Too positive	Trend	
	1	2	3	4	5		
Skills Development					5		0.15
Entertainment opportunities			3			Too positive	0.05
Customer satisfaction				4		No impact	0.15
Cognitive and cultural exchange			3			Positive	0.05
Improving the quality of life				4		No impact	0.05
Sustainable human development					5	Positive	0.10
Creating new job opportunities					5	Too positive	0.20
Employee satisfaction with their jobs				4		Too positive	0.05
Project support for the community					5	Positive	0.10
Solving society problems					5	Too positive	0.10
Average social impact	0	0	0.9	4	16.25	4.2	1.00
Social feasibility						Acceptable	

Source: The table was prepared by the researchers

Table No. (8) Strategic Impact Analysis (S.W.O.T)

	Project risk analysis				SWOT		Standard weight	
	Strength	Opportunities	Weakness	Challenges	Environment	Trend of impact		
Intensity of competition				-1	External environment	Negative	0.10	
Market size		1				Positive	0.05	
It's possible to enter the market early				-1		Negative	0.02	
Substitute goods and services		1				Positive	0.05	
Technology is constantly evolving		1				Positive	0.08	
Your customers' needs or tastes change		1				Positive	0.07	
Purchasing power of the customer		1				Positive	0.03	
Inflation factor		1				Positive	0.05	
Availability of raw materials		1				Positive	0.03	
Government support for the sector				-1		Negative	0.02	
Creativity at work	1					Internal environment	Positive	0.03
The project has a strong market position	1						Positive	0.02
Suitable production capacity	1						Positive	0.05
Management has a clear strategy	1						Positive	0.03
We have deep knowledge and skills	1				Positive		0.05	
Technology	1				Positive		0.10	
Good management	1				Positive		0.05	
Appropriate financing	1				Positive		0.10	
Human Resources	1				Positive		0.03	
Successful marketing	1				Positive	0.04		
Analysis results (SWOT)	0.5	0.36	0.	-0.14		0.5	1.00	
	Acceptable							

Source: The table was prepared by the researchers

Table No. (9) Project Risk Analysis

	Project risk analysis					Risks of Project	Standard weight
	Too negative	Negative	No impact	Positive	Too positive	Trend of impact	
	1	2	3	4	5		
Degree of project sensitivity				4		Positive	0.10
Increase in the value of the loan				4		Positive	0.10
High loan interest				4		Positive	0.10
Changes in exchange rates				4		Positive	0.15

High competition		2				Negative	0.12
Inflation				4		Positive	0.05
Market volatility			3			No impact	0.20
Political status		2				Negative	0.05
Low demand				4		Positive	0.03
Lack of liquidity				4		Positive	0.10
Analysis results	0	0.68	1.8	10.08	0	2.5	1.00
Risks of the project	Acceptable						

Source: The table was prepared by the researchers

Table No. (10) Project sector development analysis

	The sector to which the project belongs					Sector Development	Standard weight
	Too negative	Negative	No impact	Positive	Too positive	Direction of impact	
	1	2	3	4	5		
Increasing the sector's infrastructure					5	Too positive	0.15
Inventing new ways				4		Positive	0.15
Qualifying specialized cadres				4		Positive	0.15
Achieving growth in the sector				4		Positive	0.05
Achieving quality in outputs				4		Positive	0.05
Transferring modern technologies				4		Positive	0.15
Increase job opportunities				4		Positive	0.15
Increasing the state's share of activity					5	Too positive	0.05
Improving balance of payments					5	Very positive	0.05
Stabilizing the sector				4		Positive	0.05
Analysis of the results	0	0	0	12	6.25	3.7	1.00
Project sector development	Acceptable						

Source: The table was prepared by the researchers

Predicting the market need for cement for the period 2014-2045

To reach preliminary predictions that inform decision-makers about the current and future situation of the cement market in Iraq, we will adopt a set of standards, statistics, and approaches to study the subject. A set of statistical tools, sources, and historical data will be used. The inputs that will be addressed within the forecast for the mentioned period are:

1. Predictions using the linear regression equation or the forecast function.
2. Predictions according to the Iraqi individual's need for cement, which takes into account the individual's needs and the need for public services.
3. Predictions for Faruk Holding Company (Tasluja Cement Factories in Iraq).
4. Predictions according to construction and building rates in Iraq, and the strategy of the state.

Table No. (11) Predictions based on using the linear regression equation or the Forecast function.

