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DRIVERS AND BARRIERS TO CIRCULAR ECONOMY ADOPTION: A QUALITATIVE STUDY OF MANUFACTURING COMPANIES IN KAZAKHSTAN

Bachelor thesis

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I have written this Bachelor thesis independently. Any ideas or data taken from other authors or other sources have been fully referenced.

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Introduction

The idea of a sustainable alternative to the traditional economy has gained a lot of attention. For many years, industrial progress followed the conventional linear model, in which people buy a product, use it, and then throw it away. Given the current economic model's reliance on low-cost, readily available resources and its contribution to excessive waste, the Ellen MacArthur Foundation (2015) argues that fundamental systemic change is urgently needed. The idea of a Circular Economy (CE) has become a viable substitute as the world seeks to solve these issues. It aims to seperate economic expansion from unsustainable resource use by minimizing waste, extending the functional life of products, and promoting responsible consumption of materials (Korhonen et al., 2018).

Kazakhstan, a country with rich natural resources and a manufacturing sector that is important to its economy, is at a turning point. According to Ospanova (2014), key environmental problems in Kazakhstan include the management of industrial, municipal, and hazardous waste streams. Although Kazakhstan produces more than 100 million tons of solid household garbage, very little of it is recycled at the moment (Bralina, 2023). The nation must transition from a resource-dependent economic model toward a more diversified, environmentally sustainable, and innovation-driven system, since it aims to join the ranks of the world's top thirty most developed countries by mid-century.

There is a noticeable lack of generalized research that specifically looks at the factors that drive and hinder the country's manufacturing sector from implementing CE guidelines, even though the literature currently in publication offers insights into international best practices, and some localized studies mention sustainability initiatives in Kazakhstan. The majority of current research ignores the systemic issues promoting CE integration in favor of concentrating on individual industry initiatives or more general sustainability themes. Little is known about how Kazakhstan's distinct industrial and socioeconomic environment may affect or obstruct the efficacy of CE methods.

This gap in the literature highlights the need for targeted research to explore the drivers, potential benefits, and barriers associated with implementing circular economy practices in Kazakhstan's manufacturing sector. Addressing this can provide actionable insights for industry leaders, stakeholders, and forthcoming regulations to accelerate the country's transition towards a sustainable, circular economy.

The thesis aims to identify the key drivers and barriers associated with implementing circular economy practices in Kazakhstan's manufacturing sector. The following research tasks need to be completed:

- to present the theoretical framework for the Circular Economy in the manufacturing sector;
- to analyze the key drivers and barriers for adopting Circular Economy practices in the manufacturing sector;
- to give an overview and analysis of CE initiatives in Kazakhstan, including key industries and government policies;
- to collect and analyze empirical data, which includes conducting interviews;
- to evaluate the drivers and barriers for advancing CE practices in Kazakhstan's manufacturing sector;

The foundational concepts of CE, its benefits, and its relevance to the manufacturing sector are examined in the first section. It offers a theoretical foundation to understand how CE might change conventional systems of production and consumption.

The second part of the thesis contains the empirical analysis, which focuses on the present situation of CE in Kazakhstan's manufacturing sector, emphasizing its drivers and barriers

Keywords: circular economy (CE), Kazakhstan, manufacturing sector, waste management, economic system.

1. The theoretical framework for the Circular Economy in the Manufacturing Sector

1.1 Core Concepts and Principles of Circular Economy

The circular economy (CE) has become an important concept in sustainability studies, offering an alternative to the traditional linear economic model. To give a strong foundation for this study, it is important to clarify how CE is defined and interpreted in the literature. An overview of the main definitions put out by eminent academics is provided in this part, demonstrating the conceptual development and multifaceted character of the CE framework. Several of the most important definitions used in scholarly and policy debate are compiled in the following table.

Table 1

Definitions of Circular Economy

Author & Year	Definition
Geissdoerfer, Savaget, Bocken and Hultink (2017, p.759)	"The circular economy is a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling."
Kirchherr, Reike, and Hekkert (2017, p. 229)	The Circular Economy is "an economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling, and recovering materials in production/distribution and consumption processes".
Korhonen, Nuur, Feldman and Birkie (2017, p. 547)	"CE is a sustainable development initiative with the objective of reducing the societal production-consumption systems' linear material and energy throughput flows by applying material cycles, renewable and cascade-type energy flows to the linear system. CE promotes high-value material cycles alongside more traditional recycling and develops systems approaches to the cooperation of producers, consumers, and other societal actors in sustainable development work."

Source: Compiled by the author based on the cited works

It is important to keep in mind that, despite being second-hand references, some definitions are nevertheless trustworthy since they are widely used and offer important context for comprehending the term. With an emphasis on both its guiding principles and its evolving role in addressing environmental concerns and resource sustainability, the collected definitions provide a comprehensive overview of how various academics have characterized CE.

Their emphasis on reducing waste and resource consumption through techniques like reuse, recycling, and regeneration is the main similarity between these concepts. Kirchherr et al. (2017) use a system-wide economic approach aimed at changing production and consumption processes, whereas Geissdoerfer et al. (2017) stress technical methods to shut material and energy loops. Korhonen et al. (2017) offer a more thorough perspective, focusing on cooperation and the use of renewable energy sources while conceptualizing the circular economy as a socially anchored project rather than merely a technical framework.

Purvis et al. (2019) make clear that sustainability is a more comprehensive, normative framework that includes social, environmental, and economic aspects, even though phrases like "circular economy" and "sustainability" are occasionally used interchangeably. By encouraging practices like material loop closure, better resource usage, and decreased waste and emissions, Geissdoerfer et al. (2017) characterize the circular economy as a workable model intended to improve both environmental and economic sustainability.

Following a summary of the different definitions of the Circular Economy, the next section describes the evolution of the concept from its early theories by economists and environmental thinkers to its current implementation in governmental policies and initiatives.

Over time, theoretical, ecological, and policy advancements have come together to form the idea of the Circular Economy (CE). Rather than originating from a single scholar or moment, CE is influenced by a number of schools of thought. The practice of reusing industrial by-products appeared as early as the 1800s, aiming to mitigate environmental harm through exchanges between industries (Korhonen et al., 2018). They also noted that Georgescu-Roegen introduced thermodynamic constraints into economic discourse through the entropy concept, laying foundational ideas for CE. Thinkers such as Boulding, Pearce, and Turner further advanced the framework by emphasizing ecological limits and sustainable resource use. Over the past decade, circular economy principles have been increasingly rooted in policy and strategy through initiatives like the EU's Circular Economy Action Plan and the global advocacy efforts of the Ellen MacArthur Foundation (European Commission, 2015; Ellen MacArthur Foundation, 2015). As shown in Figure 1, CE as a concept has

rapidly evolved from a conceptual framework into a global policy agenda, especially in the last ten years.

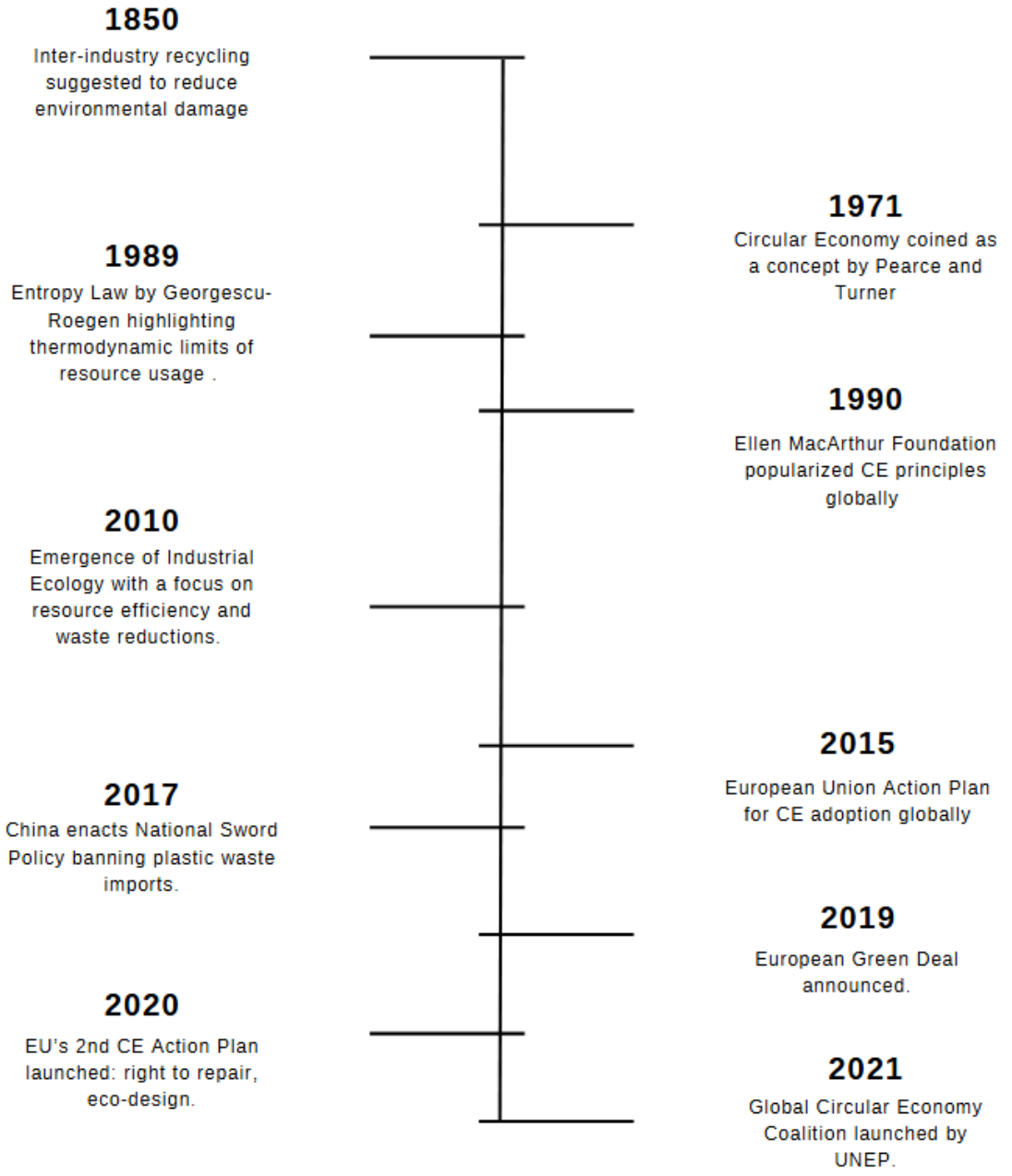

Figure 1. Timeline of CE Concept Evolution

Source: compiled by the author based on sources including Korhonen et al. (2018, with secondary references to Georgescu-Roegen, 1971), Pearce and Turner (1990), Ellen MacArthur Foundation (2015), European Commission (2019, 2020), Brooks et al. (2018), and UNEP (2021).

