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Marketing channel assessment of natural rubber: Insights from Kanyakumari district, Tamil Nadu

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Abstract

The study investigates the marketing dynamics of natural rubber in Kanyakumari district, Tamil Nadu, a traditional region for rubber cultivation in India. Utilizing a multistage random sampling method, data were collected from 150 respondents, including 120 rubber growers and 30 intermediaries, through structured questionnaires and personal interviews conducted between November 2023 and August 2024. The research aims to map the value chain of natural rubber, analyze marketing costs, margins and price spreads and identify production and marketing constraints faced by farmers. The findings revealed four primary marketing channels: direct sales to primary dealers, rubber producer societies, collection agents and processing units. Each channel exhibited distinct marketing costs and efficiencies; notably, channels involving direct sales to dealers were more cost-effective for producers compared to those utilizing collection agents. However, intermediaries achieved higher margins in the latter. Key constraints identified include adverse weather conditions, fragmented landholdings, high production costs, lack of government subsidies and inadequate access to technology. Marketing challenges such as poor standardization and grading practices exacerbate price volatility and reduce farmers' earnings. The study emphasized the need for improved marketing strategies and infrastructure to enhance the profitability of smallholder rubber farmers. By addressing these constraints through targeted interventions, stakeholders could foster a more sustainable and economically viable natural rubber sector in Kanyakumari district, ultimately benefiting the livelihoods of thousands reliant on this critical agricultural industry.

Keywords

Kanniyakumari; marketing channel; marketing efficiency; natural rubber; production efficiency; value chain

Introduction

Natural rubber, a polymer derived from the latex of the *Hevea Brasiliensis* tree, is grown predominantly in South and Southeast Asian countries like Vietnam, India, Malaysia, Indonesia and Thailand (1). The product is a versatile and electrically insulating material used in various industries, including automotive, consumer and construction. The natural rubber market is classified based on type, industry, application and region. Thailand is the primary producer of natural rubber, accounting for over 90% of the world's total rubber production in 2020. China is the major consumer, followed by India, the USA, Thailand, Japan, Indonesia, Malaysia, Brazil, Korea and Vietnam (2). Malaysia, Thailand and Indonesia are the top exporters, accounting for 79.6% of the total export value. In 2022, China, the US,

Malaysia, Japan and India were the top five countries importing natural rubber. Turkey, South Korea, Poland and Spain are the fastest-growing markets since 2021. The global market for natural rubber is projected to grow by 4.7% CAGR from 2024 to 2029 (1).

India has 8,23,000 hectares of rubber planted across multiple states, with the majority in traditional regions. The remaining states are non-traditional regions, except for Kerala and Tamil Nadu (3). India can produce about one million tonnes of natural rubber annually, with 91% of the planted area and 92% made by smallholder farmers (4). The Indian government has increased funding for the Sustainable & Inclusive Development of Natural Rubber Sector (SIDNRS) and the Rubber Plantation Development Scheme (RPDS). These initiatives aim to support rubber cultivation, planting material generation, productivity enhancement, formation of rubber producers' societies and rubber research and training (5).

Kanyakumari district in Tamil Nadu is the sole area in the state suitable for natural rubber cultivation, contributing 3% to India's total production. Covering 167,200 hectares, with 65,804 hectares dedicated to plantation crops, natural rubber accounts for 16.8% of the district's total area and 42.6% of its plantation area. Most plantations are concentrated in the Vilavancode and Kalkulam taluks, supporting over 50,000 individuals across the industry. A study on marketing channels and identifying gaps could enhance the sector's active participation and income generation. Limited studies have been conducted on the marketing of natural rubber in the district, but further research is needed to address the challenges and improve the situation in the plantation sector (6). The Kanyakumari area of Tamil Nadu, India, has seen a fall in interest in rubber plants, perhaps due to the underutilization of rubberwood, typically used for single-use purposes or as fuel. Research indicates that around 15% of the district's total farmed land for natural rubber is located inside reserve forests, most of which are controlled by public sector projects. It was found after investigating the district's rubber plantation workers' financial situation (7). According to Ashokkumar K. (2020), across all four of the research area's channels, producers' portion of the price paid by customers varied from 85% to 88% (7).