Company	Iraqi General Cement Company	Mass Iraq Cement company	Lafarge Cement Industry	Al Doha Cement Industries	Khairat Abar Al Iraqi	Al Mabrouka Cement Industry
Design capacity/ton	17,244,000	6,000,000	2,100,000	1,500,000	2,000,000	2,000,000
Production capacity/ton						
2014	3,413,613	4,776,795	4,000,000	487,367	0	528,659
2015	2,357,513	3,662,529	4,220,000	993,684	0	761,757
2016	3,209,480	4,007,758	4,148,808	1,300,000	0	1,530,000
2017	4,126,000	3,825,000	4,300,000	1,324,000	0	1,471,000
2018	4,105,774	4,265,136	2,051,195	1,059,675	957,765	2,052,984
2019	3,178,096	4,764,522	4,245,000	996,312	1,000,000	1,959,334
2020	5,325,588	4,611,865	2,093,955	1,071,000	1,100,000	1,706,400
2021	7,230,000	4,996,273	2,360,000	1,315,847	1,150,000	2,034,342
2022	6,338,296	4,789,621	3,031,961	1,084,692	532,305	1,510,677
2023	7,196,656	4,966,106	2,611,341	1,135,451	599,792	1,632,958
2024	7,793,658	5,040,425	2,545,181	1,139,914	708,412	1,754,595
2025	8,474,956	5,135,585	2,501,157	1,134,640	764,254	1,769,241
2026	9,333,070	5,198,507	2,829,850	1,108,189	847,955	1,800,263
2027	10,147,058	5,229,251	2,607,537	1,137,342	845,479	1,775,391
2028	10,476,658	5,350,291	2,730,159	1,130,243	803,824	1,740,242
2029	10,991,345	5,388,288	2,583,468	1,165,770	820,412	1,782,283
2030	11,891,623	5,496,485	2,541,227	1,145,896	780,131	1,751,927
2031	12,520,573	5,550,324	2,629,554	1,136,086	771,777	1,751,135
2032	13,175,555	5,619,988	2,632,320	1,136,112	793,498	1,765,819
2033	13,800,824	5,688,490	2,610,622	1,139,066	802,320	1,766,603
2034	14,405,416	5,763,861	2,559,084	1,150,037	801,305	1,763,014
2035	15,048,145	5,839,307	2,577,486	1,146,925	804,071	1,762,721
2036	15,759,482	5,905,641	2,556,654	1,150,299	801,963	1,762,810
2037	16,419,086	5,980,304	2,572,292	1,148,547	799,505	1,764,803
2038	17,026,292	6,046,361	2,563,705	1,147,492	797,730	1,762,655
2039	17,677,086	6,120,623	2,539,189	1,153,710	806,906	1,766,571
2040	18,327,757	6,192,380	2,529,857	1,155,481	804,911	1,764,480
2041	18,985,204	6,263,815	2,526,541	1,156,279	804,103	1,764,673
2042	19,642,662	6,334,108	2,524,934	1,156,305	805,427	1,764,749
2043	20,289,305	6,404,799	2,512,944	1,158,522	806,657	1,765,104
2044	20,927,683	6,476,736	2,505,221	1,160,053	808,391	1,765,838
2045	21,577,746	6,547,691	2,493,098	1,162,344	810,183	1,766,308

Source: The table was prepared by the researchers

Table No. (12) The design and production capacity of Iraq cement factories for the private sector