The Ellen MacArthur Foundation (2015) noted that the Circular Economy is fundamentally structured around three principles:

1. Preserve and Enhance Natural Capital: CE seeks to preserve the ecosystem health by developing systems that make use of restorative material flows and renewable energy.

2. Optimize Resource Yields: CE ensures that materials stay in their most useful state for as long as possible by reusing, recycling, repairing, and remanufacturing them.

3. Promote System Effectiveness: CE aims to eliminate waste and inefficiency by incorporating systems thinking into the development of products and services with minimal negative externalities.

The Foundation's website now rephrases these principles as "eliminate waste and pollution, circulate products and materials, and regenerate nature," but the fundamental concepts are still the same.

The CE is characterized by its emphasis on cyclical material flows, which prolong product lifecycles and lessen dependency on raw materials. Korhonen, Honkasalo, and Seppälä (2018) argue that the circular economy prioritizes more valuable interventions, such as remanufacturing and repair, over conventional recycling or energy conversion approaches. On the other hand, traditional recycling often downgrades materials, resulting in outputs with reduced economic or functional value (Korhonen et al., 2018). Emphasizing collaborative strategies and efficient resource use, the circular economy aligns closely with core principles of industrial ecology (Korhonen et al., 2018). According to the Ellen MacArthur Foundation (2015), this approach promotes the transition to a more sustainable circular economy.

The CE model’s emphasis on cyclical flows, high-value retention, and cross-sector collaboration makes it particularly applicable to Kazakhstan’s manufacturing sector. This industry is both resource-intensive and economically strategic for the country, offering strong potential for CE-driven improvements. The next section explores global experiences with CE adoption in manufacturing, providing comparative insight for Kazakhstan’s transition.

1.2. Global Drivers of Circular Economy Adoption in Manufacturing

A variety of factors, including market dynamics, technical advancements, and governmental actions, impact the manufacturing sector's adoption of circular economy (CE) practices. The motivations and methods by which CE principles can be incorporated into production systems are highlighted by these drivers. Table 2 provides a summarized perspective on key insights from existing studies, which form the foundation for understanding these drivers.

Table 2

Literature Review on Circular Economy Adoption in Manufacturing and Related Sectors

Paper Title	Author(s)	Objective	Main Findings
Circular Economy: Challenges and Opportunities in the Construction Sector of Kazakhstan	Torgautov et al., 2021	To investigate the application of CE principles in Kazakhstan's construction sector.	Kazakhstan's construction sector shows CE potential but faces economic and infrastructure barriers. Recommends BIM integration, better waste facilities, and adoption of eco-materials. Relevant for this thesis due to the local context and sectoral overlap.
Circular economy in the manufacturing sector: benefits, opportunities and barriers	Kumar et al., 2019	To identify key barriers and opportunities of CE in manufacturing.	Several implementation challenges, including insufficient public awareness, high upfront costs, limited policy frameworks, and technical knowledge gaps. They also highlighted benefits such as cost savings, innovative business models, and improved brand image, recommending enhanced educational initiatives and strategic national-level CE policies.
The circular economy in the textile and apparel industry: A systematic literature review	Jia et al., 2020	To review CE practices in the textile and apparel (T&A) industry and identify key challenges.	Significant barriers such as environmental pollution and inflexible supply chain practices exist in the textile sector. They propose dynamic conceptual models and highlight five key research directions. Although focused on textiles, their framework is adaptable to other manufacturing contexts..
Circular Economy in Spanish SMEs: Challenges and Opportunities	Ormazabal et al., 2018	To investigate the implementation of CE practices in Spanish SMEs,	SMEs mainly pursue circular practices to comply with regulations and reduce costs. They encounter both tangible and behavioral barriers, and the authors suggest that fostering inter-organizational collaboration along with sector-specific policy incentives could facilitate broader CE adoption.
A systematic review on drivers, barriers, and practices towards circular economy: a supply chain perspective	Govindan et al., 2018	To review CE adoption in global supply chains.	Stress the crucial role of public education and governmental incentives in promoting circular economy practices. They call for more empirical studies tailored to specific national contexts to support effective policy and business decisions.

Note: Shortened version. Full version included in Appendix A

Source: Compiled by the author

The literature reveals five main categories of CE drivers in the manufacturing sector: economic motivations, technological capabilities, regulatory and policy support, organizational commitment, and consumer and societal influence. Each is discussed below with global and Kazakhstan-specific insights.

Economic motivations are among the strongest drivers of CE practices. In Table 2, studies consistently highlight cost-saving opportunities as a significant benefit of CE adoption. Companies often turn to circular strategies such as waste reduction, recycling, and remanufacturing to lower production costs and improve their competitiveness. Kumar et al. (2019) highlight that European manufacturers experience tangible advantages from circular economy practices, particularly in terms of reducing waste and enhancing material efficiency. Similarly, Ormazabal et al. (2018) observed that for Spanish SMEs, resource reutilization is primarily driven by the goal of minimizing operational costs, highlighting a financial rationale behind circular economy practices. In the context of Kazakhstan, economic benefits remain a primary incentive for stakeholders, especially amid increasing interest in enhancing resource efficiency and modernizing industrial processes (Torgautov et al., 2021). Local manufacturers are beginning to explore CE not only as a sustainability strategy but as a pathway to economic growth.

Technological capabilities function as critical enablers of CE integration in manufacturing. Innovations ranging from digital tools to advanced material processing systems play an important role in facilitating circular transitions. Jia et al. (2020) note that in the textile sector, sustainability has been advanced through technological innovations and coordinated supply chain practices designed to close material loops. Torgautov et al. (2021) advocate for expanding the application of computer programs such as Building Information Modeling (BIM)

and the national E-Kurylys system in Kazakhstan to enhance construction sector efficiency, transparency, and waste reduction. These technologies may also hold promise for broader industrial applications beyond construction.

Regulatory and policy support is another foundational support for CE advancement. Governments across jurisdictions are progressively introducing frameworks to regulate the shift from linear to circular production models. The EU's Circular Economy Action Plan, noted by both Govindan and Hasanagic (2018) and Kumar et al. (2019), sets progressive recycling and waste-reduction goals that create a supportive landscape for compliance and innovation. In Kazakhstan, although CE is not yet fully embedded in national policy, key

steps have been taken. These include the adoption of the Green Economy Concept and a growing number of environmental restrictions, such as bans on plastic landfilling and pilot EPR schemes. SWITCH-Asia, in partnership with Kazakhstan's Ministry of Ecology, has supported the formulation of strategic guidance for enhancing plastic recycling and promoting sustainable public procurement (SWITCH-Asia, 2022).

One internal determinant of CE adoption is organizational commitment. Enterprises that integrate sustainability principles into their corporate mission, design processes, and supply chains are generally more successful in implementing circular approaches. According to Jia et al. (2020), long-term circular economy implementation depends on active organizational commitment and sustained collaboration among diverse industry stakeholders. Although Kazakhstan's industries largely operate on linear production principles, recent government strategies and export-focused policies are gradually guiding businesses toward more environmentally sustainable practices (Ministry of Ecology & UNDP, 2022).

Consumer and societal influence are emerging drivers of CE practices, particularly in markets where public demand for sustainable products exerts pressure on producers. According to Kakwani and Kalbar (2020), countries such as China and those in Europe have advanced in circular economy implementation due to heightened public awareness and effective policy reforms, suggesting an enabling environment for innovation. Kazakhstan is exhibiting similar trends, notably through expanded investment in environmental education, awareness campaigns, and the inclusion of sustainability in formal curricula. NGOs and civil society organizations, such as KazWaste, have contributed to public awareness and pilot recycling initiatives in Kazakhstan. Although public demand for circular products in Kazakhstan remains modest, SWITCH-Asia (2022) indicates that recent educational and institutional initiatives lay promising groundwork for increased community involvement in the near future. These initiatives suggest that consumer influence may soon evolve into a significant catalyst for CE implementation in the national context (Ministry of Ecology & UNDP, 2022).

Table 3 provides a comparative summary of global and Kazakhstan-specific drivers of CE adoption in the manufacturing sector, based on the literature reviewed.

Table 3

Comparison of global and Kazakhstan-specific drivers for Circular Economy adoption in manufacturing.

Driver Category	Global Drivers (from literature)	Kazakhstan-Specific Drivers (from reviewed sources)
Economic Motivations	- Efficient material usage and reuse contribute significantly to lowering operational costs.(Kumar et al., 2019; Ormazabal et al., 2018)	- Emphasis on industrial modernization and resource optimization (Torgautov et al., 2021)
Technological Capabilities	- Use of digital technologies (e.g., closed-loop systems, RFID) (Jia et al., 2020)	- Promotion of BIM and digital systems like “E-Kurylys” in construction to improve material efficiency (Torgautov et al., 2021)
Regulatory and Policy Support	- CE Action Plans and mandatory targets (e.g., EU CE Action Plan) (Govindan & Hasanagic, 2018)	- Green Economy Concept, ban on landfilling plastics, and roadmap efforts via SWITCH-Asia support (Zhidebekkyzy et al., 2023; SWITCH-Asia, 2022)
Organizational Commitment	- Reconfiguring supply chains and embedding sustainability principles into internal operations. (Jia et al., 2020)	- Not explicitly discussed in Kazakhstan-specific literature; this represents a research gap (Zhidebekkyzy et al., 2023)
Consumer and Societal Influence	- strong public awareness and effective regulatory frameworks (Kakwani & Kalbar, 2020)	- Growing awareness through formal curricula, NGO campaigns, and recycling infrastructure efforts (e.g., KazWaste, Zhasyl Damu) (SWITCH-Asia, 2022)

Source: Compiled by the author based on Zhidebekkyzy et al. (2023), Torgautov et al. (2021), SWITCH-Asia (2022), and literature review findings.

