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Abstract: Secondhand clothing has undergone a significant transformation from a vital household asset in the pre-industrial era to a dynamic segment of global trade in the 21st century. However, the advent of fast fashion has led to overproduction and mass consumption of inexpensive garments, fueling a surge in the secondhand clothing trade. Between 2002 and 2022, the market value of this industry quadrupled, with exports accounting for 1.17% of total global clothing exports in 2022. This study explores the global dynamics of secondhand clothing exports, focusing on the top ten exporting countries from 2013 to 2022, with Pakistan included as an emerging player. Export competitiveness tools such as RCA, RSCA, Dynamic RCA, TII, IEMP, and Unit Values are used to understand the secondhand clothing trade patterns. The analysis reveals notable trends: the United States and China dominate the market, while Pakistan and the UAE exhibit the highest growth rates.

Keywords: secondhand clothing; trade; export; import; market share; supply chain

1. Introduction

In the early modern period, secondhand clothing held significantly higher value compared to today. Before the Industrial Revolution, textiles and garments were among the most expensive items a household could purchase, often tied to major life milestones such as childbirth [1]. The durable nature of fabrics allowed them to be reused across generations, making secondhand clothing a crucial household asset that could even serve as collateral in times of financial need [2] (p. 17).

Transitioning to the 21st century, the fashion industry has been profoundly shaped by globalization, digitalization, and growing concerns about sustainability. The rapid expansion of the industry, particularly the fast fashion segment, has been driven by a 'race to the bottom' phenomenon, resulting in excessive production and consumption of low-cost garments [3]. This overproduction has, in turn, fueled a surge in the trade of secondhand clothing. While garments are discarded more quickly and should theoretically retain their quality due to limited wear, the reality is quite different. Many fast fashion items are poorly made, which creates challenges for traders attempting to resell them in destination markets, particularly in regions like Africa [4]. These markets, consequently, often become dumping grounds for surplus, low-quality fast fashion clothing.

Due to the accelerated pace of clothing consumption in developed economies followed by rapid increase in clothing production, the secondhand clothing industry has experienced substantial growth. Between 2002 and 2022, its market value quadrupled from $1.37 billion to $5.68 billion [5]. Similarly, the trade value of secondhand clothing per kilogram increased from $0.71 to $1.71 over the same period [5]. However, it is important to note that despite this growth, secondhand clothing exports still accounted for only 1.17% of total global clothing exports in 2022.

The secondhand clothing supply chain is a highly globalized, complex, and fragmented system involving multiple stakeholders and activities. In developed economies, consumers' easy access to affordable new clothing encourages the frequent disposal of garments that no longer fit, are out of style, or are simply worn out. These discarded items are often treated as waste, donated to charities, or sent for recycling [6]. From here, the secondhand clothing collected by charities and commercial

recyclers is processed and ultimately exported to underdeveloped economies, where demand for affordable clothing remains high.

Despite the significance of the global secondhand clothing trade, research in this area remains limited and fragmented. Much of the existing scholarship has focused on specific regional impacts, structural dynamics, and socioeconomic implications, with key contributions exploring the intersections of trade, local economies, and cultural processes. For instance, [7] examined the structure and evolution of the world's used clothing trade and its effects on Rwanda, emphasizing how secondhand imports minimally displaced the local textile industry while providing a rare policy tool to support national and rural incomes. Similarly, [4] investigated apparel production challenges in Africa, linking the inability to establish local manufacturing to the influx of secondhand clothing donations. [8] further explored the relationships between used clothing imports and the decline of African clothing industries, shedding light on local economic and cultural transformations resulting from these trade flows.

Other studies have broadened the scope by addressing secondhand clothing's role within global production networks. For example, [9] examined the economic geographies of the UK's secondhand clothing industry, as well as labor activities in Mozambique, while [10] emphasized the convergence of economic and cultural values within the secondhand economy. [11] contributed to this discourse by analyzing changing secondhand economies, including the expansion of secondhand markets, emerging venues, and the cultural significance of used goods.

More recently, [12] conducted a systematic review of Africa's secondhand clothing value chain, highlighting its role as a crucial supply chain connecting developed and developing economies. Their findings emphasized the trade's economic importance for impoverished communities and its potential to nurture small- to medium-sized enterprises through skill development. On a global scale, [13] examined U.S. used clothing exports, uncovering a surprising trend: significant volumes were exported to high-income countries rather than the poorest nations, driven in part by the popularity of vintage fashion and increased environmental awareness. [14] extended this analysis by assessing the sustainability impacts of the global used clothing supply chain through quantitative trade data, providing insights into trade patterns from 2010 to 2020.

Despite these valuable contributions, a notable gap persists in examining the broader global dynamics of secondhand clothing trade through export competitiveness tools. Existing studies focus heavily on regional impacts and qualitative analyses, leaving room for comprehensive research that quantitatively measures trade patterns and competitive advantages in the global secondhand clothing market. This study aims to address this gap by analyzing trade patterns in secondhand clothing exports over the past decade, focusing on the top ten exporting countries. By providing a comprehensive understanding of global trade dynamics, this research identifies key trends and their implications for both exporting and importing economies. In doing so, it sheds light on an often-overlooked segment of global trade, offering insights with significant relevance to sustainability, economic policy, and the circular economy.

2. Literature Review

Market Share

Market Share (MS) is a critical indicator used to assess a country's competitiveness in the global market for a specific product. It is calculated by comparing the export value of the product from a particular country to the total global export value of the same product. The resulting percentage reflects the country's contribution to the global market, highlighting its position relative to competitors [15]. MS value ranges from 0 to 100, where a value close to 0 indicates that the country has a weaker global position, implying the need for strategic efforts to improve global presence and competitiveness. A higher MS value indicates that the country has a dominant global market position and a robust competitive advantage.

$$MS = \frac{X_{ij}}{X_{wj}}$$

where X_{ij} represents the export value of product j from country i, and Xwj represents the product j's worldwide export value.

Market Share not only highlights a country's competitive standing but also serves as a diagnostic tool for understanding market dynamics. Countries with a higher MS often benefit from economies of scale, stronger trade networks, and superior product quality, which enhance their global influence.

Compound Annual Growth Rate

Compound Annual Growth Rate (CAGR) measures the consistent rate at which a country's trade activities grow or decline over a specified period. It is a valuable metric for understanding the overall trajectory of trade performance by analyzing the average annual growth in trade values, taking into account both increases and decreases during the given time frame. A positive CAGR value indicates sustained growth, reflecting a strengthening position in international trade or expanding demand for specific products. Conversely, a negative CAGR points to a decline, which may signify diminishing competitiveness, reduced demand, or unfavorable market conditions.

$$CAGR = 100 * \left[\left(\frac{X_{ijkt2}}{X_{ijkt1}}\right)^{\wedge \frac{1}{t2-t1}} - 1\right]$$

where X is the value of exports of product k from country i to destination j, and start and end years are t1 and t2, respectively.

CAGR provides a robust and standardized measure of trade competitiveness, allowing countries and businesses to track progress and adapt strategies for sustained economic growth [16].

