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IMPROVEMENT OF THE HARMONIZED COMMODITY DESCRIPTION AND CODING SYSTEM IN THE CIRCULAR ECONOMY ENVIRONMENT

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ABSTRACT

Artikel ini didedikasikan untuk konsep ekonomi sirkular, yang telah menarik perhatian besar dari pemerintah dan dunia bisnis sebagai pendekatan berkelanjutan untuk pengelolaan sumber daya dan pengembangan ekonomi. Penulis menganalisis tahap-tahap yang telah diimplementasikan dan direncanakan dalam peralihan ke ekonomi circular dalam kerangka model bisnis yang sudah ada, serta potensi pengembangan lebih lanjut dan masalah yang terkait dengan peralihan tersebut. Berdasarkan data yang diperoleh, peran *Harmonized Commodity Description and Coding System* (HS) dalam memastikan identifikasi, jejak, dan pengendalian bea cukai yang benar terhadap barang daur ulang diuraikan. Artikel ini membahas beberapa area yang dapat meningkatkan HS dalam hal: pengembangan kode-kode khusus untuk klasifikasi yang akurat dari barang-barang sekunder, pengenalan terminologi untuk mengidentifikasi barang dengan tepat dalam ekonomi sirkular, serta integrasi HS dengan instrumen internasional lainnya, seperti *Basel Convention*, untuk memastikan pengendalian penuh terhadap barang-barang sekunder. Sebagai kesimpulan, artikel ini menyatakan perlunya membahas isu-isu ekonomi sirkular pada sesi-sesi mendatang *World Customs Organization* (WCO) dan meninjau struktur HS yang sudah ada.

The article is devoted to the concept of a circular economy, which has attracted significant attention from the government and business as a sustainable approach to resource management and economic development. The author analyzed the implemented and planned stages of the transition to a circular economy within the framework of existing business models, as well as the potential for further development and the problems associated with such transition. Based on the data obtained, the role of the Harmonized Commodity Description and Coding System (HS) in ensuring identification, traceability and correct customs control of recycled goods. The material discusses several areas for improving the HS in this area: the development of specific codes for the accurate classification of secondary goods, the introduction of terminology to accurately identify goods within the circular economy, as well as the integration of the HS with other international instruments, such as the Basel Convention, to ensure full control of secondary goods. As a conclusion, this article argues for the need to discuss circular economy issues at future sessions of the World Customs Organization (WCO) and review the existing structure of the HS.

1. INTRODUCTION

1.1. Background of Study

The circular economy also known as close-loop economy (hereinafter referred to CE) is currently one of the leading trends in the context of economic policies in many countries worldwide. The concept of the CE offers a fundamentally new approach to production, consumption and business activities based on renewable solutions and business models. The CE approaches are particularly relevant in the context of global efforts to reduce CO2 emissions and predicted resource scarcity. What is considered waste in the traditional linear economy becomes an asset or resource in the CE. This represents a kind of revolution in the overall system of production and consumption, as it involves not only creating individual resource-saving solutions but also rethinking the very concept of "resources" and its place in the global economic and production system.

This study analyzes the main directions and principles of recycled resources trade and examines existing customs regulations for the classification of such goods in accordance with the Harmonized Commodity Description and Coding System (hereinafter referred to as the HS). The obtained results will provide valuable insights into the role of the HS in supporting the implementation of the CE and

formulate recommendations for enhancing the effectiveness of the HS in promoting sustainable resource management minimizing environmental impact.

The aim of this study is to investigate the role of the HS in facilitating the transition to the CE. The study aims to assess the challenges and opportunities associated with integrating CE principles into the HS, including the need for the development of specific codes and terminology for the accurate classification of recirculated goods. Additionally, the study aims to explore potential opportunities for integrating the HS with other international conventions.

