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OLIGOPOLISTIC COMPETITION AND PRICING IN THE CEMENT MARKET: A MODERN INDUSTRIAL ECONOMICS PERSPECTIVE

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Abstract: This article explores how Kazakhstan's cement market operates under conditions of oligopolistic competition. In the introduction, the cement industry is presented as a strategically important sector of the economy, where high capital requirements and transport costs limit market entry and shape competitive behavior. The materials and methods are based on combining classical oligopoly theory with an empirical analysis of 2023–2024 data on cement production, consumption, prices, imports, exports, and capacity utilization, complemented by comparisons with foreign cement markets. The results and discussion show that the market is strongly regionally segmented, operates with moderate capacity utilization of around 60.5%, and demonstrates relatively stable pricing with an average annual increase of about 4%. Producers tend to avoid sharp changes in output, which is largely consistent with Cournot-type competition, while in certain regions the behavior of dominant firms reflects elements of Stackelberg leadership. In the conclusions, it is argued that Kazakhstan's cement industry continues to display pronounced oligopolistic characteristics driven by cost structure, logistics, and strategic interaction among firms, and the conclusion confirms that classical oligopoly models remain a useful tool for explaining pricing and output decisions in this market.

Key words: Kazakhstan, cement market, oligopoly, pricing strategies, Cournot model, Stackelberg model, building material

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ЦЕМЕНТ НАРЫҒЫНДАҒЫ ОЛИГОПОЛИСТІК БӘСЕКЕЛЕСТІК ЖӘНЕ БАҒА: ҚАЗІРГІ ЗАМАНҒЫ ӨНЕРКӘСІП ЭКОНОМИКАСЫНЫҢ КӨРІНІСІ

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Түйін: Бұл мақала Қазақстанның цемент нарығының олигополиялық бәсекелестік жағдайында қалай жұмыс істейтінін талдауға арналған. Кіріспеде цемент өнеркәсібінің ел экономикасы үшін маңызы және жоғары капитал сыйымдылығы мен көлік шығындары сияқты бәсекелестікті шектейтін негізгі құрылымдық факторлар сипатталады. Материалдар мен әдістер бөлімінде классикалық олигополия теориясы 2023–2024 жылдардағы цемент өндірісі, тұтыну көлемі, баға, импорт, экспорт және өндірістік қуатты пайдалану жөніндегі деректерді эмпирикалық талдаумен ұштастырылады, сондай-ақ шетелдік нарықтармен салыстыру жүргізіледі. Нәтижелер мен талқылау Қазақстан цемент нарығының аймақтық бөлінгенін, өндірістік қуаттың шамамен 60,5% деңгейінде пайдаланылатынын және бағаның жылына орта есеппен 4% өсетінін көрсетеді, ал өндірушілердің

сақтықпен әрекет етуі көбіне Курно моделіне сәйкес келеді, кейбір аймақтарда Штакельберг үлгісіне тән жетекшілік элементтері байқалады. Қорытындылар мен тұжырымдар цемент өнеркәсібінің шығын құрылымы, логистика және фирмалардың стратегиялық өзара әрекеттестігі әсерінен олигополиялық сипатта сақталып отырғанын және классикалық модельдердің нарықтағы баға мен өндіріс шешімдерін түсіндіруге мүмкіндік беретінін растайды.

Кілт сөздер: Қазақстан, цемент нарығы, олигополия, баға белгілеу, Курно моделі, Штакельберг моделі, құрылыс материал

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ОЛИГОПОЛИСТИЧЕСКАЯ КОНКУРЕНЦИЯ И ЦЕНООБРАЗОВАНИЕ НА ЦЕМЕНТНОМ РЫНКЕ: ВЗГЛЯД СОВРЕМЕННОЙ ЭКОНОМИКИ ПРОМЫШЛЕННОСТИ

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Аннотация: В статье рассматривается, как функционирует цементный рынок Казахстана в условиях олигополистической конкуренции. Во введении подчёркивается значение цементной промышленности для экономического развития страны, а также отмечаются ключевые факторы, ограничивающие конкуренцию, такие как высокая капиталоёмкость и значительные транспортные издержки. Материалы и методы исследования основаны на сочетании классической теории олигополии и эмпирического анализа статистических данных за 2023–2024 годы по объёмам производства и потребления цемента, ценам, импорту, экспорту и уровню загрузки производственных мощностей, а также на сравнении с зарубежными рынками. В результатах и обсуждении показано, что рынок цемента Казахстана имеет выраженную региональную структуру, работает с умеренной загрузкой мощностей около 60,5%, характеризуется относительно стабильным ростом цен примерно на 4% в год и осторожным поведением производителей, что в целом соответствует модели Курно, при наличии элементов лидерства по Штакельбергу в отдельных регионах. В выводах и заключении делается вывод о том, что цементная отрасль Казахстана сохраняет устойчивые олигополистические черты, сформированные структурой затрат, логистическими ограничениями и стратегическим взаимодействием фирм, а классические модели олигополии позволяют адекватно объяснить наблюдаемое ценообразование и объёмы выпуска.