Revealed Comparative Advantage

The concept of comparative advantage is fundamental to international trade theory, explaining how countries benefit from specializing in producing goods where they have efficiency advantages relative to other nations. Since [17] seminal work, comparative advantages have been measured using Revealed Comparative Advantage (RCA) indexes, which rely on trade data to provide measurable insights into a country's competitive strengths.

Balassa built upon [18] methodology of employing relative export performance as a metric. He proposed the widely used RCA equation, which evaluates comparative advantage by calculating the ratio of a country's share of global exports in a specific product to its overall share in global exports. RCA is a retrospective tool used to assess a country's competitive position in a specific product or sector. It is derived by analyzing trade data, capturing both cost-related and non-price factors that influence trade patterns [19]. This innovation made the RCA index a synthetic and practical measure for assessing trade performance and competitiveness. Over the decades, RCA has remained a cornerstone in analyzing trade dynamics, helping identify sectors where countries hold significant competitive advantages.

This study employs three distinct variants of the Revealed Comparative Advantage (RCA) indices to analyze the competitive dynamics within the secondhand clothing export industry. These indices include (1) Balassa's RCA Index [17], (2) Dynamic RCA Index [20], and (3) Revealed Symmetrical Comparative Advantage (RSCA) Index [21].

By utilizing these indices, the study provides a comprehensive evaluation of the comparative advantages in the secondhand clothing export markets, offering a robust framework to track shifts in trade performance and competitiveness within the sector over the decade analyzed.

RCA is calculated as the ratio of a product's share in a country's total exports to its share in global exports. This formula identifies whether a country has a comparative advantage or disadvantage in a particular commodity. RCA values range from 0 to infinity; values below 1 indicate a country's comparative disadvantage, whereas values equal to 1 suggest neutral advantage and values above 1 indicate comparative advantage:

$$RCA_{ijk} = \frac{\left(\frac{x_{ijk}}{X_{ij}}\right)}{\left(\frac{x_{wjk}}{X_{wj}}\right)}$$

where x is the value of exports of product k from country i to destination j, and X is total exports from i to j; w indicates the total worldwide exports.

While traditional RCA indices provide a static snapshot of a country's position in the global clothing trade, dynamic RCA indices offer insights into how these positions evolve over time. Utilizing the methodology developed by [20], dynamic RCA indices evaluate whether a country has a comparative advantage in a specific commodity by comparing the growth of its export share of that commodity to the growth of the commodity's share in total world trade over a specified period.

Dynamic RCA indices capture shifts in trade patterns and highlight changes in export performance between two periods. They are particularly useful in assessing how competitive advantages in specific commodities develop or diminish, providing a more nuanced understanding of trade dynamics beyond the static perspective of traditional RCA measures.

$$Dynamic\ RCA_{ijk} = (\frac{\Delta x_{ijk}}{\Delta X_{ij}})/(\frac{\Delta x_{wjk}}{\Delta X_{wj}})$$

where Δ indicates the change in exports over time, x is the value of exports of product k from country i to destination j, and X is total exports from i to j; w indicates the total worldwide exports.

Unlike the original RCA, which can be skewed due to extreme values, the Revealed Symmetrical Comparative Advantage (RSCA) Index transforms RCA scores into a symmetrical range, facilitating easier comparisons between industries or countries.

$$RSCA_{ijk} = \frac{RCA_{ijk} - 1}{RCA_{ijk} + 1}$$

The $RSCA_{ijk}$ index ranges from minus one to one. The $RSCA_{ijk}$ greater than zero implies that country i has comparative advantage in product k from destination j. In contrast, the $RSCA_{ijk}$ less than zero imply that country i has comparative disadvantage in product k.

Index of Export Market Penetration

The Index of Export Market Penetration (IEMP) evaluates the degree to which a country's exports reach established global markets. It is determined by dividing the number of countries to which the exporting country ships a specific product by the total number of countries reporting imports of that product in a given year. A low export penetration rate may indicate the presence of trade barriers that hinder companies from expanding into additional markets. IEMP value ranges from 0 to 1, where a value close to 0 indicates that the reporter exports to very few countries, while a value of 1 indicates that the reporter exports to every country that imports a particular product.

$$IEMP = \frac{n_{x,ik}}{n_{m,k}}$$

where n_x is the number of countries to which country i exports product k, and n_m is the number of countries that import product k from any source.

The index records any trade relationship where a flow exists, regardless of its size. Consequently, even a high index value can obscure opportunities for export growth if the associated trade volumes are minimal. Additionally, the index does not account for fixed costs associated with entering new markets, variable transaction expenses, or their underlying causes [22]. It cannot differentiate whether a low value arises from unfavorable regulatory or business conditions or from high transportation and transaction costs.

Trade Intensity Index

The Trade Intensity Index (TII) evaluates the trade relationship between two regions by analyzing the proportion of one area's trade with another relative to the partner's total global trade. This metric helps assess whether a region exports more or less to a particular destination compared to global averages [23]. A notable advantage of TII is its independence from the size of the trading partners, making it a robust tool for comparing trade patterns across regions and over time, even during periods of rapid export growth.

$$TII = \frac{\frac{x_{ijk}}{X_{ik}}}{\frac{x_{wk}}{X_{wk}}}$$

where x$_{ijk}$ is the value of exports of product k from origin country i to destination j, and X is total exports from i of product k; w indicates worldwide exports. The index ranges from 0 to infinity. A TII value below 1 indicates weaker-than-average trade intensity between the two partners, while a value above 1 suggests a higher-than-average level of bilateral trade.

Unit Values

Unit values serve as a valuable metric for assessing export performance and quality competitiveness. These values are calculated as the ratio of the total value of imports to their respective quantities, offering a price-per-unit indicator for specific products. By analyzing unit values across countries and products, insights into relative quality positioning in global markets can be derived

$$Unit\ Value\ u_{itc} = \frac{Import\ Value}{Import\ Quantity}$$

where u_{itc} are computed for each product i imported from country c in year t. A higher unit value often reflects superior quality, especially for differentiated products, whereas lower values may signify cost competitiveness or specialization in lower-quality goods [24].

3. Data and Methodology

3.1. Data

This study utilizes product-level trade data from the United Nations Commodity Trade database, adhering to the 2022 Harmonized System (HS) revision. The HS (2022), the seventh edition of this internationally recognized classification framework, is utilized globally to standardize the categorization of goods in international trade [25]. Specifically, HS Product Category 6309 which consists of Worn Clothing and Other Worn Articles.

3.2. Measures and Analysis

To identify the leading exporters of secondhand clothing, the market share of all exporting countries was calculated. The analysis of changing export shares among the top exporting nations was conducted using Compound Annual Growth Rate (CAGR) and Market Share (MS) for the HS 6309 category over a ten-year period (2013–2022). Additionally, export competitiveness was evaluated through the computation of Revealed Comparative Advantage (RCA), Dynamic RCA, and Revealed Symmetrical Comparative Advantage (RSCA) indices for the same product category and time frame. To better understand trade relationships, the primary import partners for each of the top five secondhand clothing exporters were identified by calculating the market shares of imports from these countries. The bilateral trade intensity between exporting and importing nations was assessed using the Trade Intensity Index (TII). Export Market Penetration was measured to evaluate the global reach and diversification of markets for the leading secondhand clothing exporters. Finally, to measure the price competitiveness and export market postitioning, a unit value of secondhand clothing exporters were calculated. This comprehensive approach provides a nuanced understanding of trade dynamics and competitive positioning within the secondhand clothing sector.