2. LITERATURE REVIEW

Problems and paths of development of the CE have been the focus of attention for both Russian and international researchers for several years. Some scientific works are dedicated to waste management and environmental pollution (Kellenberg D., 2012; Tesfaye F. et al., 2017). The most well-known scientific work on resource trade within the framework of the CE belongs to Albaladejo M., Mulder N., Mirazo P., and Mugica Jauregi I. in their publication "The Circular Economy: From waste to resource through international trade". Russian economists also study the phenomenon of CE. Notably, the scientific article by Salamatov V.Y., Aronov I.Z., and Rybakova A.M. titled "International Trade in Circular Goods: Overview" stands out. Statistical and empirical data can be found in the research of authoritative sources such as the Royal Institute of International Affairs (UK) and the Austrian platform StartUs insights.

However, there is currently a lack of developments and scientific articles specifically addressing the implementation of principles of trade in secondary goods within the HS. This topic has only been discussed within the framework of the "Green Customs" project established by the World Customs Organization (WCO), as well as in symposiums on the greening of the HS held under the auspices of the WCO in 2022-2023. Thus, the question of adapting the nomenclature to the needs of new "eco-friendly" conditions of international trade and production remains understudied and particularly relevant.

3. RESEARCH METHODOLOGY

This article analyzes the potential for introducing a circular economy and the direction of using secondary goods,and provides a classification of categories goods used in CE. In addition, an analysis of the existing structure of the HS made it possible to identify the potential of this trading instrument to simplify the control of goods within the framework of the CE. Based on the methods of induction and analogy, potential directions for improving the HS were explored in order to adapt it to the conditions of the CE. Using synthesis and modeling methods, the author has developed and proposed priority steps to change the existing structure of the HS. Thus, based on an analysis of the principles of the circular economy, as well as the existing mechanism for using the HS for the purpose of classifying goods, using methods of induction, synthesis and modeling, it was possible to formulate new principles for modernizing the HS with a focus on the conditions for introducing the circular economy.

4. RESULTS AND FINDINGS

4.1. Findings

Figure 1 presents the main directions of the CE development at the beginning of 2023, which were identified based on the analysis of the activities of approximalately four thousand start-ups and innovative companies (StartUs, 2021).

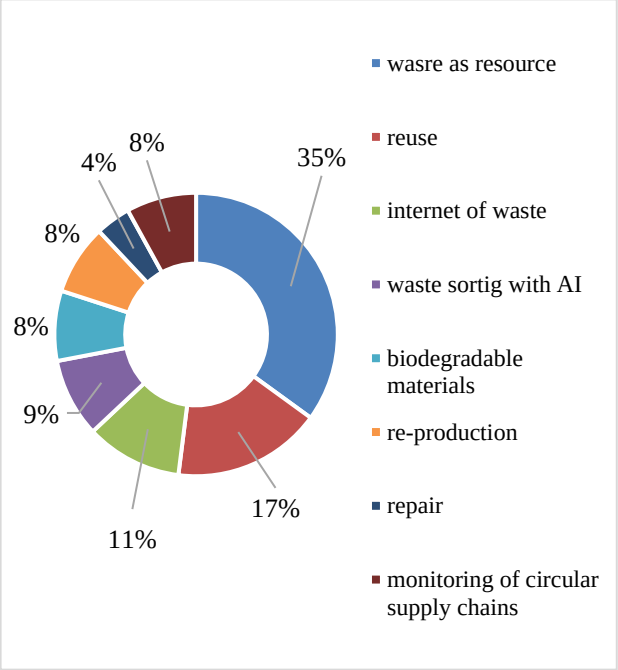

***Fig. 1. The main trends in the field of the CE* (StartUs, 2021)**

It can be seen that more than 70% of the directions of development of the CE in some way associated with the production of circular goods (i.e., goods produced within the CE framework). The production of such goods has facilitated the creation of corresponding business models, which are typically grounded in the "cradle to cradle" (C2C) concept, wherein the end-of-life disposal process involves further recycling. Examples of the implementation of these models in different countries are presented in Table 1 (Appendix I).

Within these business models, several types of production processes stand out: upcycling and downcycling - secondary recycling processes that result in a higher-quality or lower-grade product compared to the original production. Industrial symbiosis (closed-loop recycling) involves the use of by-products from one company's production as

resources for another. Examples of the application of such production processes are presented in Table 2 (Appendix II).

The trade of waste, recycled materials, and used goods is an important component of the CE as it can facilitate their transformation into resources, stimulate countries to leverage their comparative advantages in processing them, and promote scale economies.