In summary, the previously discussed drivers provide both a theoretical and empirical foundation for integrating circular economy concepts into the manufacturing industry. However, several structural, institutional, and operational obstacles continue to interfere with the shift toward CE, even in the face of favorable circumstances. The next section attempts to describe these barriers, drawing both on the international literature and on context-specific barriers observed in developing and transition countries.

1.3. Global Barriers of Circular Economy Adoption in Manufacturing

Despite the growing popularity of circular economy (CE), manufacturers encounter a complex set of barriers that hinder implementation. These challenges are not only sector- and region-specific but also interlinked, often compounding each other. This section provides a

critical overview of the major obstacles to CE adoption in the manufacturing sector, drawing from recent studies.

Technological barriers continue to pose a significant constraint on CE adoption within the manufacturing industry. Dennison et al. (2024) note that companies often struggle with navigating intricate supply chains, limited information on product lifecycle and design, and substantial upfront investments required to adopt new technologies. While most existing research focuses on construction rather than manufacturing, relevant insights can be drawn from Kazakhstan's construction sector, where circular economy practices are also emerging. For example, many SMEs in construction lack access to modern recycling equipment, adoption of digital tools such as Building Information Modeling (BIM) remains low among smaller firms, and infrastructure for material recovery and reuse is underdeveloped (Torgautov et al., 2021). These issues point to broader systemic challenges that may also affect CE implementation in manufacturing contexts.

Another significant barrier to the adoption of CE is financial constraints, especially for small and medium-sized businesses (SMEs). Cantú et al. (2021) identify that the high initial expenditures required for adopting circular economy models, such as purchasing equipment, redesigning products, and reconfiguring supply chains, can pose significant barriers for SMEs. Consequently, many firms are reluctant to allocate resources toward circular initiatives, especially in environments characterized by economic volatility or underdeveloped green finance instruments. In Kazakhstan, challenges related to limited access to green finance are compounded by the suspension of subsidies managed by the EPR operator Zhasyl Damu JSC. This policy change has negatively affected the recycling sector, with several small enterprises ceasing operations as a result (SWITCH-Asia, 2022).

Pannila et al. (2022) identify weak regulatory enforcement and the absence of a unified long-term vision among stakeholders as significant obstacles to circular economy adoption in food supply chains. This regulatory uncertainty discourages firms from making long-term CE investments. While Kazakhstan has launched strategies supporting the green economy, CE-specific policy frameworks remain underdeveloped. The absence of clear long-term guidelines, tax incentives, and regulatory enforcement discourages firms from investing in CE initiatives. As highlighted in Zhidebekkyzy et al. (2023), CE is not yet mainstreamed into Kazakhstan's governmental agenda, and implementation often depends on the voluntary efforts of NGOs or academia

Internal resistance to change within organizations can impede the transition to CE. Many firms struggle to find qualified personnel with CE knowledge, and even founders

report lacking the capacity to develop suitable organizational models (Kanda et al., 2024). Moreover, aligning employees with the firm's CE values is crucial but difficult. Entrepreneurs emphasized the need for staff who are skilled and passionate about circularity, as cultural fit is seen as essential for success (Kanda et al., 2024).

While organizational and workforce-related barriers are commonly cited in global studies, the literature reviewed for Kazakhstan reveals a noticeable gap in addressing these factors. This absence may reflect either a lack of empirical inquiry into organizational dynamics or an early stage of CE awareness within firms, suggesting a direction for future research.

A persistent barrier to CE progress lies in insufficient consumer awareness and engagement with circular practices. In emerging economies, where sustainable consumption patterns are still in their earliest stages, this issue is especially pressing. According to Tushar et al. (2024), limited public understanding of CE concepts ranks among the most critical challenges facing circular transition efforts. In addition, market demand for remanufactured or refurbished products remains weak, due in part to minimal regulatory pressure and underdeveloped market infrastructures. These conditions collectively reduce incentives for manufacturers to invest in circular production systems, further entrenching linear modes of production.

In Kazakhstan, sustainable consumption patterns are still emerging. According to Zhidebekkyzy et al. (2023), public understanding of CE remains limited, and few incentives exist for customers to prefer remanufactured products. This market immaturity reduces the economic viability of CE-aligned offerings, further discouraging producer investment.

Table 4 summarizes the main global and Kazakhstan-specific barriers identified in the literature, highlighting both common patterns and context-specific challenges.

Table 4

Global vs Kazakhstan-Specific Barriers to Circular Economy Adoption in Manufacturing

Barrier Category	Global Barriers	Kazakhstan-Specific Examples
Technological	- Outdated production systems - Lack of product lifecycle data - High capital costs for tech upgrades	- Many SMEs lack access to modern recycling equipment - Low adoption of digital tools (e.g., BIM) - Weak infrastructure for material recovery
Financial	- High upfront investment - Limited return on CE investments for some sectors	- Suspension of EPR subsidies (e.g., Zhasyl Damu JSC) - Lack of green finance mechanisms- SMEs unable to afford CE-aligned restructuring
Regulatory/Policy	- Unclear legal frameworks- Weak enforcement of CE laws- Fragmented CE policies	- CE not fully embedded in national legislation - Poor enforcement of landfill bans on plastics - Low integration of CE in industrial policy
Organizational/Workforce	- Resistance to change- Lack of CE expertise- Misalignment between departments	*Not explicitly covered in current Kazakhstan-specific literature.*
Market/Consumer Awareness	- Low demand for refurbished goods - Misconceptions about quality - Limited CE-labeled products	- The public has limited awareness of CE principles - Weak demand for recycled or reused products - Limited access to eco-labeled products
Logistical & Infrastructure	- Inefficient waste collection- Geographic fragmentation - High transport costs for recycled materials	- Plastic and C&D waste mostly landfilled despite recyclability - Recycling plants concentrated in a narrow region (north-south corridor)

Source: Compiled by the author based on Zhidebekkyzy et al. (2023), Torgautov et al. (2021), SWITCH-Asia (2022), and literature review findings.

To better understand how these barriers interact with known CE drivers, Table 5 below presents a synthesis matrix mapping their interrelations. This framework illustrates how certain drivers may reduce, mitigate, or directly counteract specific barriers.

Table 5

Drivers–Barriers Interaction Matrix

	High Upfront Investment	**Complex Tech & Supply**	**Regulatory Uncertainty**	**Cultural Misalignment**	**Weak Demand**
Cost Savings	⬆ Reduces impact	—	—	—	⬆ Incentivizes
Tech Capabilities	⬇ Tech cost barrier	⬇ Simplifies systems	—	—	⬆ Transparency
Policy & Regulation	⬆ Grants available	—	⬇ Clarifies direction	—	—
Org. Commitment	—	⬆ Process innovation	—	⬇ Drives culture	—
Societal Pressure	—	—	—	⬇ Shifts norms	⬆ Awareness

Source: Compiled by the author based on Geissdoerfer et al. (2017), Kirchherr et al. (2017), Korhonen et al. (2018), Kanda et al. (2024), and Tushar et al. (2024).

Note: ⬆ = Helps overcome the barrier; ⬇ = Reduces the severity; — = No direct link

Based on the literature reviewed in Sections 1.1 to 1.3, it is evident that the adoption of Circular Economy (CE) principles in manufacturing is influenced by a complex interplay of enabling and constraining factors. To consolidate these insights and provide a structured foundation for empirical analysis, the table below presents an integrated theoretical framework. It synthesizes globally recognized drivers of CE, contextualizes them with Kazakhstan-specific evidence, and links each driver to the barriers it may help mitigate. This structure will act as a point of reference for analyzing the interview results in the subsequent chapters.

Table 6

Integrated Theoretical Framework for Analyzing Circular Economy Adoption

Driver Category	Global Insights	Kazakhstan-Specific Evidence	Barrier(s) Mitigated
Cost Savings	Reduces material, energy, and waste costs	Motivates modernization in construction (Torgautov)	Reduces high upfront cost, incentivizes low demand
Tech Capabilities	Enables closed-loop systems, digital optimization	BIM & E-Kurylys in construction (Torgautov)	Lowers tech/supply complexity, improves transparency
Policy & Regulation	CE mandates & incentives (e.g., EU)	Green Economy strategy, landfill bans, SWITCH-Asia CE	Mitigates regulatory uncertainty, offers financial support
Org. Commitment	Internal CE alignment boosts success	Largely undocumented in the Kazakhstan literature	Drives culture change, process innovation
Societal Pressure	Consumer pressure in advanced economies	Public education & NGO-led awareness (KazWaste, etc.)	Increases awareness, shifts norms

Source: Compiled by the author based on insights from Kumar et al. (2019), Ormazabal et al. (2018), Jia et al. (2020), Govindan & Hasanagic (2018), Kakwani & Kalbar (2020), Zhidebekkyzy et al. (2023), Torgautov et al. (2021), and SWITCH-Asia (2022).

As illustrated in the integrated theoretical framework, the successful adoption of Circular Economy principles in Kazakhstan's manufacturing sector hinges on the dynamic interplay between enabling drivers and persistent barriers. While global literature identifies well-established factors, the Kazakh context reveals distinct challenges in infrastructure, organizational readiness, and regulatory clarity. By synthesizing these insights, the framework provides a structured foundation for analyzing how these theoretical dynamics unfold in practice.

The research design, data gathering techniques, and analytical methodology used to examine stakeholder perspectives on CE adoption in Kazakhstan are described in the next chapter. This empirical investigation is guided by the framework presented above.

2. Empirical analysis of Circular Economy implementation in Kazakhstan's Manufacturing Sector

2.1 Policy and Industrial Context for Circular Economy Adoption in Kazakhstan's Manufacturing Industry

In Kazakhstan's policy discourse, the idea of CE has gained popularity, especially regarding government-driven sustainable development initiatives. The launch of Kazakhstan's Green Economy Concept in 2013 laid the groundwork for circular economy

practices by prioritizing green technologies, efficiency in resource use, and better waste management (Ospanova, 2014). However, there hasn't been any particular focus on manufacturing; instead, it has mostly been on energy and waste management.

This section shifts focus specifically to the manufacturing sector - a major contributor to Kazakhstan's material consumption and energy demand. While policy initiatives reference sustainability, CE adoption in manufacturing remains minimal and fragmented.

Research by Kumar et al. (2019) and Ormazabal et al. (2018) shows that CE implementation varies significantly, with larger firms typically advancing resource-efficient innovations more readily than SMEs, which face resource and awareness limitations. Manufacturing industries show some instances of material recovery and recycling, but these efforts lack systematic frameworks or industrial symbiosis networks.