Ключевые слова: Казахстан, рынок цемента, олигополия, ценообразование, модель Курно, модель Штакельберга, строительный материал

Introduction

The cement industry is an important segment in the economic development of Kazakhstan. It remains one of the key elements of large-scale construction, including infrastructural projects and expanding industrial facilities, which are still the fields that define the rate of the country's economic growth. Even though the cement industry takes its roots from the very past, it requires not only sizable investment in equipment and facilities but also steady access to energy and the most effective transport routes, as it is one of the most logistically demanding industries. That's why only a few companies have financial and technical opportunities to enter this market and compete effectively. As a result, Kazakhstan's cement industry, much like those in many other countries, naturally gravitates toward an oligopolistic structure, where a relatively small group of firms shapes market outcomes [1, 79-90].

Cement demand in Kazakhstan is primarily driven by several structural factors:

1. State infrastructure programs (road construction, utilities modernization).

2. Housing initiatives, including «7-20-25» and regional development programs.
3. Industrial expansion projects in mining, processing, and oil & gas.
4. Urbanization is driving long-term construction growth.

Despite the fact that demand growth shows a stable trend, the competitive dynamics of the Kazakhstan cement industry remain complex. Production is regionally concentrated: firms usually serve markets within 300–400 km due to high transportation costs. As a result, the national market consists of multiple regional oligopolies, each dominated by 2 - 4 main producers [2, 32-33].

In this article, my goal is to understand how the main cement producers in Kazakhstan make decisions about pricing and output when they operate in a market with only a few serious competitors. To do that, I rely on classical oligopoly theory as a starting point, but I also compare it with real market data rather than treating it as a purely theoretical exercise. The research is based on a mix of methods: I reviewed industry reports and regulations, looked at recent statistics on production and imports, and compared Kazakhstan's situation with a few neighboring countries to see whether similar patterns appear elsewhere. This approach allows me to link theory with the practical realities that firms face today, instead of analyzing the market in isolation. This article expands previous research by combining classical oligopoly models with recent empirical evidence from Kazakhstan. The goal is to show not only how the market behaves in theory but also how real firms make decisions regarding output, pricing, and investment.

Theoretical analysis

The development of Kazakhstan's cement industry has not been a straight line; analyzing the historical development of the cement industry in Kazakhstan, we can notice that this industry passed several phases caused by the Government's economic policies, and changed market strategies depending on regional needs. During the Soviet era, cement production operated under a highly centralized system, where plants such as Shymkent Cement and Semey Cement were the results of government planning [3,1]. Their main purpose was to meet the material requirements of large construction projects, and almost every aspect, from production volumes to pricing, was set administratively. In that environment, there was no opportunity for competition in the modern sense.

In this article, I aim not only to describe the structure of Kazakhstan's cement market, but also to understand how firms actually behave when they face rivals with similar costs and limited room for price competition. While the classical Cournot and Stackelberg models provide the basic framework, I rely on them more as observation tools rather than exact predictors. In other words, the goal is to see whether the cautious pricing and output decisions observed in Kazakhstan resemble these models in practice and where they diverge. By comparing theoretical expectations with recent production, import and price data, the study offers a more realistic view of oligopolistic behavior rather than a purely abstract one.

After Kazakhstan gained independence in 1991, the industry faced a long and sometimes difficult restructuring period. Many old plants struggled with old equipment, falling output, and a lack of investment. Only in the early 2000s real modernization wave begin. Foreign companies, including HeidelbergCement and Steppe Cement, entered the market and brought with them more efficient technologies. At the same time, several domestic producers started upgrading their facilities [4, 1]. This gradually shifted the industry away from its Soviet legacy toward a more market-oriented structure.

The construction boom between roughly 2005 and 2014 created new momentum, encouraging capacity expansion, especially in southern and eastern Kazakhstan. Yet despite these improvements, the industry still behaves like a group of loosely connected regional markets rather than a single integrated one. High transport costs and logistical challenges continue to separate regions and limit direct competition among producers. This historical path helps explain why today's cement sector resembles the oligopolistic patterns described in industrial economics more

than it does a fully competitive market.