Company	Delta for Cement Industry	Kar Plant/ Najaf	Kar / Qarajokh	Faruq Kasin Group	Faruq Group Tasluja
Design capacity/ton	2,000,000	2,000,000	2,000,000	2,000,000	1,750,000
Production capacity/ton					
2014	47,627	0	0	0	0
2015	1,379,785	0	0	0	0
2016	1,600,000	200,000	0	226,477	0
2017	1,370,000	1,412,000	993,000	1,600,000	467,000
2018	870,754	1,497,747	1,931,680	1,828,000	1,134,000
2019	1,539,118	2,035,508	1,762,894	1,734,000	1,010,000
2020	1,696,320	2,000,000	1,896,301	2,000,000	2,015,000
2021	2,082,593	2,000,000	1,546,293	2,045,000	2,000,000
2022	1,326,641	1,145,858	1,018,750	1,181,661	830,258
2023	1,483,641	1,286,683	1,143,887	1,327,153	932,253
2024	1,497,472	1,447,798	1,287,148	1,493,253	1,049,015
2025	1,483,927	1,603,572	1,447,793	1,651,319	1,179,939
2026	1,497,397	1,627,050	1,504,274	1,657,495	1,268,740
2027	1,580,271	1,647,960	1,454,710	1,639,608	1,290,337
2028	1,571,021	1,583,737	1,403,263	1,615,180	1,307,160
2029	1,605,760	1,583,505	1,378,081	1,611,106	1,278,417
2030	1,528,027	1,528,615	1,364,272	1,557,872	1,177,230
2031	1,531,029	1,538,723	1,373,028	1,569,219	1,185,491
2032	1,536,849	1,570,114	1,401,565	1,599,377	1,217,035
2033	1,541,902	1,585,416	1,415,880	1,612,652	1,238,047
2034	1,549,822	1,583,319	1,412,063	1,607,926	1,245,442
2035	1,556,304	1,578,275	1,400,802	1,601,965	1,242,951
2036	1,554,778	1,570,143	1,394,430	1,597,632	1,237,747
2037	1,553,962	1,569,019	1,393,726	1,595,742	1,229,328
2038	1,545,982	1,568,059	1,396,669	1,595,117	1,224,700
2039	1,550,091	1,573,809	1,401,494	1,600,331	1,231,499
2040	1,548,492	1,574,784	1,402,095	1,601,355	1,233,355
2041	1,549,534	1,575,683	1,402,532	1,601,874	1,235,602
2042	1,550,809	1,574,108	1,400,447	1,600,223	1,235,051
2043	1,550,739	1,572,861	1,398,921	1,599,209	1,233,680
2044	1,550,721	1,572,279	1,398,756	1,598,914	1,232,598
2045	1,551,692	1,572,604	1,399,359	1,599,118	1,232,005

Source: The table was prepared by the researchers

Table No. (13) The table is the result of the sum of data from the two previous tables above

Company	Total	The percentage of government sector production out of total production %	The percentage of private sector production out of total production%
Design capacity/ton	40,594,000	0.42	0.58
Production capacity/ton			
2014	13,254,061	0.26	0.74
2015	13,375,268	0.18	0.82
2016	16,222,523	0.20	0.80
2017	20,888,000	0.20	0.80
2018	21,754,710	0.19	0.81
2019	24,224,784	0.13	0.87
2020	25,516,429	0.21	0.79
2021	28,760,348	0.25	0.75
2022	22,790,721	0.28	0.72
2023	24,315,919	0.30	0.70
2024	25,756,870	0.30	0.70
2025	27,146,384	0.31	0.69
2026	28,672,790	0.33	0.67
2027	29,354,942	0.35	0.65
2028	29,711,779	0.35	0.65
2029	30,188,436	0.36	0.64
2030	30,763,303	0.39	0.61
2031	31,556,939	0.40	0.60
2032	32,448,230	0.41	0.59
2033	33,201,823	0.42	0.58
2034	33,841,287	0.43	0.57
2035	34,558,951	0.44	0.56
2036	35,291,578	0.45	0.55
2037	36,026,313	0.46	0.54
2038	36,674,762	0.46	0.54
2039	37,421,309	0.47	0.53
2040	38,134,947	0.48	0.52
2041	38,865,839	0.49	0.51
2042	39,588,823	0.50	0.50
2043	40,292,741	0.50	0.50
2044	40,997,191	0.51	0.49
2045	41,712,149	0.52	0.48