Some insights from the construction sector suggest potential pathways for manufacturing, though evidence remains indirect. Similar to this, but in isolated efforts, pilot projects in recycling and green finance systems show increased interest in circular ideas.

Recent research by Zhidebekkyzy et al. (2023) confirms that stakeholder readiness varies significantly across sectors. Other sectors, such as education, show higher CE readiness, but manufacturing still lags.

Based on recent literature, several structural and systemic barriers continue to inhibit CE uptake in manufacturing:

- Regulatory Gaps: Although Kazakhstan has adopted sustainability-focused policies, both PAGE (2020) and Zhidebekkyzy et al. (2023) note the lack of dedicated legislation supporting circular practices in manufacturing.
- Financial Constraints: SMEs lack access to green financing mechanisms, making it difficult to adopt CE practices (Karatayev & Clarke, 2016; PAGE, 2020).
- Limited Public and Industry Awareness: According to Zhidebekkyzy et al. (2023), consumer participation in activities such as waste separation, sustainable purchasing, and circular supply chains is still minimal in Kazakhstan
- Technological Barriers: As noted by Lieder and Rashid (2016) and PAGE (2020), outdated technologies and inadequate infrastructure significantly hinder the scaling up of circular economy initiatives within Kazakhstan's industrial sector.

Global practices, as reviewed by Bjørnbet et al. (2021), underline the importance of empirical research and sectoral reviews to bridge the gap between theoretical CE principles and practical applications. In Kazakhstan, such empirical studies remain scarce, creating a

gap in understanding the manufacturing sector's specific requirements for transitioning to circularity.

Kazakhstan has recently attempted to align national standards with international environmental objectives. Efforts such as green taxonomy frameworks and waste management reforms suggest early steps toward enabling CE practices. Nonetheless, CE-specific manufacturing regulations are not well-developed, and enforcement is still weak (Bralina, 2023). Systemic CE adoption requires strong regulatory frameworks and financial incentives, according to comparative studies with nations like the UK and Spain (Singh et al., 2021).

Existing literature emphasizes the need for localized research to assess the implementability of CE practices in Kazakhstan's manufacturing sector. Major knowledge gaps include limited data on material flows and product lifespans, insufficient sector-specific metrics on resource use and waste generation, and a lack of research on how different manufacturing industries could collaborate by using each other's waste or by-products as a resource.

These contextual insights provide the foundation for the empirical analysis in the following chapters, which explores how Kazakhstani firms perceive and approach CE adoption.

2.2. Methodology of the Empirical Study

This study contributes to the CE literature by examining how global drivers and barriers manifest in Kazakhstan's manufacturing sector. To assess these dynamics empirically, the research employs sector-specific interviews designed to evaluate drivers and barriers to CE adoption among manufacturing firms.

The purpose of this empirical study is to look into the key drivers and barriers associated with implementing Circular Economy (CE) practices in Kazakhstan's manufacturing sector. This study takes a qualitative method using semi-structured interviews because of time restrictions and the difficulties in getting a high enough response rate through surveys.

The study's methodology is broken down into the following five sections: literature review, the development of a semi-structured interview guide, participant selection and data collection, thematic coding of interview transcripts, and the synthesis of results through qualitative analysis. Please see Figure 2, in which the whole process is described on the next page

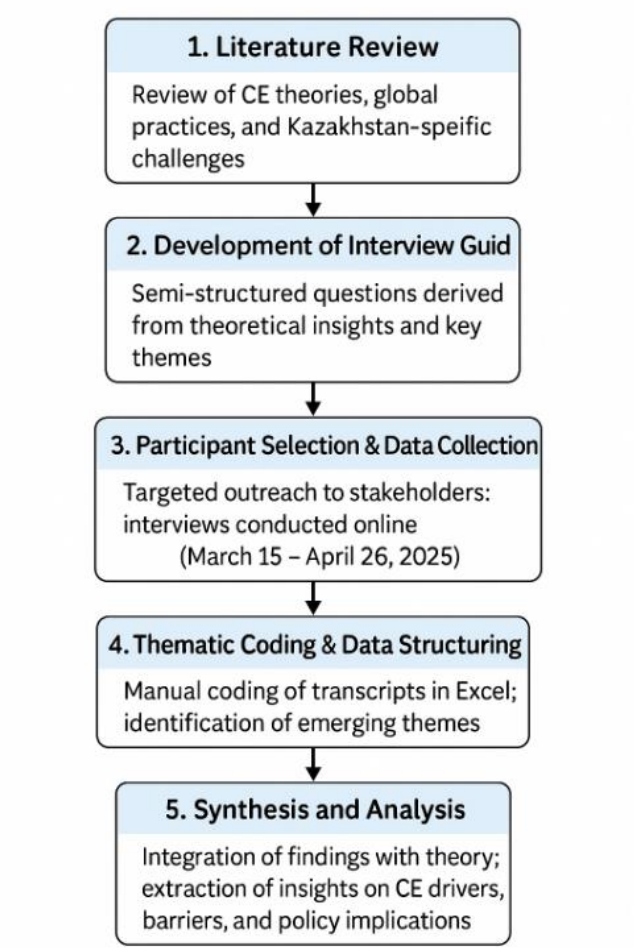

Figure 2. Methodology of the study

Source: compiled by the author

The study has already conducted an extensive review of existing literature on CE practices in manufacturing. This included an examination of prior research on CE implementation in Kazakhstan, an evaluation of international best practices, and an identification of key motivators and obstacles. The insights gained from this review serve as the theoretical foundation for empirical research design.

The interview guide is developed with input from the literature review, which also supplied the theoretical basis for the empirical research design. Drawing from international and Kazakhstan-specific CE studies, the interview guide was structured to capture both drivers and barriers of CE practices. The following questions are included, addressing the following areas:

- The current implementation of CE practices, such as resource efficiency, recycling, and waste reduction.
- Perceived barriers, such as technological, financial, and regulatory ones.

- Drivers and barriers for implementing CE, including market demand and cost reductions.
- Background information on the interviewees' organizational context.

To make sure it was clear and reliable, a small pilot test of the interview was conducted with a select group of industry professionals. Based on feedback, minor adjustments will be made to improve question wording and structure.

Potential interview subjects were found and invited to participate in the study through industry associations, personal connections, and professional networks. The time frame for gathering the data was March 15, 2025, to April 10, 2025. The participants were given the choice to respond either in written form or through an online call, depending on the participant's preference and availability. But all of them preferred to provide written responses. Although the initial deadline was April 10, the response period was extended due to scheduling constraints, and the final response was received on April 26, 2025.

Following the collection of written interview responses from four manufacturing-sector representatives, from a beverage producer, a private printing firm, a construction company, and a smart lighting equipment manufacturer, the answers were carefully reviewed and grouped thematically.

Table 7

Interview plan and accomplishment

Respondent	**Company Type**	**Position**	**Format**	**Date Received**	**Response Length**
R1	Beverage producer	Procurement Specialist	Written	April 16, 2025	3 pages
R2	Private printing firm	Founder/Director	Written	March 17, 2025	2 pages
R3	Construction company	Project Manager	Written	April 21, 2025	2 pages
R4	Smart lighting equipment manufacturer	Technical Director	Written	April 26, 2025	2 pages

Source: compiled by the author

A qualitative approach was used to identify key patterns related to the implementation of CE practices in Kazakhstan's manufacturing sector. Responses were organized thematically based on the interview guide, resulting in five core categories: current CE practices, drivers and motivators, barriers and challenges, policy perspectives, and future outlook.

The results are synthesized and compared with theoretical findings from the literature review. Key trends, motivators, and constraints are identified and discussed in relation to both global CE theory and Kazakhstan's specific context, providing actionable insights for policymakers and industry stakeholders.

Section 2.3 presents the key empirical findings from stakeholder interviews, organized thematically to highlight current CE practices, motivators, barriers, policy perspectives, and future opportunities in Kazakhstan's manufacturing sector. The findings are compared with global literature to assess alignment and context-specific gaps. This qualitative approach ensures a focused, context-rich analysis that supports the research objectives and contributes to the broader discourse on CE implementation in developing economies.

2.3. Empirical Findings and Discussion

The findings from the qualitative interviews, which were conducted with three participants from Kazakhstan's manufacturing sector, are shown in this section. The interviews were conducted in Russian and are translated into English in the quoted responses below. Appendix B contains the entire list of interview questions.

The first respondent is a procurement specialist at CCI Kazakhstan, one of the largest beverage producers in the country and a subsidiary of Coca-Cola İçecek. The second participant is the founder and director of TOO "Dom pechati Baspager", a private printing company based in Kazakhstan that provides a wide range of printing services. The third participant is a project manager from a construction company that operates as part of a large corporate group. The company is engaged in building development and has started incorporating circular principles into its project planning and material use. The fourth respondent is the technical director of a company that manufactures smart lighting systems and control cabinets, with a focus on energy efficiency and digital monitoring technologies. At the request of the third and fourth respondents, their company names are not disclosed in this study.

It is important to note that before selecting these four final participants, the author reached out to several other companies operating in industries closely linked to the circular economy, such as mining, metallurgy, packaging, food processing, textiles, and recycling. These sectors were targeted because they typically engage in activities involving material reuse, waste management, and resource efficiency, making them relevant for CE exploration. However, due to various factors, including corporate confidentiality, lack of time, or absence of internal policies regarding public sharing of information, many companies either declined

to participate or did not respond. As a result, the analysis in this chapter is based on the four firms that agreed to take part, each offering unique insights from different industrial and organizational perspectives.

The interviews were transcribed, read multiple times, and coded line by line. Codes were then grouped into sub-categories and finally into overarching categories or themes. The codebook, structured by *Theme* > *Category* > *Code*, is presented throughout this section as a basis for the discussion.

The first theme explored CE practices currently in use across the interviewed firms.

Table 8

Part of the coding table from the interviews

Theme	Category	Code
CE Practices in Use	Waste Management and Recycling	Paper recycling
		rPET use
		Packaging minimization
		Battery disposal
		Plastic and paper separation
	Resource Optimization	Donating expired goods
		Process automation
		Water filter usage
		Motion sensors
		Water boiler usage

Note: Full codebook is available in Appendix C

Source: Compiled by the author based on interview responses

Table 8 is a partial coding table illustrating the core categories and codes that emerged from this theme. The first set of practices focuses on material reuse and waste reduction, including actions such as paper recycling, rPET use, packaging minimization, and battery disposal. This category includes the most widely reported CE-related practices in the interviews.