Classical economic models often assume that firms behave as perfectly rational profit maximizers, but in practice, decision-making can be far more nuanced. In Kazakhstan's cement sector, many producers tend to approach pricing and output decisions with a degree of risk aversion. This means that they avoid sudden price cuts or big jumps in production, because they worry that competitors might react badly and everyone's profits could fall. This fits well with ideas from behavioral economics, which show that people and companies often dislike losses, try to avoid uncertainty, and generally prefer a stable, predictable situation [5, 10-20].

In informal discussions, industry participants often emphasize the importance of maintaining a predictable market environment. They prefer slow adjustments rather than sharp changes in price or output. One reason for this is the fear that a sudden expansion of output could prompt competitors to do the same, leading to oversupply and downward pressure on prices. These psychological and organizational factors help explain why producers remain cautious, even when demand is high. They often choose steady, controlled growth instead of pushing production sharply upward [6, 22-30]. In this way, the cement industry shows a mix of calculated strategy and real human behavior, and together these tendencies support the kind of oligopolistic patterns that theory predicts.

Looking at how similar industries operate in other countries helps place Kazakhstan's cement sector in a broader context. Turkey offers a useful comparison because it has developed one of the most dynamic cement markets in the region. Although Turkey hosts more producers and has shorter transport distances than Kazakhstan, its market is still dominated by a few large players, such as OYAK, which exercise significant influence over pricing and capacity decisions. Russia resembles Kazakhstan more closely in terms of geography. Like Kazakhstan, Russia is divided into several regional markets where high transport costs make it difficult for producers to compete outside their home territories. Russian competition authorities have noted cases where companies raised prices at the same time and seemed to move in a coordinated way, even without explicit agreements. Similar patterns can sometimes be seen in Kazakhstan, too. China stands apart for its large scale. China has hundreds of cement producers, so its market is much more competitive. At the same time, the government plays a strong role, setting limits on production capacity and enforcing strict environmental rules. These policies have actually helped keep prices more stable, showing that a highly competitive market is not always more chaotic [7, 4-5]. When we look at these international examples, it becomes clear that Kazakhstan's oligopolistic market structure is not unusual. It mainly comes from the country's geography, cost conditions, and historical development, which is similar to what we see in many other cement-producing countries.

Examining Kazakhstan's cement industry on a regional level reveals that each part of the country operates under distinct competitive conditions. In the southern region - close to Shymkent, Turkestan, and nearby areas, competition is relatively stronger because several major plants operate in small region. Firms in this region also contend with imports from Uzbekistan, which can be cost-competitive due to short transport distances. Prices here tend to be more sensitive to seasonal fluctuations and cross - border supply movements.

The situation in the eastern part of the country is quite different. Plants in Semey, Pavlodar, and East Kazakhstan deal with low local demand and long distances to major cities. Because of this, there is less direct competition, and prices tend to be more stable. These plants often run below full capacity, but they also feel less pressure from other producers. The western region has its own unique dynamics. It has long depended on imports from Russia, so local prices and supply conditions often change based on what is happening in the Russian market. When Russian producers have extra cement, western Kazakhstan receives a lot of cheaper imports. But when supply in Russia decreases, local companies suddenly face higher demand and rising prices.

To have a clear view of pricing strategy of cement industry in Kazakhstan in terms of oligopolistic theory, it is essential to understand the foundations of oligopoly theory first.

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Oligopoly theory focuses on markets where a few firms interact strategically. This framework is particularly relevant for cement producers because they face similar cost structures and must consider each other's output choices when planning production. Unlike markets where firms set prices directly, cement producers typically compete on quantities [1, 79-90]. Several practical factors explain this:

- production schedules are fixed well in advance,
- cement is a largely homogeneous product,
- large price cuts risk provoking retaliation from rivals,
- and firms observe each other closely.

Because of these features, the Cournot model, where firms choose quantities rather than prices, often provides a more accurate description of how cement markets operate.

Cournot Oligopoly in Cement Markets

In Cournot competition, each firm selects an output level $q_i$that maximizes its profit while anticipating the decisions of competitors. The equilibrium predicts higher prices and lower output when markets are concentrated. This is the pattern that we can observe with many regional markets in Kazakhstan. Producers tend to maintain relatively stable output levels from year to year. Sudden changes in production are uncommon in Kazakhstan's market, which reflects the cautious strategy typical of Cournot competitors [5, 1-10].