Source: The table was prepared by the researchers

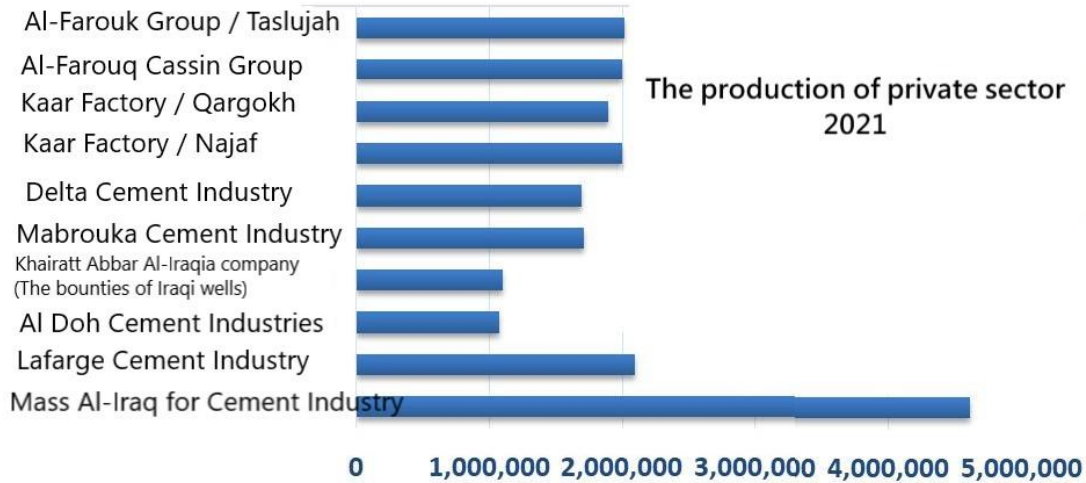


Figure No. (1) Private sector productivity for the year 2021

Source: The chart was prepared by the researchers

Using a linear regression or forecasting function, you need accurate historical data to obtain future results. Accordingly, the data of the Cement Manufacturers Association in Iraq was consulted, which is an association adopted by the private sector and sponsored by the government. This association is considered the source of official data and information, which was contacted in preparing the research via e-mail (info@cpai.iq)

Table No. (14) Population index for Iraq

Total Population	Year
35,212,600	2015
36,169,123	2016
37,139,519	2017
38,124,182	2018
39,127,900	2019
40,150,174	2020
41,190,658	2021
42,248,900	2022
43,324,000	2023
44,414,800	2024
45,520,500	2025
46,639,900	2026
47,771,600	2027
48,914,100	2028
50,061,500	2029
51,211,700	2030

Source: Ministry of Planning

Table No. (15): Forecasts according to the Iraqi individual's need for cement, which takes into account the individual's need and the need for public services.

Year	Population	Demand according to the needs of the population	Year	Population	Demand according to the needs of the population
2014	34,297,072	41,156,487	2030	51,211,700	61,454,040
2015	35,212,600	42,255,120	2031	51,989,150	62,386,980
2016	36,169,123	43,402,948	2032	53,097,551	63,717,061
2017	37,139,519	44,567,423	2033	54,204,390	65,045,267
2018	38,124,182	45,749,018	2034	55,310,772	66,372,927
2019	39,127,900	46,953,480	2035	56,415,213	67,698,256
2020	40,150,174	48,180,209	2036	57,516,250	69,019,500
2021	41,190,658	49,428,790	2037	58,613,100	70,335,720
2022	42,248,900	50,698,680	2038	59,705,226	71,646,271
2023	43,324,000	51,988,800	2039	60,792,413	72,950,895
2024	44,414,800	53,297,760	2040	61,874,842	74,249,810
2025	45,520,500	54,624,600	2041	62,953,110	75,543,732
2026	46,639,900	55,967,880	2042	64,028,270	76,833,923
2027	47,771,600	57,325,920	2043	65,101,947	78,122,337
2028	48,914,100	58,696,920	2044	66,176,382	79,411,659
2029	50,061,500	60,073,800	2045	67,254,480	80,705,376

Source: Iraqi Ministry of Planning

(https://cosit.gov.iq/ar/?option=com_content&view=article&layout=edit&id=174&jsn_setmobile=no)

Iraq is on the verge of widespread reconstruction in all aspects, as corruption, political conflict, and terrorism have disrupted several projects. Iraq becomes in dire need of building model schools and housing units as there is an intricate housing crisis and the infrastructure is halted. Iraq also needs to build dams and bridges, and Iraq needs cement for oil wells. All the mentioned constructions basically need cement as a main component. According to previous studies, the Iraqi citizen's needs in 2014 amounted to (0.4) tons of cement annually, for private and public projects. This quantity developed successively, as it was (0.44) ton of cement per capita in the following years, and after that (0.54) ton per capita, until the year 2021, the annual per capita need reached approximately (0.8) ton per capita. This percentage is expected to increase in the following years.

Table No. (16) Forecasts for Faruk Holding Company (Tasluja Cement Factories in Iraq).