4. Results

Between 2013 and 2022, the top ten exporters of secondhand clothing were identified as the United States of America (USA), China, the United Kingdom (UK), South Korea, Germany, the United Arab Emirates (UAE), the Netherlands, Poland, Italy, and Canada by analyzing the market share of all countries competing in the secondhand clothing export marketplace. With Pakistan's rise

in the secondhand clothing export market and being the eleventh top exporter, Pakistan is included in the study sample. Table 1 provides the market shares of the top eleven clothing exporting countries for the 2013 to 2022 period.

Table 1. Market Share of Top Eleven Secondhand Clothing Exporting Countries for 2013 to 2022 period.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
USA	15.63%	15.75%	17.02%	14.90%	14.61%	15.15%	15.08%	16.29%	15.60%	16.82%
China	2.30%	4.20%	6.84%	5.64%	6.89%	6.27%	7.39%	9.38%	14.14%	15.32%
UK	13.91%	12.52%	11.60%	12.35%	11.72%	12.19%	11.56%	7.87%	7.47%	7.86%
South Korea	8.27%	7.94%	7.64%	6.98%	7.09%	7.38%	7.46%	7.09%	6.51%	6.60%
Germany	11.19%	11.12%	10.36%	10.56%	9.60%	9.23%	8.44%	7.31%	6.62%	6.06%
Netherlands	5.37%	5.00%	4.98%	5.15%	4.70%	4.17%	4.16%	3.87%	3.49%	3.62%
Poland	3.20%	3.28%	3.24%	4.19%	4.16%	4.40%	4.45%	4.58%	3.90%	3.51%
UAE	0.38%	0.53%	0.44%	0.99%	4.15%	4.13%	4.79%	5.03%	4.68%	4.61%
Italy	3.19%	3.24%	3.11%	3.07%	3.13%	3.10%	2.91%	2.85%	2.71%	2.40%
Canada	3.96%	3.77%	3.39%	3.27%	3.08%	3.09%	2.89%	2.19%	2.67%	2.64%
Pakistan	0.36%	0.30%	0.27%	0.29%	0.25%	0.30%	0.73%	4.87%	5.19%	4.52%

From 2013 to 2022, the market share of secondhand clothing exports revealed interesting trends across leading exporting nations. The USA consistently held a dominant position, starting at 15.63% in 2013 and increasing to 16.82% by 2022. China displayed significant growth, climbing from a modest 2.30% in 2013 to a peak of 15.32% in 2022. The UK saw a steady decline in its share from 13.91% in 2013 to 7.86% in 2022. South Korea's share also declined from 8.27% in 2013 to 6.60% in 2022. Germany's share gradually decreased from 11.19% in 2013 to 6.06% in 2022, reflecting a consistent decline.

The Netherlands showed minor fluctuations, maintaining a relatively stable share of around 5%, while Poland experienced modest growth from 3.20% in 2013 to 3.51% in 2022. The United Arab Emirates experienced a notable rise, growing from 0.38% in 2013 to 4.61% in 2023, highlighting its emergence as a key player. Pakistan, the 11th top secondhand clothing exporter, saw remarkable growth, starting at 0.36% in 2013 and increasing to 4.52% in 2022, fueled by its dual role as both a major importer and exporter.

The CAGR analysis for the period from 2013 to 2022 shows varied performance among the countries, presented in Figure 1. Pakistan, followed by UAE had the highest CAGR, standing at 36.13%, and 35.61% respectively among the top ten secondhand clothing exporting nations. China also demonstrated impressive growth at 26.99%, indicating a significant increase in its secondhand clothing export performance. The United States and Poland displayed moderate growth rates of 3.69% and 3.90%, respectively, while Korea exhibited marginal growth at 0.30%. On the other hand, several countries faced a decline in their CAGR. Germany experienced a decrease of -3.92%, the United Kingdom -3.47%, Canada -1.70%, the Netherlands -1.54%, and Italy showed a slight contraction of -0.38%. These figures highlight the dynamic and uneven nature of the secondhand clothing export industry over the decade.
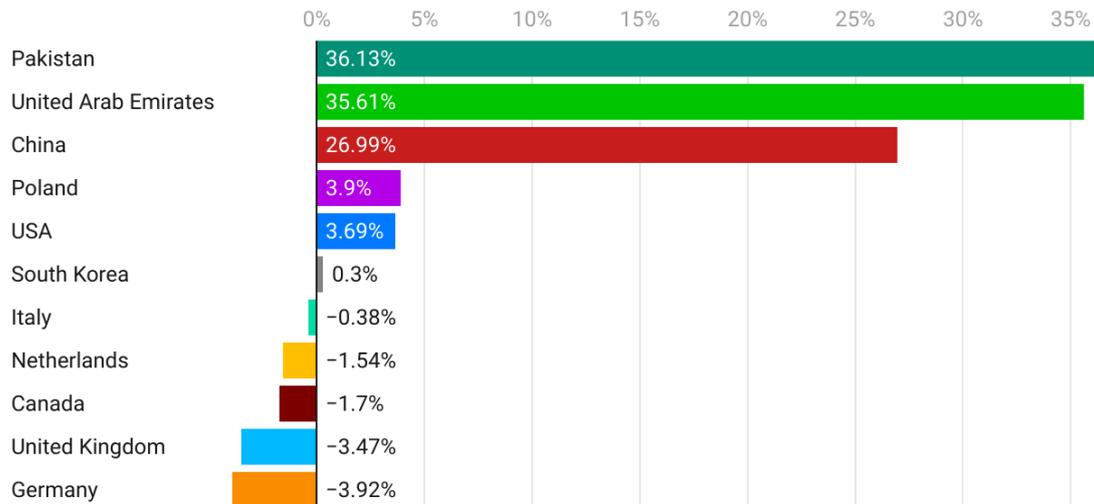
Figure 1. Compound Annual Growth Rate for Top Eleven Secondhand Clothing Exporting Nations for Period 2013 to 2022.

4.1. Export Comparative Advantage

RCA, Dynamic RCA, and RSCA indices for the HS6309 product category, detailed in Tables 2, 3, and Figure 2, indicate export competitiveness and comparative advantage trends. The UK consistently demonstrated strong comparative advantage, maintaining RCA values above 3, though experiencing a slight decline from 4.711 in 2013 to 3.373 in 2022. The USA maintained stable RCA values, averaging around 1.8, while China exhibited significant improvement, rising from 0.193 in 2013 to 0.979 in 2022, still not gaining a comparative advantage. The UAE gained a significant comparative advantage in the latter half of the decade, while Germany, Italy, and Canada experienced declines. Pakistan showed exceptional growth, with RCA surging to 36.052 in 2022 from 2.734 in 2013, reflecting its dominant market position.