Analysts from the German company Statista have projected the growth of circular trade turnover in 2026 compared to 2022 (Fig. 2 in Appendix III). According to their estimates, the volumes of circular trade will more than double across various product categories that can be identified as "used goods". This implies that international trade, at least in used goods, will also grow by approximately two-fold.

The materials used in the CE can be divided into several groups (Salamatov V.Y. et al., 2023):

1) Used goods. These can be used directly reused, repaired, refurbished, or used as secondary raw materials.
2) Refurbished goods: According to the estimates of the Organisation for Economic Co-operation and Development (OECD), refurbishment processes can result in energy savings of over 50% and waste reduction of over 80% (OECD, 2018).
3) Secondary raw materials. These typically include materials used in the production process that replace or supplement the use of new materials. Trading metals and textiles is one of the most common forms of this type of trade in terms of value and volume.
4) Waste and scrap. Traded waste is extremely diverse, which makes its regulation challenging.

The popularity of trading in such goods is driven by high demand in developing countries, as it allows them to acquire high-quality used goods at lower prices instead of lower-quality new goods. However, there are barriers to trading in these goods, including the lack of differentiation between new, refurbished, used goods (or waste and scrap) in most countries, leading to a lack of data on cross-border trade in recycled products. As a result, high import tariffs or non-tariff trade restrictions such as import bans, export bans, and complex bureaucratic procedures may be applied to refurbished goods. These barriers hinder the operations of recycling enterprises as they increase transaction time and cost, making the supply of goods unpredictable (Snodgress, D.).

4.2. The role of the HS in the customs regulation of circular economy goods

The rise in trade flows of industrial waste presents an opportunity for the CE, as these materials can be valuable inputs for production processes in other countries. To fully harness this potential, urgent measures are needed to transform these waste flows into valuable resources for production, including the adoption of circularity practices, advancements in technology, economies of scale, and the implementation of appropriate regulations.

Some industries have greater potential for circularity than others, implying that secondary materials cannot replace primary production on a one-to-one basis (Zink T. and Geyer R., 2017) Moreover, some CE-related trade flows cannot be accurately accounted for in trade statistics due to a lack of tariff lines for "refurbished", "remanufactured" or "used" goods. The magnitude of CE-related trade flows is therefore underestimated.

One of the main obstacle to trade in such goods is the lack of codes identifying these products in the HS. This leads to the problem of unreliable customs declaration, creating a gray area. In order to overcome this limitation in HS codes, some countries supporting trade in processed goods have included a formal definition of what constitutes a primary and processed product in bilateral trade agreements. For example, the Free Trade Agreement between the EU and Vietnam includes a definition of processed goods, allowing for coordinated actions in the trade of such goods. The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) also clearly distinguishes between processed and used goods and clarifies that restrictions or bans on imports should not apply to the former.

The transition to a closed-loop economy has been the subject of discussion during the Global Conference of the WCO "Green Customs" (2022), where the need for specific definitions and clear guidelines for further actions in promoting work in the field of environment and customs was highlighted. These issues were also raised at symposiums on the greening of HS codes in 2022/23, addressing better identification of environmental goods, greater simplicity and effectiveness in implementing global trade-related environmental policies. Currently, based on the HS nomenclature, separate commodity positions have been allocated for chemical substances listed in Appendix III of the Rotterdam Convention, and harmonized lists of such substances have been created to facilitate control over their movement.

The questions related to the development of the CE were brought up in a separate discussion item at the eighth session of the Steering Committee on Trade Potential and Standards of the United Nations Economic Commission for Europe (SCTCS, 2023). One of the main tasks for the development of an effective the CE was identified as the ability to track, assess, and quantitatively measure emerging trade flow trends in the context of a closed loop. During the session, it was noted that the HS rarely distinguishes between new and used goods, as well as between products made from primary or processed materials. This can be explained by two factors: the general lack of global standards, definitions or tests to determine the primary processed status of many materials, and the absence of a reliable tool for verifying whether goods are truly intended for recycling, recovery,

upgrading, or repair (instead of disposal) (WCO, 2022).