Year	Annual cement production	The demand according to the vision of Al-Faruq Holding Company	Year	Annual cement production	The demand according to the vision of Al-Faruq Holding Company
2014	13,254,061		2030	30,763,303	35,377,799
2015	13,375,268		2031	31,556,939	36,290,480
2016	16,222,523		2032	32,448,230	37,315,464
2017	20,888,000		2033	33,201,823	38,182,097

2018	21,754,710		2034	33,841,287	38,917,480
2019	24,224,784		2035	34,558,951	39,742,794
2020	25,516,429		2036	35,291,578	40,585,315
2021	28,760,348		2037	36,026,313	41,430,260
2022	22,790,721		2038	36,674,762	42,175,976
2023	24,315,919	27,963,307	2039	37,421,309	43,034,506
2024	25,756,870	29,620,401	2040	38,134,947	43,855,189
2025	27,146,384	31,218,342	2041	38,865,839	44,695,714
2026	28,672,790	32,973,709	2042	39,588,823	45,527,146
2027	29,354,942	33,758,184	2043	40,292,741	46,336,653
2028	29,711,779	34,168,545	2044	40,997,191	47,146,770
2029	30,188,436	34,716,701	2045	41,712,149	47,968,971

Source: Faruk Holding Company

<http://www.farukholding.com/market/marketdetail.xhtml?id=4&DetailId=29>.

This research was prepared by the pioneer of the cement industry in Iraq, which was the company that owns Tasluja plants in Iraq. The research was certainly unspontaneous or imaginary. Moreover, it represents a comprehensive study of the Iraqi environment based on data and reliable past experiences of the Farouk Company.

Table No. (17): Forecasts according to construction and building rates in Iraq, and the state strategy.

Source: (<https://cosit.gov.iq/ar/constr-stat/building>)

Year	The amount of cement required according to the reconstruction rates	Growth of cement consumption in Iraq	Year	The amount of cement required according to the reconstruction rates	Growth of cement consumption in Iraq
2014	14,962,600	0.13	2030	31,361,527	0.02
2015	12,507,906	-0.06	2031	32,417,658	0.03
2016	17,218,286	0.06	2032	33,164,797	0.02
2017	17,943,047	-0.14	2033	34,358,619	0.03
2018	19,874,815	-0.09	2034	35,290,169	0.04
2019	16,311,268	-0.33	2035	35,305,794	0.02
2020	29,617,202	0.16	2036	36,031,448	0.02
2021	32,617,332	0.13	2037	36,841,493	0.02
2022	23,383,928	0.03	2038	37,683,692	0.03
2023	27,019,360	0.11	2039	38,411,776	0.03
2024	26,917,541	0.05	2040	39,078,847	0.02
2025	24,060,310	-0.11	2041	39,787,625	0.02
2026	30,685,907	0.07	2042	40,429,533	0.02
2027	31,289,692	0.07	2043	41,126,027	0.02
2028	31,572,248	0.06	2044	41,933,314	0.02
2029	30,727,521	0.02	2045	42,129,270	0.01



Figure No. (2) Residential buildings in Iraq

Source: (<https://cosit.gov.iq/ar/constr-stat/building>)

The Iraqi Ministry of Planning has prepared statistics and previous studies that would be attached at the end of this research related to the level of demand for construction materials in Iraq, including cement, for the period 2014-2020. Through these statistics, the construction development rates approved in the table above were attained and approved until the year 2045. The linear regression equation was also adopted in forecasting, noting that more than this rate is expected since the results of the statistics conducted by research centers exceed expectations. The Iraqi digitization study states that Baghdad and Nineveh alone have a deficit in housing units in 2020 amounting to 1.25 million housing units.

Table No. (18) Population growth rates and the need for cement

Year	Predictions reconstruction rates of in Iraq	Predictions of Farouk Holding Company	Predictions of an individual's need for cement	Predictions of the linear regression equation
2014	14,962,600	0	41,156,487	13,254,061
2015	12,507,906	0	42,255,120	13,375,268
2016	17,218,286	0	43,402,948	16,222,523
2017	17,943,047	0	44,567,423	20,888,000
2018	19,874,815	0	45,749,018	21,754,710
2019	16,311,268	0	46,953,480	24,224,784
2020	29,617,202	0	48,180,209	25,516,429