The RSCA metric further highlights competitive shifts. The UAE also showed a significant RSCA improvement, transitioning from a negative score (-0.678 in 2013) to a positive 0.345 by 2022. In contrast, Germany's RSCA declined into negative territory (-0.096 in 2022), and the United Kingdom saw a moderate decrease from 0.650 to 0.543. China moved toward comparative advantage, improving from -0.676 in 2013 to -0.011 in 2022. Conversely, Canada, and Italy experienced declines in their RSCA scores, with Canada reaching near neutrality by 2022 (0.008). Pakistan exhibited remarkable growth, with RSCA rising from 0.464 in 2013 to 0.946 in 2022, indicating a strong increase in comparative advantage.

Dynamic RCA, which measures the growth in comparative advantage over time, reveals the following patterns: Pakistan led with a staggering value of 199.88, reflecting its robust dominance in the sector. The UAE followed at 5.89, and the UK achieved substantial value at 44.97, despite a slight decline in recent years. China showed steady improvement with a dynamic RCA value of 1.93. However, several countries experienced declines in dynamic RCA, including Germany (-2.20), Canada (-0.62), and the Netherlands (-0.56). Italy remained relatively stable with a slight negative value of -0.12, while Korea saw minimal value change (0.28). These results highlight significant shifts in global competitiveness within the secondhand clothing industry over the decade.

Table 2. RCA Values for Secondhand Clothing Exporting Nations.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
USA	1.840	1.797	1.829	1.611	1.631	1.726	1.690	1.958	1.927	1.874
China	0.193	0.331	0.486	0.422	0.525	0.479	0.545	0.623	0.924	0.979
United Kingdom	4.711	4.526	4.017	4.710	4.580	4.712	4.551	3.418	3.439	3.373

South Korea	2.743	2.560	2.343	2.212	2.135	2.316	2.535	2.378	2.189	2.218
Germany	1.431	1.372	1.259	1.240	1.158	1.120	1.041	0.907	0.877	0.825
Netherlands	1.732	1.604	1.730	1.725	1.536	1.347	1.330	1.206	1.084	1.083
Poland	2.916	2.828	2.686	3.346	3.243	3.189	3.258	3.099	2.661	2.351
UAE	0.192	0.286	0.237	0.525	2.283	2.020	2.268	2.576	2.385	2.055
Italy	1.145	1.131	1.098	1.044	1.075	1.068	0.999	0.981	0.953	0.835
Canada	1.611	1.465	1.338	1.319	1.265	1.300	1.195	0.968	1.155	1.015
Pakistan	2.734	2.220	1.793	2.083	2.069	2.612	5.706	35.272	50.575	36.052

Table 3. RSCA Values for Secondhand Clothing Export Nations.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
USA	0.296	0.285	0.293	0.234	0.240	0.266	0.257	0.324	0.317	0.304
China	-0.676	-0.502	-0.346	-0.406	-0.311	-0.353	-0.294	-0.232	-0.040	-0.011
United Kingdom	0.650	0.638	0.601	0.650	0.642	0.650	0.640	0.547	0.549	0.543
South Korea	0.466	0.438	0.402	0.377	0.362	0.397	0.434	0.408	0.373	0.378
Germany	0.177	0.157	0.115	0.107	0.073	0.057	0.020	-0.049	-0.066	-0.096
Netherlands	0.268	0.232	0.267	0.266	0.211	0.148	0.142	0.093	0.040	0.040
Poland	0.489	0.478	0.457	0.540	0.529	0.523	0.530	0.512	0.454	0.403
UAE	-0.678	-0.556	-0.617	-0.312	0.391	0.338	0.388	0.441	0.409	0.345
Italy	0.067	0.062	0.047	0.022	0.036	0.033	-0.001	-0.009	-0.024	-0.090
Canada	0.234	0.189	0.145	0.138	0.117	0.130	0.089	-0.016	0.072	0.008
Pakistan	0.464	0.379	0.284	0.351	0.348	0.446	0.702	0.945	0.961	0.946

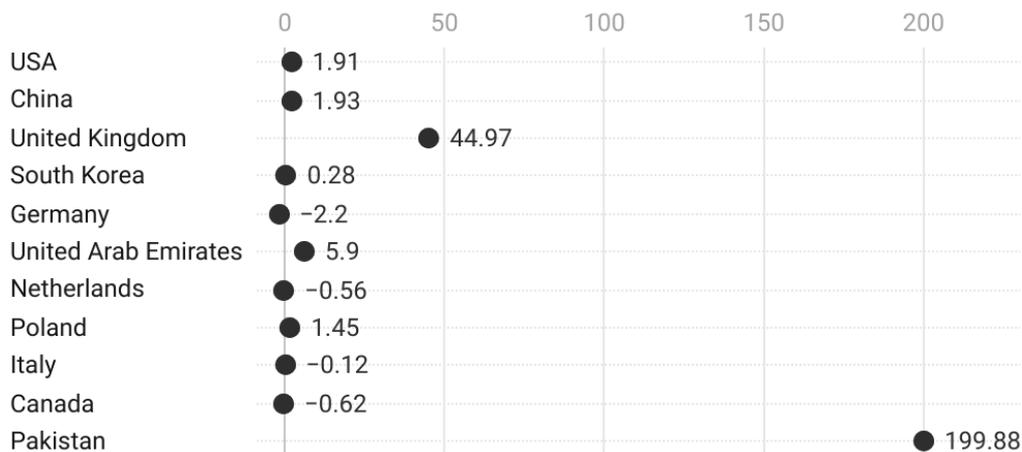| Extreme Disadvantage					Extreme Advantage

Figure 2. Dynamic RCA value for Secondhand Clothing Export Nations.

4.2. Export Markets

An analysis of the major export destinations of the top five exporters revealed distinct patterns. Between 2013 and 2022, the USA's secondhand clothing exports to various countries showed distinct patterns, as seen in Table 4. Guatemala consistently increased its share, becoming the largest destination for US secondhand clothing by 2022 with 18.3%, up from 8.1% in 2013. Canada, which was once the top recipient, saw a decline in its share over the years, dropping from 15.1% in 2013 to 6.3% in 2022. Chile remained a steady destination throughout the decade, with a slight decrease from

8.9% in 2013 to 9.7% in 2022. Honduras experienced a rise in its share, growing from 3.3% in 2013 to 9.7% by 2022, with a notable peak in 2021 at 10.4%. Mexico, after peaking at 21.6% in 2015, fluctuated and ended the period with 5.9% in 2022.

Table 4. USA's Secondhand Clothing Export Destinations.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Guatemala	8.1%	8.4%	9.9%	13.3%	13.0%	12.9%	14.0%	13.3%	16.6%	18.3%
Canada	15.1%	12.5%	7.9%	7.6%	8.3%	8.5%	7.7%	4.9%	6.4%	6.3%
Chile	8.9%	8.5%	8.1%	10.7%	10.5%	10.2%	9.5%	8.9%	9.8%	9.7%
Honduras	3.3%	3.8%	4.0%	6.7%	8.6%	8.4%	9.1%	8.1%	10.4%	9.7%
Mexico	4.5%	9.9%	21.6%	3.6%	3.7%	2.9%	3.0%	3.7%	4.8%	5.9%

Table 5 presents China's exporting destinations. From 2013 to 2022, China's majority of secondhand clothing exports were to several African nations. Kenya, the largest destination, saw a steady increase in its share, rising from 6.3% in 2013 to 16.1% in 2022. Angola also experienced significant growth, particularly between 2015 and 2017, when its share surged from 5.2% to 15.5%, but then declined to 10.1% by 2022. The United Republic of Tanzania showed a fluctuation in its share over the years, peaking at 9.9% in 2015 and ending at 8.2% in 2022. Ghana's share was more variable, starting at 7.9% in 2013, dipping in the following years, and falling to 4.7% by 2022. Nigeria, like Ghana, had fluctuating exports, peaking at 13.5% in 2016 before declining to 4.3% by 2022. This data reflects the dynamic nature of the global secondhand clothing trade, with African markets playing an increasingly important role in China's export destinations.