A multistage sample technique was used to examine natural rubber's price and marketing trends in the Kanyakumari district and a positive growth rate was discovered despite a fall (8). Small rubber producers experienced significant marketing challenges due to excessive transportation costs, payment delays, insufficient support from the Rubber Board and improper account maintenance. It was discovered that while Channel II in Gomati district is more efficient, Channel I in South Tripura district has superior marketing efficiency than Gomati district (8). Most rubber growers have adopted rubber cultivation techniques to a medium degree. Appropriate trainings and demonstrations are necessary to improve knowledge (9). The objectives of this study were threefold: first, to map the value chain of natural rubber in the Kanniyakumari district; second, to compute the marketing costs, margins, price spread and efficiency of the various marketing channels; and third, to identify the production and marketing constraints faced by natural rubber farmers in the study area. Through these objectives, the research aims to provide a comprehensive understanding of the natural rubber sector and its challenges, ultimately contributing to more effective strategies for improvement.

Materials and Methods

Sample design

The study on the marketing of natural rubber was conducted in the Kanyakumari district of Tamil Nadu, a traditional region for rubber cultivation in India, making it a relevant choice for this research. Sample respondents were selected using multistage random sampling, dividing the population into taluks and explicitly focusing on the rubber-growing taluks of Kalkulam, Vilavancode and Thovalai. One hundred fifty respondents were included, comprising 120 producers (40 from each taluk) and 30 intermediaries (10 from each taluk). The research employed a descriptive design, utilizing a well-structured questionnaire to gather data through surveys and personal interviews. Data collection occurred from November 2023 to August 2024, specifically in April, May and June 2024. Primary data included demographic details, costs incurred and constraints faced by respondents, while secondary data was sourced from various articles and websites to support the study's objectives.

Tools of analysis

The study utilizes descriptive statistics to comprehensively analyze the demographic characteristics of natural rubber producers in Kanyakumari district, focusing on critical factors such as age, family size, income levels, land area, cultivation costs and marketing expenses (10). It employs percentage analysis to assess price dynamics in the rubber market by calculating the price spread-the difference between consumer prices (Pp) and producer prices (Pf)-and determining the farmer's share in the consumer's rupee (Ps), which reflects the proportion of the price received by farmers. Additionally, the study evaluates marketing costs by aggregating expenses incurred by farmers and intermediaries, providing insights into the financial burdens of bringing rubber to market (11). After deducting associated costs, the marketing margin is analyzed to understand the net share retained by intermediaries. To gauge marketing efficiency, the study applies Acharya's approach and Shepherd's formula, which measure how effectively natural rubber products are transferred from producers to consumers at minimal costs (12, 13).

According to Acharya (2003), the marketing efficiency is calculated as shown in Equation 1.

$$ME = FP / (MC+MM) \qquad \text{Eqn. 1}$$

where,

ME–Marketing efficiency

FP–Prices received by the farmers

MC–Total marketing cost

MM–Net marketing margin

The economic efficiency of the marketing system can be measured as the ratio of the consumer price per unit of natural rubber to the marketing cost per unit. The higher the ratio, the higher the efficiency of the marketing system. The Shepherds' formula is used to assess the channel efficiency in selling natural rubber.

According to Shepherd, Marketing efficiency is measured by the ratio of the price spread paid by the consumer (total value of the products) to total marketing cost. Equation 2 shows the mathematical Equation for finding marketing efficiency using Shepherds' method.

$$ME = (V / I) - 1 \qquad \text{Eqn. 2}$$

where,

ME–Marketing efficiency

V–Value of goods sold

I–Total marketing cost

Furthermore, Garett's ranking technique identifies and ranks various constraints faced by producers and intermediaries in the rubber supply chain (14). The ranks are converted into percent positions using the Equation. 3.

$$\text{Percent position} = \frac{100 \times \Sigma (R_{ij} - 0.5)}{N_j} \qquad \text{Eqn. 3}$$

where,

R_{ij}–Ranking is given for the i^{th} factor by the j^{th} respondents

N_j–Number of variables ranked by j^{th} respondents.