2021	32,617,332	0	49,428,790	28,760,348
2022	23,383,928	0	50,698,680	22,790,721
2023	27,019,360	27,963,307	51,988,800	24,315,919
2024	26,917,541	29,620,401	53,297,760	25,756,870
2025	24,060,310	31,218,342	54,624,600	27,146,384
2026	30,685,907	32,973,709	55,967,880	28,672,790
2027	31,289,692	33,758,184	57,325,920	29,354,942
2028	31,572,248	34,168,545	58,696,920	29,711,779
2029	30,727,521	34,716,701	60,073,800	30,188,436
2030	31,361,527	35,377,799	61,454,040	30,763,303
2031	32,417,658	36,290,480	62,386,980	31,556,939
2032	33,164,797	37,315,464	63,717,061	32,448,230
2033	34,358,619	38,182,097	65,045,267	33,201,823
2034	35,290,169	38,917,480	66,372,927	33,841,287
2035	35,305,794	39,742,794	67,698,256	34,558,951
2036	36,031,448	40,585,315	69,019,500	35,291,578
2037	36,841,493	41,430,260	70,335,720	36,026,313
2038	37,683,692	42,175,976	71,646,271	36,674,762
2039	38,411,776	43,034,506	72,950,895	37,421,309
2040	39,078,847	43,855,189	74,249,810	38,134,947
2041	39,787,625	44,695,714	75,543,732	38,865,839
2042	40,429,533	45,527,146	76,833,923	39,588,823
2043	41,126,027	46,336,653	78,122,337	40,292,741
2044	41,933,314	47,146,770	79,411,659	40,997,191
2045	42,129,270	47,968,971	80,705,376	41,712,149

Source: This table was prepared by the researcher

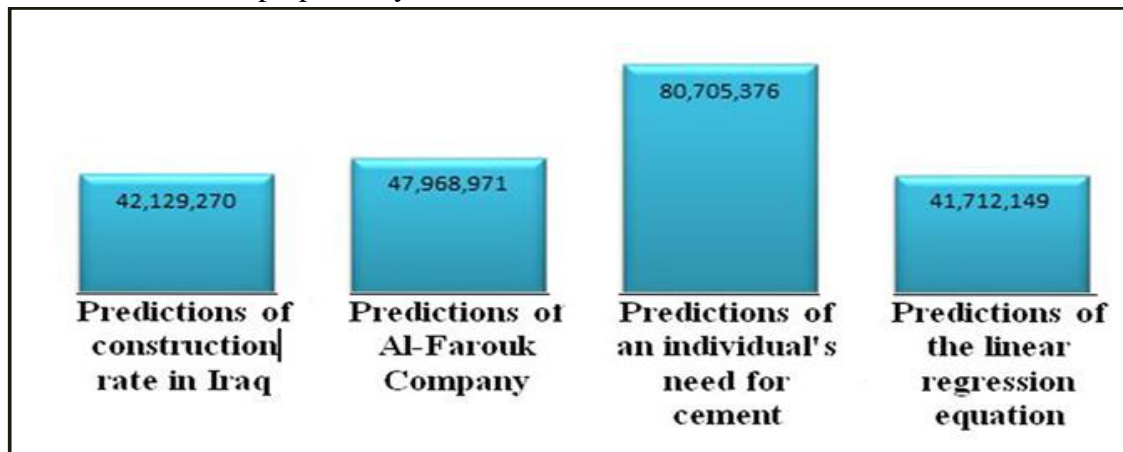


Figure No. (3) Summary of predictions

Source: This table was prepared by the researcher

Technical Vision

The attached tables include the following statistics:

Table No. (20) The designed production capacity of companies producing cement.

No	Company	Design capacity/ton	Production capacity for the year 2014	Production capacity for the year 2015	Production capacity for the year 2016	Production capacity for the year 2017	Production capacity for the year 2018	
1-	Iraqi General Cement Company	17,244,000	3,413,613	2,357,513	3,209,480	4,126,000	4,105,774	
2-	Mass Iraq Cement Company	6,000,000	4,776,795	3,662,529	4,007,758	3,825,000	4,265,136	
3-	Lafarge Cement Manufacturing Company (Bazian Factory)	2,100,000	4,000,000	4,220,000	4,148,808	4,300,000	2,051,195	
4-	Doha Cement Industries Company	1,500,000	487,367	993,684	1,300,000	1,324,000	1,059,675	
5-	Khairat Al-Abar Iraqi Company / Saman Plant	2,000,000	-----	-----	-----	-----	957,765	
5-	Al Mabrouka Cement Industry Company	2,000,000	528,659	761,757	1,530,000	1,471,000	2,052,984	
7-	Delta Cement Company	2,000,000	47,627	1,379,785	1,600,000	1,370,000	870,754	
8-	Kar Engineering and Construction Company Limited	Najaf Al-Ashraf Factory	2,000,000	-----	-----	200,000	1,412,000	1,497,747
		Qarjooj Plant	2,000,000	-----	-----	-----	993,000	1,931,680
9-	Al-Faruq Holding Group the total	Kassin Plant	2,000,000	-----	-----	226,477	1,600,000	1,828,000
		Tasluja Plant	1,750,000	-----	-----	-----	467,000	1,134,000
10-	Total	40,594,000	13,254,061	13,375,268	16,222,523	20,888,000	21,754,711	
11-	Percentage of government sector production out of total production %	42	25.7	17.6	19.8	19.7	18.9	
12-	Percentage of private sector production out of total production %	58	74.3	82.4	79.2	79.3	81.1	

Table No. (20): The production capacity achieved by companies producing cement annually from 2014 until the end of 2021.