Respondents emphasized the importance of basic but impactful actions such as paper and plastic recycling, as well as packaging reduction. The second respondent described, “All paper waste is handed over as waste paper,” showing how even small-scale material recovery is established in their processes. The first respondent further illustrated their involvement with advanced practices like rPET usage, noting, “We use recycled plastic (rPET),” which signals an alignment with closed-loop product strategies.

The fourth respondent emphasized a range of both technical and behavioral CE practices. They described how the company collects and properly disposes of hazardous

waste: “We collect used batteries and hand them over for recycling.”
This demonstrates attention to environmental safety and adherence to proper e-waste protocols, which were not previously mentioned by the other firms. Their company also replaced inefficient municipal hot water systems with localized solutions: “The central hot water supply has been turned off, and we are using a water boiler instead.” Smart sensors were added to optimize electricity use: “Motion sensors are installed everywhere on the lighting.” These practices reflect an advanced level of resource optimization and show that technological CE practices are emerging even without formal certification. Finally, the firm reduced reliance on plastic bottles through water filtration systems: “Instead of using bottled water, we use a water purification filter.” This aligns with the core CE principle of reducing single-use materials and promoting long-term asset efficiency.

This aligns with the theoretical discussion in Section 1.3, where waste management and resource circulation were identified as core CE principles (Geissdoerfer et al., 2016; Kirchherr et al., 2017). It also demonstrates that companies are more inclined to start with the most visible and manageable aspects of CE. However, the implementation is often inconsistent, and deeper circular strategies like design for disassembly or industrial symbiosis were notably absent from the interviews.

A second cluster of practices highlights resource optimization, encompassing process automation and the redistribution of defective goods. This category captures practices aimed at internal efficiency. The third respondent shared how automation helps reduce losses, while the second respondent emphasized their efforts to redistribute rather than dispose of surplus goods: “The leftovers are donated to schools and shelters.”

Such cases reflect the CE emphasis on operational optimization and resource efficiency, central themes in the works of Kumar et al. (2019) and Ormazabal et al. (2018), as noted in Section 1.2. Interestingly, these optimization efforts are internally driven, rather than supported by industry-wide benchmarks or external certification. This shows a pragmatic approach to CE adoption, where firms aim for efficiency first and circularity second.

The second theme addresses the main drivers and motivators that guide CE adoption. Below is a partial coding table illustrating the core categories and codes that emerged from this theme:

Table 9

Part of the coding table from the interviews

Theme	Category	Code
Drivers and Motivators for CE	Ethical and Social Values	Patriotism
		Concern for future generations
		Intergenerational responsibility
	Strategic Business Incentives	Cost efficiency
		Brand image
		International compliance

Note: Full codebook is available in Appendix C

Source: Compiled by the author based on interview responses

In terms of ethical drivers, the interviews revealed recurring themes such as patriotism and concern for future generations. The second respondent described a strong ethical foundation for their CE actions: “The motivation was patriotism and care for children.” This points to a value-driven CE adoption process where personal responsibility and national pride play pivotal roles. The fourth interviewee emphasized intergenerational ethics as a key motivator:

“The motivation is to keep our planet clean and pass it on to future generations in good condition.”

This deeply personal commitment reflects a future-oriented mindset.

This relates to motivational factors such as societal influence and public awareness, which are presented as important non-financial drivers of CE in Kazakhstan’s context (Ministry of Ecology & UNDP, 2022). These sentiments reflect a bottom-up environmentalism where business decisions are influenced by cultural identity and intergenerational responsibility rather than regulations or profit motives. It highlights a potentially powerful but underutilized motivator for sustainable practices.

Strategic motivations, including cost efficiency, brand image, and alignment with international compliance standards, were also common. The third respondent shared a proverb, “A penny saves a ruble. (This is a Russian proverb, similar in meaning to the English "A penny saved is a penny earned."), highlighting cost-saving as a core business incentive. At the same time, economic logic was not absent, for the fourth respondent said:

“An opportunity to reduce costs and contribute to the preservation of the environment.”

Meanwhile, the first respondent spoke of aligning with global expectations: “Our clients expect ESG compliance.”

This supports prior work by Kumar et al. (2019) and Govindan and Hasanagic (2018), who identify regulatory adherence and enhanced market competitiveness as key motivations for CE integration in manufacturing. These drivers suggest that while Kazakhstan’s regulatory push may be weak, the pull from international partnerships and export requirements can be significant, pushing firms toward circularity even in the absence of national mandates.

Table 10

Part of the coding table from the interviews

Theme	Category	Code
Barriers and Challenges	Strategic Business Incentives	Cost efficiency conflict
	Infrastructure and Policy	Lack of gov. Incentives
		Lack of recycling points
		Government inaction
		Officials' lack of knowledge
	Market and Awareness Gaps	Low consumer demand
		Absence of eco-certification
		Untrained personnel
		Low public awareness

Note: Full codebook is available in Appendix C

Source: Compiled by the author based on interview responses

The third theme identifies existing barriers and challenges hindering the advancement of CE. Table 10 is a partial coding table illustrating the core categories and codes that emerged from this theme.

Participants unanimously identified weak state regulation and lack of infrastructure as central barriers. As the second respondent bluntly noted, “The government currently only imposes fines but does not provide support.” The fourth respondent strongly emphasized the geographic and systemic gap in recycling infrastructure:

“Recycling is poorly developed. There are not many collection points for plastic and wastepaper.” This adds a spatial dimension to the infrastructure barrier, suggesting that CE accessibility differs across regions. Moreover, their critique of the government was direct: “Officials themselves still don’t understand these issues.” This shows not just regulatory gaps but also institutional unpreparedness.

Both PAGE (2020) and Zhidebekkyzy et al. (2023) highlight institutional shortcomings, particularly the absence of a cohesive regulatory framework to support circular

economy practices in Kazakhstan's manufacturing sector. Firms appear to operate in an uncertain policy landscape where risks are high, and incentives are low. Without a clear roadmap, businesses struggle to justify major investments in circular technologies or redesign processes.

In addition to structural limitations, low consumer demand, the absence of eco-certification, and untrained personnel were identified as major obstacles.

This category describes external and internal awareness challenges. The third respondent shared that customers rarely show interest in sustainable packaging, while others noted the absence of certification standards. A major challenge for the fourth respondent was also public disinterest, expressed as: "Unfortunately, without any incentives from the state, few people understand the need."

Such barriers are consistent with insights from Singh et al. (2021) and Tushar et al. (2024), which identified limited awareness and market readiness as critical challenges in CE adoption across transitional economies. The lack of demand feedback loops creates a vicious cycle: without consumer pressure, businesses lack incentive to innovate, and without innovation, public awareness remains low

Table 11

Part of the coding table from the interviews

Theme	Category	Code
Role of Government and Policy	Policy Limitations	Weak laws
		Missing enforcement
		Short-term thinking
	Desired Policy Actions	Smart lighting policy
		Company ranking system
		Procurement incentives
		Deposit-return systems
		CE procurement rules,
		Green subsidies

Note: Full codebook is available in Appendix C

Source: Compiled by the author based on interview responses

The function of governmental regulations and policies is the subject of the fourth theme. The partial coding table above illustrates the core categories and codes that emerged from this theme.

Participants reflected on existing shortcomings in public policy, highlighting issues such as weak laws, missing enforcement mechanisms, and short-term policy thinking.

All three interviews stressed that existing CE-related legislation is weak and inconsistently enforced. The first respondent stated: "There are no clear standards or incentive

mechanisms." The fourth respondent made it clear that no regulatory backing or support has been offered: "We do not receive and have not received any support or any regulatory measures from government agencies."

This corresponds to PAGE (2020), which documents Kazakhstan's lack of clear CE policy tools and enforcement strategies. Moreover, this limitation undercuts business momentum, as uncertainty deters long-term investments in CE infrastructure or R&D.

As potential policy solutions, interviewees recommended deposit-return systems, CE procurement rules, and green subsidies.

Participants suggested concrete policy instruments, such as return schemes and eco-subsidies. CCI proposed a clearer roadmap for ESG integration: "It is necessary to comply with ESG standards." The fourth respondent also offered detailed policy proposals, including rating systems and eco-incentives:

"Creating a rating among companies according to the level of participation in the Central Election and providing benefits..."

They also connected smart lighting systems to CE goals, noting:

"...the implementation of smart lighting gives the effect of 10-15% energy savings..."

Such policy tools are also discussed in the literature as crucial for enabling systemic CE transition (Karatayev & Clarke, 2016; PAGE, 2020). The immediate and unanimous call for government action implies that any future CE strategy in Kazakhstan should be jointly developed with industry to take sectoral readiness and real-world needs into account.

Table 12

Part of the coding table from the interviews

Theme	Category	Code
Opportunities and Future Outlook	Potential Benefits	Export competitiveness
		Operational savings
		Youth involvement
		Environmental contribution
		Electricity savings
	Collaboration and Innovation	University partnerships
		CE-based product design
		Best practice sharing

Note: Full codebook is available in Appendix C

Source: Compiled by the author based on interview responses

The fifth theme highlights perceived opportunities and the future direction of CE implementation. Table 12 is a partial coding table illustrating the core categories and codes that emerged from this theme.

Some of the most optimistic responses were related to CE's future potential, especially regarding export competitiveness, operational savings, and youth involvement.

Firms acknowledged CE's potential to reduce costs and improve market positioning. The third respondent noted, "This could become an advantage in exports." pointing to CE as an economic advantage.

Similar conclusions are drawn by Kumar et al. (2019) and Jia et al. (2020), who connect circular economy initiatives with strategic advantages like improved competitiveness in international markets. These views also suggest that Kazakhstan's future CE success may depend more on external trade relations than on internal regulation, at least in the short term.

The fourth interviewee highlighted environmental and economic synergy, stating: "Возможность снизить расходы и внести вклад в сохранение окружающей среды." This dual perspective fits Govindan et al. (2018), describing circular economy implementation as offering both economic growth opportunities and regulatory compliance benefits, underscoring its dual role in promoting long-term business resilience and competitiveness. They also noted that CE offers clear savings through infrastructure design: "...motion sensors and a boiler have already reduced costs." This supports the view that CE can bring quick returns even without subsidies if firms are technologically prepared.