Traditionally, the classification of the HS has primarily served as an economic tool for monitoring goods and revenue collection. Over the past few decades, the role of the HS instrument has gradually evolved to incorporate some key environmental and social aspects that have gained increasing importance. Another pertinent factor to consider in relation to HS codes is the gathering of daily statistical data pertaining to the import and export dynamics of diverse commodities. This information is of great importance to customs authorities, as it serves not only to appraise revenue generation and trade patterns, but also to utilize performance metrics for evaluating goods during customs control.

Thus, it can be concluded that the HS constitutes a crucial instrument for customs control and the facilitation of international trade, with its functionality expanding to encompass not only fiscal and statistical aspects but also ecological and security concerns.

In light of the emerging trend towards a closed-loop economy, a key question arises as to whether the HS codes can provide adequate information on materials and products that are being reused, repaired, recycled, recovered, or processed.

Let us consider the current version of the HS 2022. Among the 5612 HS codes in 2022, there is only one code provided for reconditioned goods - Retreaded or used pneumatic tyres of rubber (heading 40.12), and one heading 63.09 for used goods (Worn clothing and other worn articles). It is worth noting that used goods can be distinguished in national nomenclatures based on the HS. For example, the Eurasian Economic Union Customs commodity nomenclature (hereinafter referred to as the CN EAEU) contains codes for used engines (subheadings 8407.10, 8408.10, 8408.90), equipment of subheading 8443.13, motor vehicles of subheading 8607.19, and musical instruments of subheading 9201.10. Additionally, the HS includes a category for waste and scrap, which pertains to various goods and appears in 31 out of the 99 HS chapters. Of particular interest in this regard is the term "municipal waste" used in the HS (heading 3825, subheading 3825.10). The definition of this term according to Note 4 to HS Chapter 38 is as follows:

"Throughout the Nomenclature, "municipal waste" means waste of a kind collected from households, hotels, restaurants, hospitals, shops, offices, etc., road and pavement sweepings, as well as construction and demolition waste. Municipal waste generally contains a large variety of materials such as plastics, rubber, wood, paper, textiles, glass, metals, food materials, broken furniture and other damaged or discarded articles. The term “municipal waste”, however, does not cover:

a. Individual materials or articles segregated from the waste, such as wastes of plastics, rubber, wood, paper, textiles, glass or metals and spent batteries which fall in their appropriate headings of the Nomenclature;
b. Industrial waste;
c. Waste pharmaceuticals, as defined in Note 4 (k) to Chapter 30; or
d. Clinical waste, as defined in Note 6 (a) below."

In accordance with the HS, municipal waste refers to waste collected from urban infrastructure facilities and street refuse. This provision merits significant attention in terms of greening the HS, as many countries actively promote and implement separate waste collection systems (plastics, paper, glass), which are subsequently recycled in industrial enterprises.

It is worth noting that the publication of the HS codes in 2022 led to the creation of a new heading 85.49 and Note 6 to Section 16 for waste and scrap of electrical and electronic equipment - one of the fastest-growing waste categories. This significant change contributes to enhancing transparency in the trade flows of such waste, supporting customs control over this hazardous commodity across borders, and obtaining accurate trade data. At the same time, electronic waste can also be a key component of the transformation towards the CE: possessing high economic value, they are easily recyclable and allow for the recovery of high-quality precious metals (Tesfaye F. et al., 2017).

It is worth noting that the 2022 HS codes have resulted in the creation of a new heading 85.49 and Section 16 Note 6 for electrical and electronic waste and scrap, one of the fastest growing categories of waste. This major change contributes to greater transparency in the trade flows of such wastes, support for customs control of this dangerous product across borders, and accurate trade data. At the same time, e-waste can also be a key component in the transformation of the economy into a recycling one: having a high economic value, it is easily recycled and allows the recovery of high-quality precious metals (Dave et al., 2016; Tesfaye et al., 2017).