Results and Discussion

Marketing channel of natural rubber

The channels of marketing of natural rubber identified in the study are given below;

Channel 1-Rubber growers, primary dealer, secondary dealer, manufacturers

Channel 2-Rubber growers, primary dealers, rubber producer societies, manufacturers

Channel 3-Rubber growers, collection agents, secondary dealers, manufacturers

Channel 4-Rubber growers, processing units, manufacturers

Rubber growers, mostly marginal farmers, take their products to the local dealers in the form of rubber sheets. The wholesalers collect the graded rubber sheets from the local dealers and further distribute them to the rubber products manufacturing companies. In another channel, local dealers take the graded rubber sheets to the rubber cooperatives existing in the district. The rubber growers also trade the rubber sheets directly to the wholesalers. The rubber in the form of latex, mainly from large landholdings and estates, is processed by the processing units that process the latex into rubber sheets or blocks and take them to the manufacturers of rubber products (15).

Cost of marketing

Marketing functions add value to the produce to be sold but also involve costs that ultimately impact the profitability of the sellers. The cost involved in moving the rubber from the point of production to the point of consumption, known otherwise as the cost of performing marketing functions, is discussed in this section.

Marketing cost of the rubber growers

The producers in the study area sell their produce through different channels. The cost incurred by the producers for one tonne includes the cost of preparation for the market, packaging, transportation, loading and unloading, commission and rejection loss. The data collected from the sample respondents for the channels are presented in Table 1. It is observed from Table 1 that the cost incurred by the rubber grower in the marketing of one tonne of natural rubber amounts to Rs.3055 in Channel 1 and Channel 2, Rs. 3572 in Channel 3 and Rs. 2828 in Channel 4. These costs incurred by the rubber growers are essential to prepare natural rubber for sale to the intermediaries. The variation in the above percentage is caused by the differences in transporting, loading and unloading charges. Transportation, loading, unloading and commission charges contribute to marketing costs (16). This is understandable as the producer must transport the goods to the primary dealers in the case of Channel 1 and 2, which are, in most cases, found near the place of production. In the case of Channel 3, as the collection agents themselves take care of transportation, loading and unloading, the cost of transportation is reduced. Still, the commission is higher in this case. In Channel 4, the product is traded from the producers as latex without processing into sheets. Therefore, the cost of preparation and packaging in the market is lower. The rejection loss is high in Channel 3 as the collection agents often leave out the rubber sheets that are not good enough. It may be expected that the producer will prefer a channel with less commission among the four channels. However, it was found from the answers furnished by the respondents that the marketing cost is less in Channel 1 and Channel 2 if the trade from the rubber growers happens in the form of rubber sheets. When trade occurs between the producers and the collection agents, the marketing cost is higher but more convenient. The marketing cost is less for the producers when the rubber is traded as latex without processing, but it is not viable for small-scale farmers. Channel choice impacts marketing costs, margins and producers' share of consumer price. Factors influencing channel selection include market considerations, product characteristics and producer preferences (17).

Table 1. Marketing cost of rubber growers

S. No.	Particulars	Channel 1	Channel 2	Channel 3	Channel 4
1	Preparation to market	678	678	678	424
2	Packaging	225	225	230	124
3	Transporting, loading and unloading	835	835	724	1152
4	Commission	437	437	917	525
5	Rejection loss	790	790	910	535
6	Miscellaneous	90	90	113	68
	Total	3055	3055	3572	2828

Marketing cost of intermediaries

The details of marketing costs incurred by the intermediaries, namely the primary dealer, secondary dealer, collection agents, rubber producer societies and processing units for one tonne of natural rubber, were collected from the respondents and presented in Table 2. Table 2 shows that the marketing cost of intermediaries was higher in Channel 1, followed by Channel 2, Channel 3 and Channel 4. The higher marketing cost in Channel 1 can be explained by the fact that the number of dealers in the channel is higher than that of the others, as it costs more among the agents. As Channel 4 comprises just one intermediary, the processing unit processes the latex and markets the rubber sheets to the consumer, reducing the cost. The involvement of collection agents in Channel 3 reduces the marketing cost of the channel. Research on agricultural marketing channels consistently shows that the number of intermediaries significantly impacts marketing costs and efficiency. Multiple studies across different crops and regions in India demonstrate that channels with fewer intermediaries have lower marketing costs and higher efficiency (16).