Table 5. China's Secondhand Clothing Export Destinations.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Kenya	6.3%	10.3%	15.0%	13.2%	12.3%	19.2%	16.0%	14.0%	15.8%	16.1%
Angola	1.3%	5.7%	5.2%	9.2%	15.5%	12.1%	10.7%	10.5%	13.8%	10.1%
Tanzania	5.5%	5.8%	9.9%	8.2%	6.9%	6.4%	7.8%	6.9%	11.0%	8.2%
Ghana	7.9%	3.3%	5.1%	9.7%	7.0%	6.3%	5.0%	8.4%	5.5%	4.7%
Nigeria	3.3%	4.4%	4.9%	13.5%	6.5%	8.7%	7.4%	7.6%	6.7%	4.3%

The UK's secondhand clothing export destinations exhibited notable shifts in market shares as seen in Table 6. Ghana, the largest recipient, saw its share fluctuate, peaking at 22.6% in 2020 before dropping to 14.5% in 2022. Poland consistently remained a significant destination, with its share ranging from 10.2% in 2016 to 14.0% in 2021, maintaining a relatively stable presence throughout the decade. Ukraine experienced a decline in its share over the years, with a notable peak of 9.7% in 2018 before dropping to 9.9% in 2022. Pakistan's share, after peaking in 2018 at 12.6%, sharply declined in the later years, falling to just 4.5% by 2022. Nigeria, which saw gradual increases in its share until 2019, experienced a sharp rise in 2020 to 10.9%, before dropping back to 3.2% in 2022.

Table 6. United Kingdom's Secondhand Clothing Export Destinations.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Ghana	10.6%	8.9%	13.7%	20.2%	19.8%	17.9%	17.2%	22.6%	20.3%	14.5%
Poland	12.0%	12.9%	12.2%	10.2%	11.4%	12.8%	10.5%	11.4%	14.0%	13.5%
Ukraine	8.7%	8.9%	8.0%	6.7%	8.4%	9.7%	9.1%	9.8%	14.8%	9.9%
Pakistan	10.0%	10.1%	8.3%	9.8%	11.2%	11.7%	12.6%	3.4%	2.6%	4.5%
Nigeria	1.6%	2.3%	2.6%	6.4%	8.1%	8.9%	10.4%	10.9%	8.4%	3.2%

Germany's secondhand clothing exports presented in Table 7, exhibited a relatively stable distribution across various destinations from 2013 to 2022. Poland was consistently the largest recipient, with its share ranging from 11.4% in 2013 to 18.5% in 2021 before slightly dropping to 18.4% in 2022. The Netherlands maintained a steady presence as the second-largest destination, with its share varying between 8.7% and 11.3% over the years. The Russian Federation, which accounted for 4.7% of Germany's secondhand clothing exports in 2013, experienced a decline, particularly after 2021, when its share plummeted to just 0.8% by 2022. Ukraine's share fluctuated between 3.1% and 4.5%, showing some consistency despite minor annual shifts. Italy remained a steady but smaller market, with its share ranging between 3.3% and 3.9% over the decade, reflecting a stable demand for secondhand clothing.

Table 7. Germany's Secondhand Export Market Destination.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Poland	11.4%	12.0%	13.9%	14.5%	12.9%	10.0%	12.6%	13.0%	18.5%	18.4%
Netherlands	9.8%	9.5%	8.7%	9.7%	9.8%	10.4%	10.5%	11.3%	10.2%	10.6%
Russian	4.7%	4.3%	3.3%	3.9%	6.0%	5.1%	5.2%	5.0%	4.7%	0.8%
Ukraine	4.5%	3.6%	4.0%	4.5%	4.2%	4.0%	3.0%	3.4%	3.9%	3.1%
Italy	3.3%	3.8%	3.8%	3.9%	3.8%	3.9%	3.7%	3.4%	3.3%	3.9%

South Korea's secondhand clothing export destinations saw varying trends from 2013 to 2022, as presented in Table 8. Malaysia was the largest recipient, with its share steadily increasing over the years, from 9.9% in 2013 to 29.3% in 2022, averaging 14.3% over the period. Cambodia, while consistently important, experienced fluctuations, reaching its peak of 15.9% in 2014 but settling at 4.5% in 2022, averaging 11.4%. The Philippines had a fairly stable share, peaking at 12.1% in 2016 and maintaining a steady range between 4.3% and 12.9%, averaging 9.2%. India's market share also grew, particularly in the later years, peaking at 14.0% in 2022 and averaging 9.0%. Nigeria's share varied, fluctuating between 4.7% and 10.1%, with its highest share of 10.7% in 2020, averaging 7.6%. Thailand, a smaller market, experienced steady growth, reaching 10.8% in 2019 before dropping slightly to 8.9% in 2022, averaging 7.0%.

Table 8. South Korea's Secondhand Clothing Export Destinations.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Malaysia	9.9%	12.8%	10.0%	7.4%	9.6%	6.6%	11.3%	16.3%	30.0%	29.3%
Cambodia	10.2%	15.9%	14.4%	13.2%	11.5%	14.1%	12.6%	11.4%	5.7%	4.5%
Philippines	5.5%	4.3%	6.1%	12.1%	12.9%	12.3%	11.8%	9.6%	9.1%	8.3%
India	4.6%	6.5%	7.8%	7.7%	6.8%	9.1%	11.4%	11.1%	11.2%	14.0%
Nigeria	6.8%	7.1%	4.7%	5.1%	8.7%	10.1%	9.3%	10.7%	8.3%	5.4%
Thailand	1.7%	1.7%	3.6%	5.2%	7.9%	10.5%	10.8%	10.7%	8.5%	8.9%

The UAE's secondhand clothing export destinations saw considerable variation from 2013 to 2022. Kenya was a major recipient, with its share fluctuating significantly, reaching as high as 17.9% in 2013 before experiencing a decline in the following years. However, by 2021, it rebounded to 20.2%, averaging 17.2% over the period. The United Republic of Tanzania also experienced a similar pattern, initially contributing 10.6% of the exports in 2013, but dropping to a low of 0.4% in 2017 before rising again to 20.0% in 2021, averaging 13.5%. Thailand's share grew steadily over the years, from 4.5% in 2013 to 11.1% in 2022, reflecting a consistent upward trend in their secondhand clothing imports. The Philippines had a very small but growing share, increasing from 0.8% in 2013 to 5.0% by 2022. Lastly, Angola's share started at 5.8% in 2013 but dwindled significantly in the years that followed, with a peak of 3.5% in 2022.