Innovation-focused suggestions included university partnerships, CE-based product design, and best practice sharing.

Innovation and collaboration were seen as crucial to long-term CE development. CCI Kazakhstan mentioned intentions to work with academic institutions: "We want to collaborate with universities." Moreover, although not framed as "innovation," the fourth company's proactive implementation of smart systems reveals a capacity for autonomous CE adoption, even in policy-limited environments.

These findings correspond with those Jia et al. (2020) and Govindan et al. (2018), who emphasize that expanding circular economy practices relies heavily on collaborative networks among stakeholders and the development of supportive innovation infrastructures. The current lack of formal platforms for such collaboration is a missed opportunity and should be addressed in future national strategies.

The findings from the Kazakhstani manufacturing context confirm several global CE trends while also highlighting region-specific challenges. The table below summarizes key similarities and divergences.

Table 13

Comparison with Global CE Patterns

Dimension	Kazakhstan Findings	Global Literature Reference
Early CE Practices	Waste sorting, recycling, and basic reuse	Govindan et al. (2018)
Ethical Drivers	Patriotism, intergenerational responsibility	*Not explicitly covered in the literature review*
Structural Barriers	Weak regulations, no eco-standards	Kumar et al. (2018); PAGE (2020)
External Influence	International client demand, ESG requirements	Ormazabal et al. (2018); Govindan et al. (2018)
Technological Adoption	Limited to isolated cases	Jia et al. (2020);

Source: Compiled by the author

One of the most distinctive findings of this study is the prominence of ethical drivers in stakeholder interviews. Respondents frequently referenced values such as *patriotism*, *intergenerational responsibility*, and a *moral duty to preserve the environment* as central motivators for engaging in circular practices, even when institutional support or economic returns were lacking. Unlike some localized findings, much of the global CE literature, such as that by Kumar et al. (2019), Govindan and Hasanagic (2018), and Jia et al. (2020), frames adoption drivers primarily through the lens of economic viability, policy enforcement, and technological advancement. The absence of such ethical dimensions in international CE models may reflect cultural blind spots or assumptions rooted in market-oriented economies. In Kazakhstan, however, these values offer an underutilized but potentially powerful foundation for CE expansion.

In contexts where regulatory enforcement is weak and technological adoption is uneven, ethical commitment may play a compensatory role, helping maintain engagement in sustainable practices despite systemic limitations.

This section compares empirical findings from stakeholder interviews with the theoretical Drivers–Barriers Interaction Matrix developed in Chapter 1. Rather than repeating individual barriers, it focuses on evaluating whether the theoretical drivers identified in the literature are active in practice and whether they effectively mitigate key barriers in Kazakhstan.

- High Upfront Investment: Interviewees revealed cost remains a consideration, but some investments (e.g., motion sensors, boiler systems) were justified by expected

long-term savings. This confirms the matrix's prediction that cost savings and tech capabilities reduce this barrier.

- Complex Tech & Supply: Only Interview 4 reported smart technologies and energy-efficient automation. Other firms did not reference supply chain transformation. This partially aligns with the matrix where tech capabilities reduce perceived complexity.
- Regulatory Uncertainty: All firms confirmed a lack of clear CE laws or incentives. None mentioned grants or supportive regulation, meaning the matrix's proposed driver (⬆ policy clarification) is not yet effective in Kazakhstan.
- Cultural Misalignment: While firms showed strong internal ethics (especially concerning future generations), public awareness remains low. Thus, societal pressure is weak, confirming that culture shifts are internal but not societal.
- Weak Demand: This remains unaddressed. Respondents observed no consumer interest in CE-friendly products. Awareness and demand-side transparency are largely absent, making this one of the most persistent barriers.

Table 14

Driver–Barrier Alignment from Interview Findings

Barrier	Driver from Interviews	Matches Matrix
High Upfront Investment	Tech solutions (Interview 4), cost savings	Yes — in one case
Complex Tech & Supply	Smart automation, low supply complexity	Partial — one firm only
Regulatory Uncertainty	No grants, unclear laws	No — barrier persists
Cultural Misalignment	Strong personal ethics, patriotism	Internally yes, society no
Weak Demand	Recognized as a barrier, no strong driver	No — demand is still weak

Source: Compiled by the author

This comparison reveals that while some theoretical drivers are emerging (e.g., internal ethics, process innovation), others, such as societal pressure and policy incentives, are still lacking. This highlights the need for targeted public and regulatory interventions to unlock CE potential in Kazakhstan.

Table 14 provides an integrated framework that combines literature-based drivers, their interaction with key barriers, and empirical validation through stakeholder interviews. This triangulated analysis highlights several important findings. First, cost-saving motivations are consistently strong across all levels, reinforcing their role as a universal driver of CE adoption. Second, while technological tools like BIM are promoted in policy,

their implementation remains inconsistent in practice. Third, regulatory efforts in Kazakhstan exist, but are perceived as fragmented or poorly enforced by stakeholders. Notably, organizational commitment and societal pressure emerge as underdeveloped in both literature and interviews, indicating critical gaps that warrant further attention in policy and capacity-building efforts.

While this study used drivers as the organizing categories for analysis, barriers remain central to the evaluation. Each driver was assessed not only in terms of its presence in Kazakhstan but also in terms of the specific challenges it addresses, such as regulatory fragmentation, financial constraints, or limited societal awareness.

Table 15

Integrated Validation of CE Drivers: Literature Insights, Kazakhstan Context, and Interview Findings

Driver	Global Insights	Kazakhstan-Specific Evidence	Barrier(s) Mitigated	Interview Findings
Cost Savings	CE improves material efficiency and reduces waste (Kumar et al.)	Seen as motivator in construction sector modernization (Torgautov et al., 2021)	⬆ Reduces cost barrier, ⬆ Incentivizes weak demand	Confirmed by several SMEs as a primary motivator
Tech Capabilities	Closed-loop systems, supply chain digitalization (Jia et al., 2020)	BIM, E-Kurylys promoted in construction (Torgautov et al., 2021)	⬇ Tech & supply complexity, ⬆ Transparency	Partial uptake; digital tools unevenly adopted across firms
Policy & Regulation	EU CE Action Plan, recycling mandates	Green Economy Strategy, landfill bans, SWITCH-Asia support	⬆ Grants, ⬇ Uncertainty	Fragmented enforcement; stakeholders want clearer CE policy signals
Org. Commitment	Internal integration, supply chain redesign	*Not well documented in the literature*	⬆ Innovation, ⬇ Cultural resistance	Weak in SMEs; leadership awareness varies greatly
Societal Pressure	Public demand in mature markets (Kakwani & Kalbar)	Growing awareness via NGOs, formal education (SWITCH-Asia)	⬇ Shifts norms, ⬆ Public awareness	Recognized as emerging, but not yet a strong driver

Source: Compiled by the author based on Kumar et al. (2019), Jia et al. (2020), Torgautov et al. (2021), Zhidebekkyzy et al. (2023), SWITCH-Asia (2022), and primary interview data.

These findings support the proposition that CE adoption in Kazakhstan is currently driven more by economic necessity than by cultural or regulatory alignment. This has

implications for future interventions, which must prioritize coherence in policy implementation and organizational readiness alongside public engagement.

Conclusion

This thesis aimed to evaluate the drivers and barriers shaping the implementation of Circular Economy (CE) practices in Kazakhstan's manufacturing sector. In addressing this aim, the study developed a theoretical framework grounded in global CE literature and contextualized it with evidence from Kazakhstan. Through a review of relevant academic and policy sources, followed by an analysis of semi-structured interviews with local industry stakeholders, the research provided a multifaceted evaluation of CE readiness, motivation, and constraints within the national manufacturing landscape.

The literature review identified five core categories of CE drivers—economic motivations, technological capabilities, regulatory and policy support, organizational commitment, and societal influence, and mapped them against known barriers such as high upfront costs, supply chain complexity, regulatory uncertainty, cultural misalignment, and weak consumer demand. These realizations were combined to provide a comprehensive theoretical framework that guided the examination of the empirical evidence.

Findings from the interviews confirmed the presence of several key drivers, most notably cost-saving motivations and internal ethical values such as patriotism and intergenerational responsibility. These ethical drivers were particularly prominent and represented a meaningful divergence from the global literature, where such motivations are rarely emphasized. Technological adoption and internal organizational awareness were also observed in select cases, although their overall diffusion remains limited.

Barriers identified in the literature, particularly regulatory ambiguity, weak enforcement, and low public awareness, were strongly echoed in the interviews. Participants consistently noted the absence of supportive legal frameworks, consumer demand, and market incentives for CE-aligned products. Furthermore, while firms demonstrated individual commitment, there was little evidence of systemic or cultural shifts toward circularity at the societal level.

The triangulated comparison between theory, Kazakhstan-specific literature, and interview data revealed partial alignment. Some theoretical drivers, especially economic and ethical ones, are active in practice, while others, like societal pressure and regulatory incentives, remain largely aspirational. This asymmetry underscores the need to consider local institutional realities when applying global CE frameworks.

In conclusion, the study contributes to the CE discourse by highlighting both commonalities and unique features of the CE transition in Kazakhstan. It reveals that while individual firms may be ready to adopt CE practices, broader system-level enablers, such as coherent regulation, consumer engagement, and industry-wide capacity, are not yet sufficiently developed. Recognizing these contextual nuances is essential for understanding the potential and limitations of CE implementation in emerging economies.

While this study provides valuable insights into the drivers and barriers of circular economy adoption in Kazakhstan's manufacturing sector, several areas merit further investigationThe sample size could be increased in future studies to cover a wider range of industries, such as mining, metallurgy, or electronics, which were underrepresented in this study. In-depth case studies could explore how organizational culture and leadership styles influence CE adoption at the firm level. Moreover, longitudinal studies would be useful in tracking how emerging government policies and consumer awareness campaigns affect CE implementation over time. Finally, quantitative approaches could complement these findings by measuring the economic and environmental impacts of specific CE practices across sectors.