In the Cournot model, each firm chooses output $q_i$to maximize profit:

$$\pi_i = (P(Q) - c_i)q_i.$$

In Kazakhstan's regions with 3–4 major plants, Cournot predictions align well with observed patterns:

- prices are above marginal cost
- output remains stable year to year
- firms rarely expand production aggressively

Stackelberg Leadership: The Role of Dominant Firms

In situations where one firm is significantly larger or more efficient, the Stackelberg model becomes useful. A leading firm sets its output first, and rivals follow. In Kazakhstan, Steppe Cement plays such a role in parts of the country, especially given its 1.7 million tonnes of sales in 2024 [8, 3]. As a result, other producers often adjust their output relative to Steppe Cement's decisions, which mirrors Stackelberg leadership behavior.

Collusion and Market Monitoring

Cement markets worldwide have historically been vulnerable to collusion, both explicit and tacit. Price parallelism, coordinated output restraint, and simultaneous price increases have been observed in various countries. Kazakhstan's competition authority has also monitored the industry for similar patterns. This does not mean firms explicitly collude, but the market structure makes coordinated behavior easier to sustain [6, 32-40].

Quantitative Results

Table 1. Key Indicators of Kazakhstan's Cement Industry (2023–2024)

Indicator	Value	Source
Cement production (2023)	~12.2 million tonnes	[8, 1]
Cement consumption (2024)	~11.9 million tonnes	[8, 1]
Steppe Cement sales (2024)	1.71 million tonnes	[8, 3]
Ex-factory price	42USD/tonne	[8, 2]

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Indicator	Value	Source
Import volume (2024)	935,000 tonnes	[9, 1]
Export volume (2024)	900,000 tonnes	[8, 2]
Capacity utilization	60.5%	[9, 1]
Annual price increase	4%	[8, 3]

Discussion and analysis

This table presents the key indicators of the cement industry in Kazakhstan for 2023-2024. First, we examine the volume of cement production in 2023, followed by the use of cement by the population in 2024. After that, you can see the sales of one particular company, Steppe Cement, which is one of the largest manufacturers in the country. You can also notice the minimum factory price per ton of cement. The table shows the volume of imports and exports for 2024, the volume is not too large due to the fact that the cost of transporting cement is high and, accordingly, this volume of imports and exports is an indicator specifically related to regions close to the border where it is cheaper to import cement from abroad, since it is expensive to bring local products. 60.5% is an indicator of how many percent of the country's total potential is used specifically in cement production; that is, even if demand increases significantly, the country has the potential to increase production accordingly without any problems, so we do not depend on neighboring countries even if demand increases. Last, this table shows an annual increase in prices of 4%, which is relatively small, since cement production in the country is under control. Next, you can see the specific results of the analysis of this table, and the analysis of cement pricing in Kazakhstan.

1. Market Structure

The market’s moderate-to-high concentration is evident through:

- high fixed costs
- dominance of 4–5 large firms
- regional segmentation
- stable pricing patterns

This structure strongly aligns with Cournot predictions of above-competitive prices [1, 85-102].

2. Impact of Imports

Imports (mainly from Russia, Uzbekistan, Kyrgyzstan) reached 935,000 tonnes in 2024, acting as a competitive constraint. However, imports concentrate mostly near border regions.

3. Pricing Strategy

The 4% national price increase in 2024 indicates:

- cost pass-through (energy, logistics)
- possible tacit coordination (parallel increases)

4. Capacity Utilization and Output Discipline

Kazakhstan’s 60.5% utilization rate implies:

- significant potential output
- strategic output restraint
- alignment with oligopolistic discipline

The goals I set out in the introduction were reached by comparing what the classic oligopoly models would expect to happen with what is actually taking place in Kazakhstan’s cement market. Instead of treating the models as perfect rules, I used them more as a guide to understand real behavior. When I looked at recent figures on production, prices, and how much capacity is being used, the patterns were consistent with firms avoiding sudden jumps in output or price cuts. The regional differences also helped show why competition is limited, mostly because long transport

distances make it unprofitable to move cement far. Taken together, these observations suggest that the cautious pricing and output strategies predicted by Cournot and Stackelberg are not just theoretical ideas, they can be seen in how producers operate today.

The cost structure of cement production in Kazakhstan depends on several practical factors: technology, geography, and day-to-day operations. Understanding these costs makes it easier to see why firms set their prices the way they do. Cement production requires very large investments in equipment such as kilns, quarries, storage systems, and environmental control units. Because these investments are so expensive, a big part of the total cost is fixed, and companies need to keep production steady just to cover these initial expenses. The main variable costs come from energy. Cement plants use a lot of electricity for grinding and a lot of heat to produce clinker. Older plants that rely on wet-kiln technology spend even more on energy, sometimes more than a third of their total costs, while newer dry-kiln plants operate more efficiently [10, 39-47]. Transport costs are another important issue. Cement is heavy and not very valuable per tonne, so moving it long distances becomes too expensive. This naturally pushes producers to focus on nearby markets, which is one reason Kazakhstan's industry is divided into regional segments. Labor costs are not very high overall, but in some areas the lack of experienced technical workers can create production challenges. When you put all these factors together, it becomes clear why firms in Kazakhstan avoid aggressive price competition. With high fixed costs and similar production expenses across companies, a price war would hurt everyone. This encourages more stable and predictable pricing behavior instead.