Furthermore, significant work in this direction is being carried out by the Secretariat of the Basel Convention (hereinafter referred to as the Convention), as one of the current challenges lies in the lack of harmonization between HS codes and the provisions of the Convention. The definition of waste outlined in the Basel Convention focuses on the intention of disposal (i.e., reducing value to a minimum), while the primary objective of the HS is to interpret waste as goods (i.e., objects with value). This complicates the classification of waste for customs services. Since 2013, attempts have been made to better align the lists presented in the Convention with the HS codes. Specifically, the Secretariat of the Basel Convention has raised issues such as possible amendments to the HS regarding used pneumatic tires and plastic waste during the agenda of the HS Review Sub-Committee in 2022-2023. The aim of the amendment regarding pneumatic tires was to modify the notes to Chapter 40 in such a way as to

differentiate between used tires and tires suitable for further use, for which the Parties to the Convention proposed various distinguishing criteria characterizing the degree of tire wear. With regard to plastic waste, criteria or a threshold value were proposed to indicate the "hazardous nature" of such waste and enable proper disposal.

4.3. Discussion

Despite some efforts to update the HS texts in terms of environmental protection, these measures are insufficient to fully track the flow of goods and adapt customs tariff regulations to the new CE conditions. The adaptation of the HS to the environmental agenda and the demands of new business models is particularly relevant in the context of the strategic review of the HS initiated by the HS Committee, aiming for a more comprehensive examination of the HS compared to regular review cycles (including its tools) for any potentially effective ideas. The HS Committee of the WCO has decided that it is time to identify and review potential improvements to the HS system (in addition to changes in content already covered by existing review cycles) and develop practical recommendations for specific strategies that can align the HS with the modern needs and opportunities of tomorrow (WCO, 2019). In other words, it is advisable to review the HS from the perspective of the CE to ensure that new economic realities are reflected in such a fundamental trade instrument as the HS.

Thus, based on the analysis of the current state and trends of the CE, as well as the analysis of the current level of development of the HS in this regard, it is deemed appropriate to develop practical recommendations that would enhance the HS and adapt it to trade within the framework of the CE.

First and foremost, it is necessary to analyze existing sub-positions at the national level to identify the classification of used and reprocessed goods that are intended for further use (such as the sub-position for used musical instruments in the CN EAEU). Furthermore, a comparative analysis of studies conducted by the Parties to the HS Convention should be carried out, consolidating the results and identifying categories of circular goods that have separate classification codes in these countries. Based on such data, work should be undertaken to establish new sub-positions at the HS level.

Additionally, a comprehensive analysis should be conducted through collaboration with businesses to identify goods that are supplied for international trade for reuse. For instance, these goods may include children's attractions, mobile grandstands, products for street and indoor decoration, gaming and vending machines, equipment, products of chapters 93 and 94, and so forth.

The issue of waste deserves particular attention. The distinction between waste and residues from production processes with potential circularity (i.e., secondary raw materials) is currently not reflected in the 6-digit codes. These categories do not encompass all traded waste, but they can provide a more comprehensive picture of waste and scrap trade that may be intended for processing, reuse, and disposal in the destination country.

According to American researcher Kellenberg, the HS tool can help identify 62 types of waste, which can be grouped into broader waste categories (fig. 3 in Appendix IV) (Kellenberg D., 2012): chemical, metallic, paper, plastic, textile, and other waste. However, this grouping has theoretical significance and does not cover all types of waste traded internationally. It is also worth noting that there are three possible options for waste management: recycling, export, and domestic disposal. Waste is exported for two possible reasons: for processing into materials in a foreign country or for disposal in a foreign country. These characteristics are important for trade within the the framework of the CE, thus it seems appropriate to provide detailed classification of waste (at least for those most demanded in industrial sectors) based on their purpose, i.e., distinguishing between waste intended for domestic disposal and waste intended for subsequent processing (secondary raw materials).

Moreover, this solution requires the introduction of new terminology - it is necessary to clearly distinguish such concepts as waste, secondary raw materials, used goods, and refurbished materials (suitable for use after repair). On one hand, such detailed classification may seem cumbersome and complicate the HS. However, it should be noted that, firstly, the role of these considered categories of goods will increase in the context of the CE, and secondly, besides its fiscal and statistical functions, the HS faces new tasks. Therefore, its application should meet the new requirements of modern economic conditions. In these circumstances, it is important to expedite the transition to unambiguous rules for identifying circular goods within the HS and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, and to ensure effective traceability of these products.