No	Company	Production/ Ton
1-	The Iraqi Cement State Company	7230000
2-	Doh Cement Industries Company	1315847
3-	Mas Iraq Cement Company	4996273
4-	Lafarge Cement Company/Bazian Factory	2360000
5-	Al-Mabrouka Cement Company / Mill	2034342
6-	Delta cement company	2082593
7-	Faruk Group (Kasin and Tasluja)	404500.
8-	Kar Cement Company (Najaf and Qarajokh)	3546293

9-	Saman Cement Company	1746000
10	Ard Al-Amara Cement Company mill/grinder	608654
11	Saqr Al-Qitan Company/Mill	1053836
12	Najma Al-Samawah	672458
13	Total	31691296

Source: Iraqi Cement Manufacturers Association

Table No. (21) A report of supplying cement for association companies for (12 months) 2021

No	Company	Quantities produced from December 2 - June 2021	Quantities produced from December 2 - July 2021	Quantities produced (12 months) 2012 from December 2 - December 1
1	The Iraqi Cement State Company	3322000	3908000	7230000
2	Doh company for cement industries	635000	680847	1315847
3	Mas company for cement industry	2738031.52	2258241.56	4996273
4	Lafarge/Bazyan plant for cement industry	1180000	1180000	236000
5	Mabrouka company for cement industry	991044	1043298	2034342
6	Delta for cement industry	1012291.70	1070301.32	2082593
7	Faruk Holding (Kasin and Tasluja) companies for cement industry	1615000	2430000	4045000
8	Kar (Najaf/Qargokh) for cement industry	1706381.84	1839911	3546293
9	Saman company for cement industry	832000	914000	1746000
1	Ard Al-Amarah company for cement Industry	309226,910	299427,233	608654
1	Saqr Al-Qitan company	518103	535733	1053836
1	Najm Al-Samwaha company	-	672458	672458
1	Total	14859078.97	16832217,113	31691296

Source: Iraqi Cement Manufacturers Association

Table (22) Monthly cement processing report for (9) cement factories for the Cement Manufacturers Association in Iraq (12) months (January - December) for the year 2019

1-	Companies	Quantities produced during 12 months in 2019
2-	Doh Cement Co.	996,312
3-	Mass Iraq Co.	4764521.94
4-	Lafarge Co.	4,245,000
5-	Mabrouka Co.	1,959,334
6-	Umm Qasr North Co.	530,505
7-	Delta Cement Co.	1,539,118.50
8-	Casin Co.	2,296,000 1,913,000
9-	Kar Co.	2035507.95 1762894.13
10	Saman Co.	1,734,000
11	Total	26423784.52 tons

Source: Iraqi Cement Manufacturers Association

Table No. (23) Achieved production capacity and sales of cement companies in Iraq for the year 2020

1	Companies	Production/Ton
2	The Iraqi Cement State Company	5325588
3	AlDoh Cement Industries Company	1071000
4	Mass Iraq Cement Company	4611865
5	Lafarge Cement Company/Bazyan Plant	2093955
6	Al-Mabrouka Cement Company / Mill	1706400
7	Delta Cement Company	1696320
8	Faruk Holding (Kasin and Tasluja)	4015000
9	Kar Cement Company (Najaf and Qarajokh)	3896301
1	Saman Cement Company	1393900
1	Ard Al-Amara Cement Company mill/grinder	218020
1	Saqr Al-Qitan Company/Mill	1057357
1	Total	27,085,706

Source: Iraqi Cement Manufacturers Association

Through these tables shown the following indexes: -

First: - The Iraqi Cement State Company

- The Iraqi Cement State Company (a government company). The plants of this company were established from the 1950s until the 1980s.

- 50% of the plants of this company have become obsolete, as they have been established for a long time, exceeding 50 years. It was operated by using the wet method (the previous production method), so it became economically unfeasible to rehabilitate and operate it.
- The Iraqi General Cement Company rehabilitated its dry-process plants that were established in the eighties of the last century with the participation of private sector companies. Accordingly, production quantities have been achieved for the year 2021. There is one remaining factory that has not been rehabilitated (Al-Muthanna Cement Factory) yet.