List of references

1. Bjørnbet, T., Skaar, C., Fet, A. M., & Schulte, K. (2021). Circular economy in manufacturing companies: A review of case study literature. *Sustainability*
2. Bralina, A. (2023). *What are the Perspectives of the Circular Economy in Kazakhstan?* Business and Economics Journal.
3. Brooks, A. L., Wang, S., & Jambeck, J. R. (2018). *The Chinese import ban and its impact on global plastic waste trade*. *Science Advances, 4*(6), eaat0131. https://doi.org/10.1126/sciadv.aat0131
4. Cantú, A., Aguiñaga, E., & Scheel, C. (2021). Learning from failure and success: The challenges for circular economy implementation in SMEs in an emerging economy. *Sustainability, 13*(3), 1529.
5. Dennison, M. S., Kumar, M. B., & Jebabalan, S. K. (2024). Realization of circular economy principles in manufacturing: obstacles, advancements, and routes to achieve a sustainable industry transformation. *Discover Sustainability, 5*(1). https://doi.org/10.1007/s43621-024-00689-2
6. Ellen MacArthur Foundation. (n.d.). *Circular economy principles*. https://www.ellenmacarthurfoundation.org/circular-economy-principles
7. Ellen MacArthur Foundation. (2015). *TOWARDS A CIRCULAR ECONOMY: BUSINESS RATIONALE FOR AN ACCELERATED TRANSITION*. Retrieved from https://ellenmacarthurfoundation.org/
8. European Commission. (2019). *The European Green Deal*. COM(2019) 640 final.
9. European Commission. (2020). *A new Circular Economy Action Plan: For a cleaner and more competitive Europe*. COM(2020) 98 final.
10. Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2016). The Circular Economy – A new sustainability paradigm? *Journal of Cleaner Production, 143*, 757–768. https://doi.org/10.1016/j.jclepro.2016.07.019
11. Govindan, K., & Hasanagic, M. (2018). A systematic review on drivers, barriers, and practices towards circular economy: A supply chain perspective. *Journal of Cleaner Production*
12. Jia, F., Yin, S., Chen, L., & Chen, X. (2020). The circular economy in the textile and apparel industry: A systematic literature review. *Journal of Cleaner Production*
13. Kakwani, P., & Kalbar, P. (2020). Review of circular economy in the urban water sector: Challenges and opportunities in India. *Environmental Science and Pollution Research*

14. Kanda, W., Klofsten, M., Bienkowska, D., Henry, M., & Hjelm, O. (2024). Challenges of circular new ventures: An empirical analysis of 70 cases. *Journal of Cleaner Production*, *442*(141103), 141103. https://doi.org/10.1016/j.jclepro.2024.141103
15. Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the Circular Economy: An analysis of 114 definitions. *Resources, Conservation & Recycling, 127*, 221–232. https://doi.org/10.1016/j.resconrec.2017.09.005
16. Korhonen, J., Honkasalo, A., & Seppälä, J. (2018). Circular Economy: The concept and its limitations. *Ecological Economics, 143*, 37–46. https://doi.org/10.1016/j.ecolecon.2017.06.041
17. Korhonen, J., Nuur, C., Feldmann, A., & Birkie, S. E. (2018). Circular economy as an essentially contested concept. *Journal of Cleaner Production, 175*, 544–552. https://doi.org/10.1016/j.jclepro.2017.12.111
18. Kumar, V., Sezersan, I., Garza-Reyes, J. A., Gonzalez, E. D. R. S., & Al-Shboul, M. A. (2019). Circular economy in the manufacturing sector: Benefits, opportunities and barriers.
19. Lieder, M., & Rashid, A. (2016). Towards circular economy implementation: A comprehensive review in context of manufacturing industry. *Journal of Cleaner Production*
20. Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan, & United Nations Development Programme. (2022). *Eighth national communication and fifth biennial report of the Republic of Kazakhstan to the UN Framework Convention on Climate Change*. Astana
21. Ngan, S. L., How, B. S., Teng, S. Y., Promentilla, M. A. B., Yatim, P., Er, A. C., & Lam, H. L. (2019). Prioritization of sustainability indicators for promoting the circular economy: The case of developing countries. *Renewable and Sustainable Energy Reviews, 111*, 314–331. https://doi.org/10.1016/j.rser.2019.05.001
22. Ormazabal, M., Prieto-Sandoval, V., Jaca, C., & Santos, J. (2018). Circular economy in Spanish SMEs: Challenges and opportunities. *Journal of Cleaner Production*
23. Ospanova, S. (2014). *Assessing Kazakhstan's policy and institutional framework for a green economy*. International Institute for Environment and Development (IIED).
24. PAGE (2020). *Kazakhstan's transition to a Green Economy: A stocktaking report.* Partnership for Action on Green Economy (PAGE).

25. Pannila, N., Jayalath, M. M., Thibbotuwawa, A., Nielsen, I., & Uthpala, T. G. G. (2022). Challenges in applying circular economy concepts to food supply chains. *Sustainability, 14*(24), 16536.
26. Pearce, D., & Turner, R. K. (1990). Economics of Natural Resources and the Environment. Harvester Wheatsheaf.
27. Purvis, B., Mao, Y., & Robinson, D. (2019). Three pillars of sustainability: in search of conceptual origins. *Sustainability Science, 14*(3), 681–695.
28. Singh, J., Sung, K., Cooper, T., West, K., & Mont, O. (2021). Challenges and opportunities for circular economy implementation: A sectoral analysis. *Sustainability*
29. SWITCH-Asia. (2022). *Kazakhstan: Towards a circular economy for plastics*. European Union SWITCH-Asia Programme. https://switch-asia.eu/resource/kazakhstan-towards-a-circular-economy-for-plastics
30. Torgautov, A., Myrzabekova, M., & Nurzhanova, A. (2021). Circular economy: Challenges and opportunities in the construction sector of Kazakhstan. *Business Perspectives and Research*
31. Tushar, Z. N., Morshed, S. M., Ahsan, A., Sarkar, S., Bari, A. B. M. M., & Islam, A. R. M. T. (2024). A pythagorean fuzzy approach to evaluate the challenges to implementing circular economy in the glass manufacturing industry: Implications for sustainable development. *Results in Engineering*, *24*(102911), 102911. https://doi.org/10.1016/j.rineng.2024.102911
32. UNEP. (2021). *Vision and strategy of the Global Alliance on Circular Economy and Resource Efficiency (GACERE)*.
33. Zhidebekkyzy, A., Moldabekova, A., Amangeldiyeva, B., & Šanova, P. (2023). Transition to a circular economy: Exploring stakeholder perspectives in Kazakhstan. *Journal of International Studies, 16*(3), 144-158. https://doi.org/10.14254/2071-8330.2023/16-3/8

Appendices

APPENDIX A.

Literature review

Paper	Author	Objective	data	methods	Conclusion/results
Circular Economy: Challenges and Opportunities in the Construction Sector of Kazakhstan	Torgautov et al., 2021	Investigate the application of Circular Economy (CE) principles in Kazakhstan's construction sector. Identify barriers and opportunities for CE adoption, and provide policy recommendations.	Interviews with local stakeholders in construction (clients, contractors, designers, manufacturers). PEST analysis on local trends.	Semi-structured surveys using the ReSOLVE framework (Regenerate, Share, Optimize, Loop, Virtualize, Exchange) and PEST analysis.	The construction sector has potential for CE implementation, but economic barriers and lack of CE infrastructure are limiting progress. Key recommendations include expanding BIM technologies, improving waste processing facilities, and exploring eco-friendly materials. Future research should explore more economically feasible solutions and strategic policy implementation.
Circular economy in the manufacturing sector: benefits, opportunities and barriers	Kumar et al., 2019	To identify the barriers and opportunities of circular economy (CE) in the manufacturing sector through socio-political, economic, legal, and environmental perspectives.	Data collected from over 200 companies approached in the UK and EU, with 63 responses. Data collection lasted two months.	Positivist approach, deductive. Survey questionnaire.	Highlights key barriers and opportunities of CE for manufacturing industries, adding to the limited empirical literature on CE in the UK and EU.

Review of Circular Economy in urban water sector: Challenges and opportunities in India	Kakwani & Kalbar, 2020	To review the global implementation of Circular Economy (CE) in the water sector from economic, environmental, social, and technical perspectives.	Review of 98 publications selected through systematic literature review.	Systematic literature review	Calls for a comprehensive, multi-stakeholder approach to water resource management in urban areas, focusing on 6Rs strategies to enable the transition to CE. Emphasizes the need for technological, environmental, and methodological advances, while identifying gaps in social and economic aspects.
The circular economy in the textile and apparel industry: A systematic literature review	Jia et al., 2020	To review circular economy (CE) practices in the textile and apparel (T&A) industry and identify key challenges.	Articles from a single database	Systematic literature review	1. CE in T&A industry has unique challenges due to high pollution levels. 2. Proposed a framework including relationship-building and dynamic supply chain execution to improve circular practices. 3. Five actionable research directions suggested. 4. Identified limitations, including a single-database focus and lack of detailed analysis of recycling steps
Circular economy in manufacturing companies: A review of case study literature	Bjørnbet et al., 2021	To assess the shift from conceptual to empirical research on circular economy (CE) in manufacturing, and to evaluate the link	Case studies from after 2015	Systematic literature review	The review indicates progress in empirical CE research, yet sustainability efforts often focus solely on the environmental aspect, with less attention to social and economic dimensions. This narrow approach may hinder truly holistic sustainability,

		between CE practices and sustainable development.			suggesting a need for inclusive, multidimensional strategies.
Thematic exploration of sectoral and cross-cutting challenges to circular economy implementation	Singh et al., 2021	To review sector-specific challenges and opportunities in implementing and measuring the benefits of CE strategies.	Literature on CE adoption in various sectors, including food, chemicals, metals, consumer electronics, and building	Literature mapping, life cycle assessment (LCA), and material flow analysis (MFA)	Highlights fragmented CE literature, lacking synthesis across sectors; calls for integrative methodologies and novel CE business models; identifies CE pathways as a promising avenue for exploring social adaptation and innovation in material management.
Towards circular economy implementation: A comprehensive review in context of manufacturing industry	Lieder & Rashid, 2015	To provide a comprehensive review of CE research in manufacturing, focusing on resource scarcity, waste generation, and economic benefits.	Review of CE research across multiple dimensions including resource use, environmental impact, and economic benefits	Comprehensive literature review, CE framework development	Concludes that CE research primarily addresses waste and resource use, with limited focus on business advantages. Emphasizes a CE framework integrating environmental, resource, and economic perspectives, jointly supported by stakeholders, to ensure successful CE implementation. Recommends a dual top-down and bottom-up approach, stakeholder inclusivity, business model innovation, and educational efforts to enhance social awareness and the benefits of circular product systems. Future