Thus, the work on the strategic revision of the HS within the development of the CE can be divided into three stages, as presented in Figure 4 (Appendix V).

In this regard, it is important to note that these innovations should also affect tariff regulation. For example, customs duties for secondary raw materials or used goods should be the most favorable and attractive for businesses.

An important part of the work is related to the identification of these considered goods at the border for the purpose of their classification. The identification of the detail theCE goods can be a challenging task due to the lack of universally accepted standards and criteria for assessing

whether a particular item is suitable for reuse or has been previously used. In order to address this, firstly, international standards need to be developed, and additional information on such goods needs to be provided, including the quality level of waste and scrap for use as secondary raw materials, precise information on the age of reusable goods, etc. Secondly, a traceability system needs to be implemented, which will provide information on all cycles of use of a specific product and allow for an assessment of its potential future applications.

In combination, the aforementioned measures will contribute to the development of the CE and the production of recirculated goods. For example, if a specific organization imports waste and scrap for the production of its goods, which are then exported as finished products, it will be eligible for customs duty exemptions or simplified customs procedures (the traceability system in this case will provide evidence that the products are indeed manufactured from secondary raw materials).

5. CONCLUSIONS

The concept of the CE presents a promising approach to address resource depletion and environmental degradation in the modern world. The application of the CE principles requires efficient systems and frameworks for the trade and management of circular goods. The HS plays a crucial role in facilitating this trade by providing a standardized classification and coding system for goods.

Through the analysis of key indicators and trends in trade within the CE, this article has highlighted the importance of regulating the movement of circular goods. However, it has also identified the challenge of insufficient regulation and lack of resources for effective control by customs authorities. Nonetheless, the existing structure of the HS demonstrates its potential as a trade instrument to simplify and enhance control over goods within the CE.

By formulating new principles for modernizing the HS with an orientation towards the conditions of the CE, this research contributes to the advancement of trade practices in this field. The proposed principles, developed through methods of analysis, induction, and synthesis, aim to streamline the classification and control of circular goods, thus facilitating their efficient movement and promoting the growth of the CE.

Further research and collaboration among stakeholders, including customs authorities, policymakers, and businesses, are necessary to implement and refine named principles. By leveraging the potential of the HS and other trade instruments, we can create a more effective and sustainable framework for the trade of circular goods, ultimately advancing the transition towards the CE and achieving a more resource-efficient and environmentally conscious future.

Thus, the CE is an inevitable future that needs to be adapted in all sectors of economic life. Customs authorities play a crucial role in this regard. With the transition to the CE, the issues requiring resolution and control become more complex. One of the problems and, at the same time, one of the tools for the successful adaptation of customs to the new conditions is the improvement of the tariff nomenclature.

6. RECOMMENDATION

Based on the findings and analysis presented in this scientific article on the CE and the role of the HS, the following recommendations are proposed.

Firstly, within the work of the WCO HS Committee, which is responsible for conducting research on the strategic revision of the HS, it is necessary for each contracting party to analyze their national nomenclature for the presence of codes that detail the HS subheadings reflecting waste, used goods, and secondary raw materials.

Furthermore, the HS Committee needs to consolidate the data and conduct an analysis to determine for which groups of goods, according to the HS, the presence of codes for circular goods is most in demand.

Secondly, at the national customs administration level, a dialogue with the business community needs to be conducted to identify potential trade needs for various secondary resources. This information should be brought to the discussion of the HS Committee for the allocation of new subheadings for circular goods.

Thirdly, based on the conducted research, it is necessary to review the existing structure of the HS and reflect such goods in the appropriate groups. It is important to differentiate between waste intended for disposal in another country and goods suitable for reuse. Recommendations from the WCO should include provisions for tariff regulation of such goods and the reduction of customs duties.

Fourthly, it is necessary to include definitions of terms such as secondary raw materials and circular goods in the legal text of the HS. A clear distinction should be made between different types of circular goods.

Fifthly, it is important to continue efforts to harmonize the HS with the provisions of the Basel Convention and other international documents regulating environmental protection. Enhancing the identification within the HS will allow for a clearer tracking of material flows in international trade of processed products. The successful resolution of these and other related tasks largely determines the success of international trade in circular goods and, ultimately, the success of the closed-loop economy itself.