Analyzing Kazakhstan's cement industry through oligopoly theory requires us to keep in mind what these models assume. The Cournot model, for example, is based on the idea that firms choose their production levels at the same time. This fits the cement industry well because producers usually plan their output months ahead, and since cement is hard to store or move long distances, companies generally know how much their regional competitors can produce [5, 10-20]. At the same time, the model leaves out some real-world details. It doesn't fully consider capacity limits, even though many plants in Kazakhstan are running below full capacity and could increase output if needed. The Stackelberg model, which is built around a leader - follower relationship, also helps explain some parts of the market. In certain regions, one firm has a clear advantage, either because it has lower costs or larger capacity. Steppe Cement often plays this leading role in northern Kazakhstan due to its size and efficiency. But even these models don't explain everything. They don't fully reflect the impact of imports or the cautious decision-making style many managers prefer. By keeping these limitations in mind, we can use the models as helpful guides rather than exact predictions of how the market will behave.

In recent years, Kazakhstan's cement industry has slowly moved toward modernization, pushed by both economic pressures and government policies. Many producers have started upgrading old equipment, replacing the older, energy-heavy wet-kiln systems with newer dry-kiln technologies. These modern kilns use less energy and help plants stay competitive, especially in areas where energy prices are rising. Automation is also becoming more common. Digital tools now help companies monitor production, track equipment performance, and reduce unexpected downtime. Another noticeable trend is the growing interest in alternative fuels. Some producers are testing waste-based fuels or biomass as a way to lower energy costs and meet environmental requirements. These upgrades, however, are not cheap. They require large initial investments, which many smaller firms cannot easily afford. As a result, modernization tends to benefit bigger companies, particularly those with international backing, who are better positioned to invest and strengthen their competitive position [11, 1].

One more interesting thing about the pricing is the impact of environmental regulation. Environmental rules are slowly becoming a more important factor in Kazakhstan's cement industry. Since cement production uses a lot of energy and produces significant Carbon Dioxide emissions, the government has started introducing stricter standards. Carbon taxes and emission

limits are still being developed, but many producers are already bracing for higher compliance costs. Older plants may have to invest heavily in upgrades just to meet these new requirements [12, 31-38]. These changes will likely affect cement prices in the coming years. As companies spend money on cleaner technologies or adjust their operations to reduce emissions, some of these costs will naturally be passed on to buyers. Other countries have seen similar trends, where environmental policies encouraged consolidation and left only the most efficient producers in the market. If Kazakhstan goes down the same path, the industry could become even more concentrated, strengthening the oligopolistic structure that already exists.

Conclusion

The review of Kazakhstan's cement industry shows that the sector continues to work under conditions that naturally lead to an oligopoly. Only a limited number of firms can operate in this market because production requires large investments, stable access to energy, and well-developed logistics. This means that companies closely watch each other and often adjust their decisions based on what their competitors might do. As a result, prices stay relatively stable, and firms tend to increase output slowly and carefully, even when demand is growing.

Regional differences also matter a lot. The southern, eastern, and western parts of the country each have their own market conditions shaped by transport distances, imports, and local demand. Because of this, Kazakhstan does not have one single cement market. Instead, it works like several smaller regional markets, each with only a few major producers.

Modernization and environmental rules add new challenges. New technologies and alternative fuels can make production more efficient, but these upgrades are expensive. Larger companies can afford them, while smaller firms often cannot, which may increase market concentration. Stricter environmental requirements may have the same effect by pushing outdated plants to either modernize or exit the market.

Overall, the combination of industry structure, cautious decision-making, and upcoming regulations suggests that Kazakhstan's cement market will likely remain an oligopoly for years to come. For the government, it is important to support transparency, monitor pricing behavior, and help create conditions that encourage fair competition and efficient production. The results of this article can be useful not only for academic work on industrial economics, but also for people involved in competition policy and planning in the construction sector. The analysis helps explain how pricing and output decisions are made in a market with only a few major players, which can be valuable for regulators and companies considering investment or modernization. It also offers a starting point for further research on regional competition, environmental rules, or the long-term development of the cement industry in Kazakhstan and similar markets.

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