Accordingly, we conclude that the production capacity achieved by the Iraqi General Cement Company in the future will not exceed (10) million tons annually.

Second: Cement investment companies (private sector)

- The positive development in the annual production capacity of investment cement companies (private sector) in some years was at a rate of (28%, 21%, 17%) during the period from 2015 until the end of the year 2021, but at a rate of (15%) during the above period.
- The production capacity achieved by investment cement companies that only own a cement mill and which depend on importing clinker from abroad was (11%) of the total production capacity achieved annually for the years (2020, 2021).
- The achieved production capacity of investment cement companies (private sector) out of the designed production capacity in 2020 was (91%).
- The achieved production capacity of cement investment companies (private sector) out of the designed production capacity in 2021 was (102%).

Based on the study of the cement market in Iraq, which was presented in this research, and based on the aforementioned indicators, it is concluded that there will be a demand for cement more than the current supply in the coming years.

Conclusions:

There are many conclusions related to this research, including:

- 1- The summary of the predictions was as follows: predictions of reconstruction rates in Iraq are (42,129,270). As for the forecasts of Farouk Holding Company, they were (47,968,971), whereas the forecasts for the per capita need for cement were (80,705,376). The prediction of the linear regression equation was (41,712,149).
- 2- Accordingly, we conclude that the production capacity achieved by the Iraqi General Cement Company in the future will not exceed (10) million tons annually. The positive development in the annual production capacity of investment cement companies (private sector) in some years was at a rate of (28%, 21%, 17%) during the period from the year 2015 until the end of the year 2021, which was at a rate of (15%) during the above period.
- 3- Although Iraq is going through a state of governmental instability and the cessation of projects, the per capita share of cement can be calculated through the quantity of production relative to the population. Production has reached 32 million tons and the population inside the country does not exceed 40 million. The per capita share of cement was 0.8 tons per capita for the year 2021.

- 4- Iraq will witness rapid economic growth, which will lead to an increase in demand for building materials, including cement. The Iraqi government estimates that demand for cement in the country will rise by 7.5% annually over the next five years.
- 5- Iraq is rich in the raw materials needed to produce cement, including sand, chalk and limestone. The Iraqi Ministry of Industry and Minerals estimates that Iraq has sufficient reserves of these raw materials to ensure cement production for next decades.
- 6- Iraq enjoys a competitive advantage in cement production due to the low cost of energy and labor in the country. Recent feasibility studies indicate that the cost of producing a ton of cement in Iraq is 20% lower than the cost of production in neighboring countries.
- 7- Establishing cement factories in Iraq will create new job opportunities and enhance economic growth, as well as lower transportation costs because cement factories are close to consuming markets. This is an additional competitive advantage that will increase profits for the private sector, increase revenues by the government sector, and reduce costs, which will save foreign currency for the state.

Recommendations:

- 1- The cement industry is one of the major basic and strategic industries that must exist in every country because of its close connection to the building and construction and the infrastructure sectors, which increases the volume of demand for cement. Therefore, we recommend that the construction and rehabilitation of cement factories rely on the use of the best modern technology in order to obtain the best quality level of the product, increase the production rate, and meet the growing market need for cement.
- 2- Strategic places should be chosen to establish new cement factories, and not located near residential areas. Moreover, when rehabilitating old factories, the quality of the cement material must be developed and environmental pollution reduced.
- 3- Promoting investment in cement, both at the public and private sector levels. This would have a positive impact on the economy.
- 4- This industry provides good revenues, supports, and encourages other productive sectors to develop, build and produce using the latest methods, lowest costs, high quality and competitiveness.
- 5- Maintaining government decisions that stipulate not allowing the import of cement from outside Iraq to support the local factory.
- 6- It is important to create an environment and provide a good investment climate for investment in establishing or rehabilitating cement factories in particular or investments in general in Iraq, whether at the level of the national or foreign investor, and not creating a state of uncertainty within the economy, as it plays a negative role in not developing investments. And direct it.
- 7- In many developed and developing countries, such projects contribute to directing economic activity to the investment projects that the country needs, which contribute to the growth of the economy.
- 8- Investing in such industries is considered one of the basic steps in economic growth and in improving social and living conditions. It also contributes to attracting foreign investments

and stimulating local investments in the public and private sectors by providing the appropriate legal, economic and political frameworks for this.

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