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In-text reference: (SCTCS, 2023)

APPENDIX I

Table 1: Usage of recycling, alternative materials

 Textile	JBC (certificate C2C)	Production clothes from recycled materials: pockets - 100% recycled cotton, labels - 100% recycled polyester
 Metallurgy	Urban Mining	Production of NdFeB magnets from scrap metal using patented technologies "from magnet to magnet"
 Auto Industry	Renault	Production cars from recycled materials (In Europe, 36% of the mass of new automobiles is derived from secondary raw materials, and 85% of automobiles are subject to recycling).
 Petrochemistry	OOO Sibur	The waste-free production of the company "Biaksplen" involves the return of all polymer waste back into the production cycle, where it is added to the primary raw materials during the production of new products. The company "Rusvinyl" processes sludge (waste consisting of a mixture of sand with calcium and magnesium salts) into a construction material.

APPENDIX II

Table 2: The application of various types of production processes based on resource recirculation

Upcycling		
Fashionable industry	Freitag	Manufacturing bags from tarpaulins, seat belts, and used airbags.
Musical industry	Boomera	Manufacturing of musical instrumentsfrom recycled waste
Aviation industry Furniture production Fashionable industry	Singapore Airlines	Transferring parts and materials from decommissioned commercial aircraft for recycling and use in the production of retail goods (furniture items, clothing and accessories, bags) and works of art.
Downcycling		
Package	Bor polymer company	Production of construction polymer-sand products based on plastic recycling technologies (polymer-sand curbstones, borders, roof tiles)
Construction materials	Veolia North America	Processing (grinding) wind turbine blades and using them as a replacement for raw materials in cement production
Industrial symbiosis		
Construction materials	K.K. Plastic management Ltd	Production of additive from plastic waste for road construction. The company processes 30 tons of plastic waste per day
Pharmaceuticals	LLC "Ecoprotein"	Processing food waste into protein using black soldier fly larvae. The larvae grow rapidly and are used as feed for large ruminant livestock, fish, domestic animals
Aquaculture	Leroy seafood (company oceanfish)	Utilizing waste from fish farms for the cultivation of kelp and mussels.

APPENDIX III

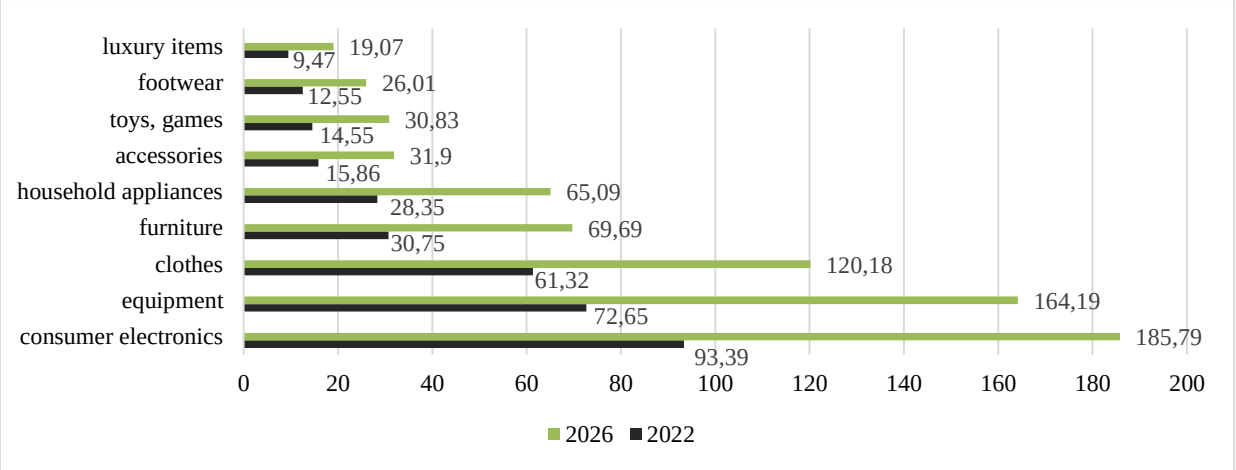

Fig. 2. Growth in the volume of trade in circular goods by 2026
Sourse: Salamatov V.Y., Aronov I.Z., Rybakova A.M. (2023). International Trade in Circular Goods: Overview. Russian economic herald, 4, 66-87.