In the global commerce of secondhand clothing, Pakistan is a key player, as the largest importer and one of the top exporters. From 2013 to 2022, Pakistan's secondhand clothing export destinations shifted notably. Kenya consistently ranked as the leading recipient, although its share of imports fluctuated over the years. In 2013, Kenya accounted for 19.0% of Pakistan's secondhand clothing exports, and despite a decline in 2017, it remained a major market, with 17.6% in 2022. Mozambique, another key market, showed steady growth over the years, reaching 14.1% by 2022, up from 8.3% in 2013. Similarly, the United Republic of Tanzania experienced a rise in its share of imports, peaking at 18.0% in 2021 after starting at 11.2% in 2013. Thailand, another significant destination, had a fluctuating yet upward trajectory, reaching 11.3% in 2022 after starting at 4.8% in 2013. Angola, while contributing to the overall export figures, saw a decline, with its share dropping from 6.2% in 2013 to 3.6% in 2022.

Pakistan's export and import destinations are provided in Table 9. As for Pakistan's secondhand clothing imports, the United States was the largest supplier over the years. In 2013, 43.95% of Pakistan's secondhand clothing imports came from the USA, and this figure rose to 53.47% by 2022, reflecting a strong and increasing reliance on American exports. The UK consistently supplied a significant portion, though its share declined from 9.81% in 2013 to 4.57% in 2022. South Korea contributed steadily, maintaining a share between 7.35% and 3.25% throughout the decade. Canada and Germany also played roles in supplying secondhand clothing to Pakistan, with Canada providing between 4.64% and 6.91%, and Germany's share gradually decreasing from 9.03% in 2013 to 2.42% in 2022.

Table 9. Pakistan's Secondhand Clothing Export and Import Destinations.

		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Exports To	Kenya	19.0%	17.1%	16.7%	10.5%	7.3%	6.1%	15.1%	19.4%	18.2%	17.6%
	Mozambique	8.3%	9.1%	7.0%	5.7%	3.3%	3.4%	7.4%	11.9%	13.2%	14.1%
	Tanzania	11.2%	10.8%	10.5%	6.6%	6.4%	8.5%	10.3%	15.8%	18.0%	13.8%
	Thailand	4.8%	7.7%	8.4%	10.8%	11.0%	14.4%	11.7%	9.7%	9.2%	11.3%
	Angola	6.2%	9.6%	4.7%	0.9%	2.5%	4.8%	4.3%	3.1%	2.5%	3.6%
Imports From	USA	43.95%	38.78%	37.59%	42.51%	42.94%	45.04%	30.01%	28.59%	50.18%	53.47%
	UK	9.81%	12.59%	12.64%	10.74%	9.76%	9.52%	10.39%	6.87%	3.95%	4.57%
	South Korea	7.35%	8.28%	9.33%	8.87%	8.49%	6.45%	7.03%	7.40%	3.98%	3.25%
	Canada	4.64%	6.33%	5.55%	5.30%	6.91%	5.38%	4.61%	4.69%	6.15%	5.72%
	Germany	9.03%	7.16%	6.70%	6.26%	5.14%	4.31%	5.46%	5.29%	3.01%	2.42%

4.2.1. Trade Intensity Index (TII)

The TII for the top 5 exporters revealed interesting trends and showcased in Table 10. For the USA, the TII with Canada remained consistently high, averaging between 7.3 and 7.9 throughout the period. Trade with other countries such as Guatemala and Honduras showed moderate values, ranging from 4.4 to 5.7, while Nicaragua's TII fluctuated between 2.4 and 3.6. China's trade intensity with Angola, Kenya, and Nigeria remained relatively stable, with values between 1.4 and 2.4. The Philippines and Tanzania showed higher intensity, with values of 2.4 and above by 2022, reflecting strong trade links.

The UK demonstrated high TII values with Ghana and Nigeria, maintaining values around 1.3 to 1.7. Pakistan and Poland showed relatively lower indices, fluctuating between 0.5 and 1.0, while trade with Ukraine remained more moderate. Germany's trade intensity with Italy, Poland, and the Netherlands was significant, with values above 1.8 and reaching 3.7 for Poland. However, trade with

the Russian Federation and Ukraine showed lower values, particularly in 2022 for Russia at 1.08. For South Korea, the TII with Malaysia and India showed steady values, ranging between 1.1 and 1.4. The Philippines displayed a notably high TII, peaking at 3.1, while trade intensity with Cambodia and Thailand remained more moderate, hovering around 1.

Table 10. Trade Intensity Index for the Top Five Secondhand Clothing Exporters and their Trading Partners.

Exporting Nations	Trade Partners	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
USA	Canada	7.91	7.90	7.36	7.34	7.49	7.54	7.30	7.54	7.81	7.14
	Chile	2.92	2.88	2.78	2.49	2.48	2.50	2.64	2.70	2.47	2.80
	Guatemala	4.40	4.43	4.00	4.23	4.65	4.44	4.36	4.37	4.51	4.41
	Honduras	5.74	5.97	5.16	5.08	5.16	5.28	5.12	5.02	5.39	5.24
	Nicaragua	2.44	2.08	2.23	2.54	2.70	3.14	3.21	3.06	3.57	3.58
China	Angola	1.36	1.66	1.42	1.08	1.45	1.66	1.60	1.53	1.68	1.79
	Kenya	1.57	1.82	2.15	2.53	2.16	2.17	2.02	2.00	1.86	2.18
	Nigeria	2.07	2.32	2.42	2.42	2.57	2.48	2.61	2.59	2.47	2.23
	Philippines	1.72	1.76	1.92	2.13	2.06	2.08	2.35	2.38	2.41	2.39
	Tanzania	2.04	2.31	2.32	2.51	2.28	2.15	2.11	2.24	2.26	2.37
United Kingdom	Ghana	1.18	1.30	1.05	1.98	1.31	1.26	1.07	1.02	1.21	1.19
	Nigeria	1.68	1.57	1.39	1.63	1.56	1.65	1.40	1.29	1.30	1.15
	Pakistan	0.71	0.78	0.65	0.70	0.65	0.72	0.77	0.62	0.61	0.51
	Poland	0.91	1.02	0.96	1.05	1.08	1.01	0.99	0.97	0.74	0.89
	Ukraine	0.40	0.40	0.43	0.49	0.42	0.47	0.46	0.43	0.59	0.50
Germany	Italy	1.98	1.91	2.01	1.99	1.99	2.05	2.02	2.09	2.18	2.16
	Netherlands	1.90	1.87	1.98	2.02	1.96	1.96	1.93	2.03	2.05	2.01
	Poland	3.40	3.48	3.51	3.44	3.37	3.36	3.39	3.46	3.53	3.68
	Russia	1.96	1.70	1.69	1.65	1.71	1.69	1.64	1.56	1.60	1.08
	Ukraine	1.27	1.14	1.18	1.26	1.29	1.18	1.22	1.25	1.31	1.58
South Korea	Cambodia	0.97	1.14	1.04	1.01	0.87	0.74	0.84	0.74	0.57	0.51
	Malaysia	1.28	1.12	1.27	1.37	1.23	1.31	1.42	1.53	1.33	1.28
	Philippines	3.00	3.09	2.59	2.20	2.69	2.94	2.22	2.05	2.14	2.39
	India	1.15	1.23	1.20	1.25	1.27	1.26	1.39	1.35	1.14	1.25
	Thailand	1.33	1.30	1.11	1.20	1.16	1.24	1.30	1.24	1.20	1.11