					research should support systemic, multidisciplinary approaches and decision-support tools to accelerate CE transition.
Circular Economy in Spanish SMEs: Challenges and Opportunitie	Orma zabal et al., 2018	To investigate the implementat ion of Circular Economy (CE) practices in Spanish SMEs, including perceived barriers and opportunitie s.	Survey data from SMEs in Navarra and the Basque Country, Spain	Factor Analysis on survey data	SMEs primarily focus on compliance and cost savings; they face "hard" and "human-based" barriers; industrial collaboration could aid CE adoption. Policy incentives and sector-specific strategies are recommended.
A systematic review on drivers, barriers, and practices towards circular economy: a supply chain perspective	Govin dan et al., 2018	To systematical ly review drivers, barriers, and practices influencing circular economy (CE) implementat ion in supply chains.	60 academic papers on CE and supply chains	Systematic literature review, content analysis	Identified 13 drivers, 34 practices, and 39 barriers. Found that government interventions are critical for CE adoption due to initial investment costs, and societal awareness is key. Highlights the need for further empirical testing of the framework, especially for sector-specific and country-specific applications.
Insights from Circular Economy Literature: A Review of Extant Definitions and Unravelling Paths to Future Research	Alha wari et al., 2021	aim to provide a definitional analysis of the CE and suggest future research streams to advance the	91 papers, secondary data	systematic literature review	The study highlights the conceptual ambiguity of circular economy (CE) definitions and proposes a comprehensive organizational perspective, emphasizing resource efficiency and dual-

		existing literature			loop regenerative systems. It identifies the growing but underexplored integration of CE with Industry 4.0, advocating for future research on digital transformation's role in CE practices and value chains.
Circular Economy: The Concept and its Limitations	Korhonen et al., 2018	to contribute to the scientific research on CE; define the concept of CE from the perspective of WCED sustainable development and sustainability science; conduct a critical analysis of the concept from the perspective of environmental sustainability	Secondary data	conceptual and critical analysis	The paper concludes that while the circular economy (CE) holds significant promise as a sustainability framework by engaging the business community and emphasizing high-value material cycles, its scientific foundation remains underdeveloped, with critical environmental sustainability challenges—such as thermodynamics, system boundaries, and governance—requiring further research to ensure CE contributes effectively to global net sustainability.
The Circular Economy – A new sustainability paradigm?	Geisdoefrer et al	provide conceptual clarity by distinguishing the terms and synthesising the different types of relationship	qualitative data, derived from an extensive literature review	literature review	The paper concludes that while the Circular Economy (CE) and sustainability share common goals and contexts, they are distinct concepts, with CE focusing on minimizing resource

	s between them	input and waste through regenerative material and energy loops, and sustainability emphasizing the integration of economic, social, and environmental dimensions for current and future generations.

Source: compiled by the author

APPENDIX B.

Imterview questions

(In English)

1. Introduction and Background

- Can you tell us about your company's history and its involvement in the manufacturing sector in Kazakhstan?
- What are your company's sustainability goals, and how do you see Circular Economy fitting into these objectives?

2. Adoption of Circular Economy

- How would you describe your company's current approach to Circular Economy principles?
- What specific Circular Economy practices have been implemented in your manufacturing operations?
- What motivated your company to adopt these practices? Were there any external influences such as government policies or market trends?

3. Opportunities and Drivers

- From your perspective, what are the most significant opportunities for adopting Circular Economy in Kazakhstan’s manufacturing sector?
- How do you perceive the role of government policies and regulations in promoting Circular Economy practices in Kazakhstan?
- How do consumer preferences and demand for sustainable products impact your company's decisions regarding Circular Economy?

4. Barriers and Challenges

- What do you see as the main challenges your company faces in implementing Circular Economy practices?
- Are there specific barriers related to the lack of infrastructure, technology, or knowledge within Kazakhstan's manufacturing sector?
- How does your company overcome resistance to change, particularly when it comes to adopting sustainable practices?

5. Future Outlook and Recommendations

- How do you see the adoption of Circular Economy principles evolving in Kazakhstan's manufacturing sector over the next few years?
- What actions or changes would help accelerate the adoption of Circular Economy practices in your company and the sector as a whole?
- What policies or incentives would you recommend to the government to encourage greater adoption of Circular Economy principles in the manufacturing sector?

6. Closing

- Is there anything else you would like to add regarding Circular Economy adoption in Kazakhstan’s manufacturing sector?

- What advice would you give to other companies looking to implement Circular Economy practices?

(In Russian)

1. Введение и общая информация

1. Расскажите, пожалуйста, о своей компании и её деятельности в производственном секторе Казахстана.
2. Каковы цели вашей компании в области устойчивого развития и какую роль в них играет циркулярная экономика?

2. Внедрение принципов циркулярной экономики

3. Как бы Вы описали текущий подход Вашей компании к принципам циркулярной экономики?
4. Какие конкретные практики ЦЭ (например, переработка, повторное использование, переработка продукции) уже внедрены на вашем предприятии?
5. Что стало мотивацией к внедрению этих практик? Были ли на это внешние влияния (госпрограммы, рыночные тренды, запросы клиентов и др.)?

3. Возможности и стимулы

6. Какие, на Ваш взгляд, основные возможности открывает внедрение ЦЭ для производственного сектора Казахстана?
7. Как вы оцениваете влияние государственных политик и регулирования на усилия вашей компании в области устойчивости и ЦЭ?
8. Влияют ли предпочтения потребителей и спрос на экологичную продукцию на принятие решений в компании?

4. Препятствия и вызовы

9. С какими основными трудностями сталкивается ваша компания при внедрении практик циркулярной экономики?
10. Есть ли проблемы, связанные с недостатком инфраструктуры, технологий или знаний в сфере ЦЭ в Казахстане?
11. Как вы преодолеваете внутреннее сопротивление изменениям, особенно при переходе на устойчивые практики?

5. Будущее и рекомендации

12. Как, по вашему мнению, будет развиваться циркулярная экономика в производственном секторе Казахстана в ближайшие годы?
13. Какие действия могли бы ускорить внедрение принципов ЦЭ в вашей компании и по отрасли в целом?
14. Какие меры государственной поддержки (например, финансирование, законодательные изменения) были бы полезны для внедрения ЦЭ в бизнесе?

6. Завершение

15. Хотели бы вы добавить что-либо по теме внедрения циркулярной экономики в производственном секторе Казахстана?
16. Какой совет вы могли бы дать другим компаниям, заинтересованным в переходе к циркулярной экономике?

APPENDIX C.

Thematic coding table from the interviews

Theme	Category	Code
CE Practices in Use	Waste Management and Recycling	Paper recycling
		rPET use
		Packaging minimization
		Battery disposal
		Plastic and paper separation
	Resource Optimization	Donating expired goods
		Process automation
		Water filter usage
		Motion sensors
		Water boiler usage
Drivers and Motivators for CE	Ethical and Social Values	Patriotism
		Concern for future generations
		Intergenerational responsibility
	Strategic Business Incentives	Cost efficiency
		Brand image
		International compliance
Barriers and Challenges	Strategic Business Incentives	High upfront costs
	Market and Awareness Gaps	Low consumer demand
		Absence of eco-certification
		Untrained personnel
		Low public awareness
	Infrastructure and Policy	Lack of gov. Incentives
		Lack of recycling points
		Government inaction
		Officials' lack of knowledge
Role of Government and Policy	Policy Limitations	Weak laws
		Missing enforcement
		Short-term thinking
	Policy suggestions	Smart lighting policy
		Company ranking system
		Procurement incentives
		Deposit-return systems
		CE procurement rules, Green subsidies
Opportunities and Future Outlook	Potential Benefits	Export competitiveness
		Operational savings
		Youth involvement
		Environmental contribution
		Electricity savings

	Collaboration and Innovation	University partnerships CE-based product design Best practice sharing

Source: compiled by the author

Resümee

RINGMAJANDUSE KASUTUSELEVÕTU AJENDID JA TAKISTUSED: KVALITATIIVNE UURING KAZAKHSTANI TÖÖTLEVAST TÖÖSTUSEST

Ayaulym Zhumatay

Käesoleva bakalaureusetöö eesmärk on uurida, millised tegurid soodustavad ja takistavad ringmajanduse (RM) põhimõtete kasutuselevõttu Kasahstani töötlevas tööstuses. Ringmajandus kujutab endast alternatiivi lineaarsele majandusmudelile, mille puhul rõhutatakse ressursside tõhusamat kasutamist, jäätmetekke vähendamist ja materjalivoogude sulgemist.

Töö esimene osa keskendub ringmajanduse teoreetilistele alustele ja globaalsetele praktikatele, tuues välja peamised ajendid (nagu kulude kokkuhoid, tehnoloogilised võimalused, poliitikaraamistik, organisatsiooniline valmisolek ja ühiskondlik surve) ning peamised takistused (nagu tehnoloogiline mahajäämus, rahastusprobleemid, nõrk õiguslik raamistik, tarbijate teadlikkuse puudumine ja kultuuriline vastuseis). Need ülevaated on struktureeritud teoreetiliseks raamistikuks.

Empiirilises osas analüüsitakse Intervjuudele tuginedes abil nelja Kasahstani töötleva tööstuse esindaja kogemusi. Intervjuud viidi läbi poolstruktureeritud küsimustiku alusel, keskendudes olemasolevatele RM praktikatele, motivaatoritele, takistustele ja soovitud poliitikameetmetele. Tulemused näitavad, et ettevõtted rakendavad RM põhimõtteid eelkõige kulude kokkuhoiu ja sotsiaalse vastutustunde tõttu – näiteks patriotism ja põlvkondadevaheline vastutus – samas kui regulatiivne tugi ja tarbijanõudlus jäävad väheseks.

Peamised rakendatavad praktikad on seotud jäätmekäitluse, taaskasutuse ja ressursside optimeerimisega. Suuremad takistused on riikliku toetuseta jätmine, nõrk infrastruktuur, vähene tarbijate teadlikkus ja ökomärgiste puudumine. Samuti selgus, et CE-reeglite puudumine ja ametnike vähene teadlikkus pidurdavad oluliselt süsteemset arengut.

Autor järeldab, et kuigi mõned globaalsed ajendid toimivad ka Kasahstani kontekstis (nt kulupõhine motivatsioon), jäävad paljud muud soosivad tegurid (nagu ühiskondlik surve ja selge poliitikaraamistik) tahaplaanile.

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