APPENDIX IV

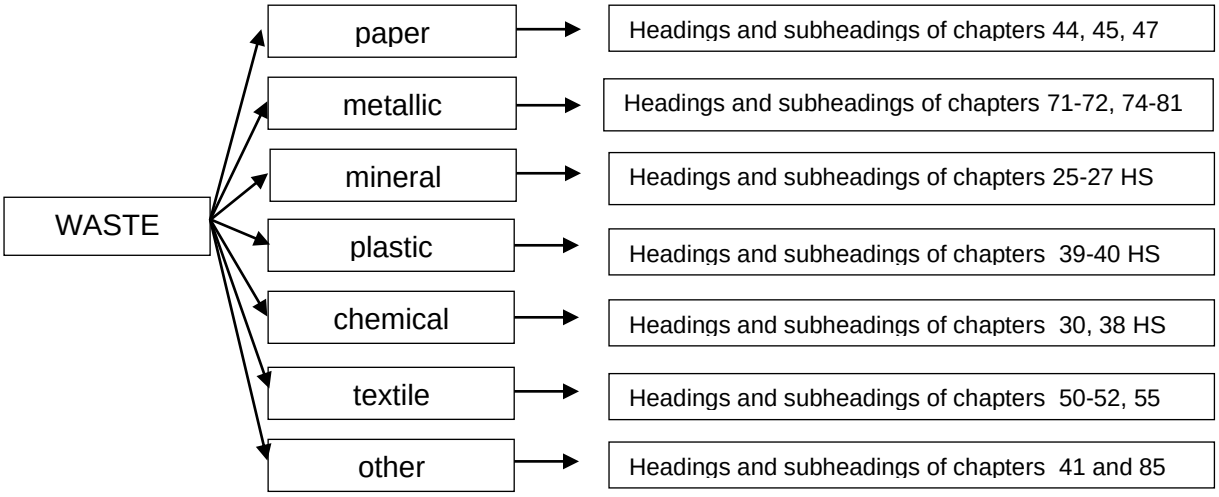

Fig. 3. Waste typology by the HS codes
Source: Author`s own elaboration based on Kellenberg's research

APPENDIX V

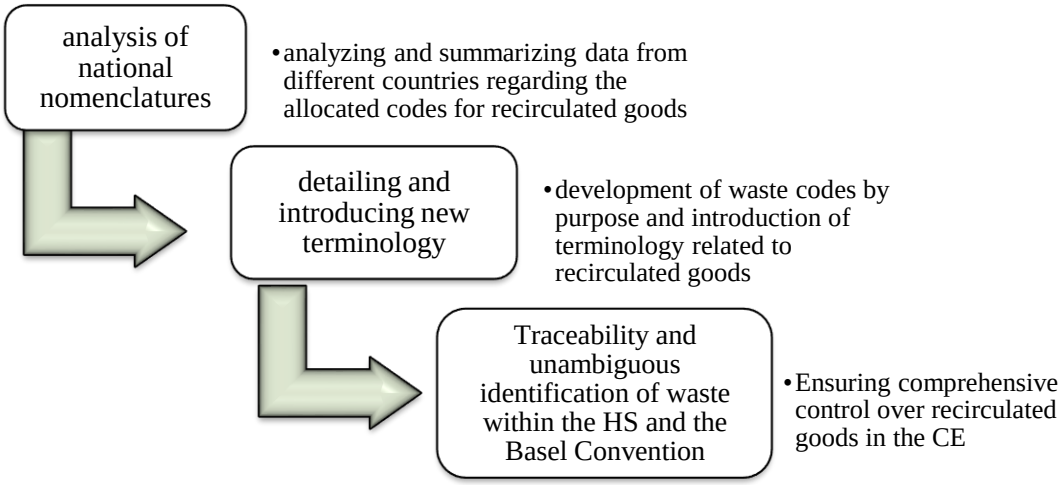

Fig. 4. The stages of adapting the HS to the CE conditions