4.2.2. Index of Export Market Penetration (IEMP)

The IEMP values for the top 11 secondhand clothing export nations for the years 2013 to 2022 are presented in Figure 3. In 2013, the USA had a very high IEMP value of 0.975, which slightly increased to 1.000 by 2021 and 2022, indicating that the USA expanded its export reach to almost every country importing secondhand goods. China, in contrast, had an IEMP value of 0.549 in 2013, which gradually increased over the years, reaching 0.839 in 2022. The UK's performance remained strong, with values ranging from 0.858 in 2013 to 0.953 in 2022, reflecting its continued penetration into global markets. Germany's IEMP value was consistently high, peaking at 0.846 in 2013 and gradually declining to 0.765 in 2022. South Korea experienced a steady rise from 0.611 in 2013 to 0.728 in 2021, before dipping slightly to 0.678 in 2022.

Among emerging markets, Netherlands showed a peak IEMP of 0.987 in 2015 but dropped slightly to 0.832 in 2022, still reflecting a strong export presence. Poland improved steadily from 0.586 in 2013 to 0.818 in 2022, marking its growing integration into global trade networks. The UAE, starting with an IEMP value of 0.481 in 2013, made significant progress, achieving 0.872 in 2022, reflecting its growing export market penetration. Italy maintained moderate values, ranging between 0.65 and 0.74, with a slight increase to 0.731 in 2022, showing stable penetration efforts. Canada exhibited minimal variation, with values ranging from 0.603 in 2019 to 0.709 in 2013, reflecting a steady export market presence. Pakistan showed fluctuating performance, with values ranging from 0.327 in 2014 to 0.450 in 2022, indicating some improvement in global export reach over time. Covid-19 did impact the secondhand clothing exports as the top exporting nations did see a decline in IEMP values in 2019.
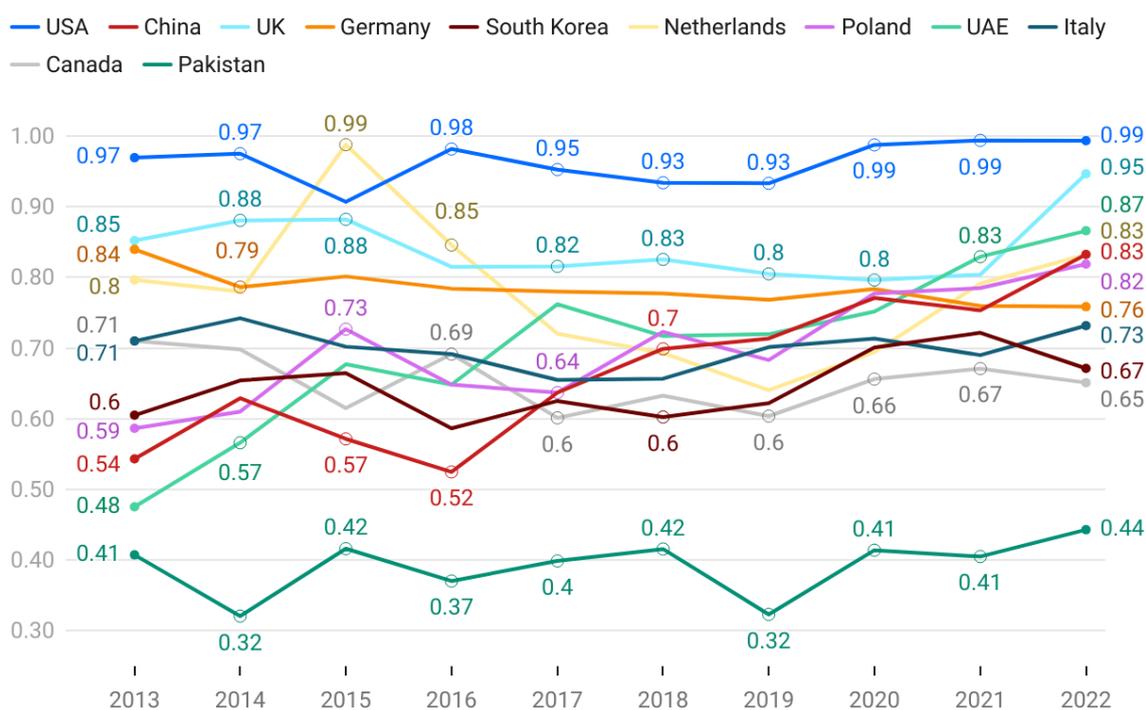
Figure 3. Export Market Penetration of Secondhand Clothing Export Nations.

4.2.3. Unit Export Values

Figure 4 provides unit values for secondhand clothing exports, measured in dollars per kilogram. The data spans the years 2013 to 2022 for top 11 secondhand clothing export countries, revealing trends in relative prices for this product category. The USA showed steady unit values, starting at $0.633/kg in 2013, peaking at $0.823/kg in 2020, and ending at $0.763/kg in 2022. China exhibited fluctuations, beginning at $0.807/kg in 2013, dropping sharply to $0.538/kg in 2014, and peaking at $0.984/kg in 2018. By 2022, China's unit value settled at $0.878/kg. The UK started with relatively high unit values at $1.102/kg in 2013 but dropped down to $0.577/kg in 2016, then increased to $0.916 by 2022/kg.

South Korea demonstrated significant volatility, with values dropping to $0.164/kg in 2016 but increasing steadily to $0.867/kg by 2022. Germany also experienced a decline in unit values, from $0.756/kg in 2013 to $0.536/kg in 2018, before stabilizing at $0.827/kg in 2022. The UAE showed irregular trends, falling to $0.11/kg in 2019 but rising to $0.978/kg in 2022. The Netherlands maintained higher unit values compared to many countries, starting at $1.154/kg in 2013, peaking at $1.067/kg in 2021, and ending slightly lower at $1.025/kg in 2022. Poland exhibited an upward trend with notable increases, peaking at $1.163/kg in 2020 before stabilizing at $0.930/kg in 2022. Italy showed moderate variability, beginning at $0.819/kg in 2013 and concluding at $0.700/kg in 2022,

while Canada displayed lower values, with fluctuations between $0.445/kg in 2014 and $0.768 in 2022/kg. Pakistan exhibited notable volatility, particularly with an extreme low of $0.10/kg in 2016, before recovering to $1.064/kg in 2022. Unit value prices for Secondhand clothing exports saw dramatic decline in the 2019, and can be attributed to the Covid-19 effects.
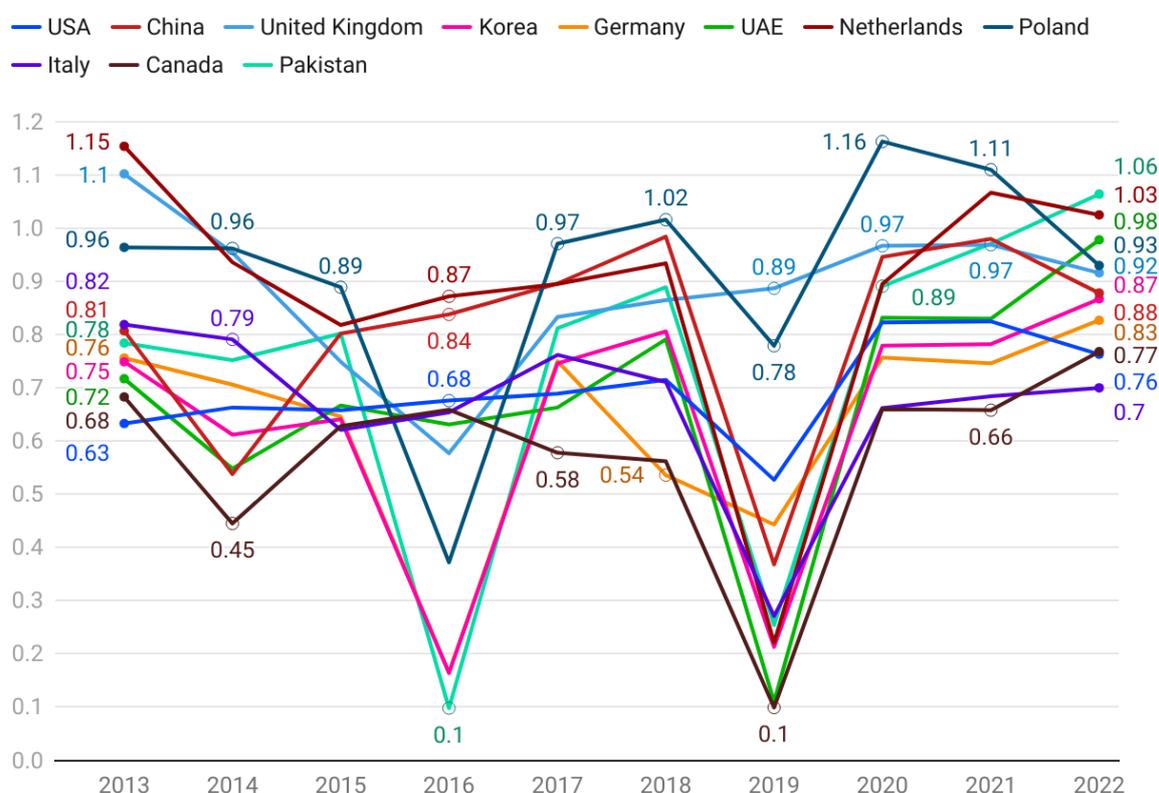

Figure 4. Unit Values ($/kg) of Exports for Secondhand Clothing Export Nations.

5. Conclusions

The analysis of secondhand clothing exports from 2013 to 2022 highlights the dynamic shifts in global trade patterns within this sector. The United States, China, and the United Kingdom remain dominant players, with the UAE and Pakistan emerging as rapidly growing exporters, as evidenced by their high CAGRs. The RCA, Dynamic RCA, and RSCA indices further underscore the evolving comparative advantages, showcasing countries like the UAE gaining ground while others, such as Germany and Canada, face declining competitiveness. The UAE and Pakistan, though historically smaller players, showcased remarkable growth rates, underscoring their potential to reshape the global secondhand clothing trade landscape. Export destinations reveal a diverse range of trading partners, reflecting the global interconnectedness of the secondhand clothing market.

Despite their historical dominance, traditional exporters such as the UK, Germany, and South Korea faced declining market shares and export competitiveness. Factors such as market saturation, shifting consumer demand, and evolving trade policies likely contributed to their diminishing positions. These trends highlight the need for these nations to innovate and adapt to changing global trade dynamics to maintain relevance in the secondhand clothing export market. Meanwhile, the growth of emerging exporters such as Pakistan and the UAE signals a diversification of global secondhand clothing markets. Pakistan's dual role as a major importer and exporter demonstrates the potential for creating closed-loop systems, where secondhand clothes gets upcycled and refurbished.

Pakistan's and the UAE's exceptional growth in comparative advantage metrics, particularly in RCA and RSCA, demonstrates their strategic positioning within the secondhand clothing industry. Conversely, the decline of key exporters like Germany and the UK suggests challenges in sustaining

competitiveness. The dynamic RCA findings reveal that adaptability and market diversification are critical for long-term success in this sector.

Moreover, the Trade Intensity Index and Export Market Penetration metrics provide deeper insights into trade relationships and market reach. The United States leads in export relationships, supported by strong trade intensity with nearby countries. Meanwhile, China, the UK, and South Korea maintain robust trade networks in distinct regions. The increasing importance of African nations for exporters like China, the UAE, and Pakistan highlights the continent's growing role in the secondhand clothing trade. Moreover, trends in export market penetration, as evidenced by the IEMP, suggest that countries expanding their reach across diverse markets are better positioned to navigate fluctuations in global demand and trade policies. This comprehensive evaluation underscores the nuanced dynamics of the secondhand clothing trade and provides a foundation for future strategies to strengthen global competitiveness in this sector.

The study makes significant contributions to the field by providing a comprehensive analysis of global trade dynamics in the secondhand clothing market over a decade. It employs indices like RCA, Dynamic RCA, RSCA, TII, IEMP, and Unit Values, offering a robust framework to evaluate the competitive advantages and bilateral trade relationships among major exporters. By identifying emerging players like the UAE and Pakistan, the research highlights shifts in global trade patterns and trends. Finally, the findings provide actionable insights for exporters, traders, and policymakers, emphasizing market-specific opportunities and strategies to expand the secondhand clothing global trade networks.

The research has important implications for various stakeholders. Policymakers in leading exporting countries can leverage the findings to design strategies that enhance their competitive advantages, particularly for countries experiencing a decline in trade performance. The study also highlights market opportunities and strategic trade partnerships for emerging exporters like Pakistan and the UAE. By identifying these opportunities, stakeholders can address global challenges such as waste reduction and promote circular fashion practices. Additionally, the analysis underscores the need for equitable economic development, suggesting that countries with declining comparative advantages could benefit from targeted investments or collaborations to boost their competitiveness.

The study's findings have several notable limitations. It primarily relies on trade data from 2013 to 2022 for the HS6309 product category, which may not fully capture informal trade flows or recent changes in the secondhand clothing market. Additionally, it focuses on formal export statistics, potentially overlooking significant regional dynamics and gray market contributions. The analysis does not consider the influence of economic policies, trade restrictions, or global events like the COVID-19 pandemic, which could impact trade patterns. Furthermore, the environmental and ethical aspects of secondhand clothing trade, such as waste management and labor conditions, are not explored. Lastly, while the study examines export trends in detail, it provides limited insights into consumer demand, or recycling's role in shaping the market.

Data Availability Statement: The original data presented in the study is publicly available from the United Nations Commodity Trade Database (UN Comtrade) and the World Bank's World Integrated Trade Solution (WITS) Database. Both sources provide access to international trade data classified under the Harmonized System (HS) nomenclature.

Conflicts of Interest: The authors declare no conflicts of interest.

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