Price spread in natural rubber

The difference between the price paid by the consumer and the price received by the producer for an equivalent quality is known as the price spread. The study of price spread in natural rubber marketing is essential, as it reflects the producer's shares and different intermediaries. The price spread varies depending on the number of intermediaries involved in the marketing channel. Hence, the higher the number of intermediaries, the higher the price spread. Generally, the channel with the lowest price spread is preferred. The price spread has a decisive impact on the producers' profit margin. Hence, an attempt has been made to study the price spread. The costs incurred and margin earned by the various market intermediaries in different channels in the marketing of one tonne of natural rubber in the study area are presented in Table 3.

It could be inferred from Table 3 that the farmer receives the maximum share of the consumer's price in Channel 1 and 2 (84.14 per cent), followed by Channel 4 (79.89 per cent) and Channel 3 (78.41 per cent). This shows that the rubber sheets marketed by the farmers to the dealers were more productive than those collected by the collection agents in Channel 3. Channel 3 case was primarily followed for the convenience purpose of the farmers, but they were inefficient. The latex form traded to the processing units in Channel 4 provides a better share for the farmers than in Channel 3. The price spread and marketing margin of different Channels are provided in Table 4. Table 4 shows that the marketing margin was higher in Channel 3, followed by Channel 4, Channel 2 and Channel 1. This infers that the marketing margin was high, though the farmer's share in Channel 3 was less. This shows that the intermediaries fare better in this channel. The collection agents' model was found to be better productive from the intermediary point of view.

Table 2. Marketing cost of intermediaries

S. No.	Particulars	Channel	Primary Dealer	Secondary Dealer	Collection Agents	Rubber Producer Societies	Processing Units
1	Transportation, loading and unloading	Channel 1	810	1150	-	-	-
		Channel 2	895	-	-	900	-
		Channel 3	-	1150	755	-	-
		Channel 4	-	-	-	-	1025
2	Packaging	Channel 1	85	175	-	-	-
		Channel 2	85	-	-	170	-
		Channel 3	-	175	143	-	-
		Channel 4	-	-	-	-	170
3	Storage	Channel 1	255	380	-	-	-
		Channel 2	255	-	-	325	-
		Channel 3	-	380	90	-	-
		Channel 4	-	-	-	-	410
4	Staffing and administration	Channel 1	435	470	-	-	-
		Channel 2	435	-	-	480	-
		Channel 3	-	470	175	-	-
		Channel 4	-	-	-	-	525
5	Rejection and weight loss	Channel 1	310	225	-	-	-
		Channel 2	295	-	-	325	-
		Channel 3	-	225	50	-	-
		Channel 4	-	-	-	-	376
6	Miscellaneous	Channel 1	65	80	-	-	-
		Channel 2	65	-	-	75	-
		Channel 3	-	80	50	-	-
		Channel 4	-	-	-	-	90
7	**Total**	Channel 1	**1960**	**2480**	-	-	-
		Channel 2	**2030**	-	-	**2275**	-
		Channel 3	-	**2480**	**1263**	-	-
		Channel 4	-	-	-	-	**2596**

Table 3. Price received by stakeholders

S. No.	Stakeholder	Particulars	(Rs. / Tonnes)			
			Channel 1	Channel 2	Channel 3	Channel 4
1	Rubber grower	Gross price received	2,16,000	2,16,000	2,02,000	2,05,000
		Marketing cost	3055	3055	3572	2828
		Net price received	2,12,945 (84.14)	2,12,945 (84.14)	1,98,428 (78.41)	2,02,172 (79.89)
2	Primary dealer	Gross price received	2,35,536	2,35,536		
		Marketing cost	1960	2030		
		Net price received	2,33,576 (92.30)	2,33,506 (92.27)		
4	Collection agents	Gross price received			2,34,352	
		Marketing cost			1263	
		Net price received			2,33,089 (92.10)	
3	Secondary dealer	Gross price received	2,43,281		2,43,281	
		Marketing cost	2480		2480	
		Net price received	2,40,801 (95.15)		2,40,801 (95.15)	
5	Rubber producer societies	Gross price received		2,42,456		
		Marketing cost		2275		
		Net price received		2,40,181 (94.91)		
6	Processing units	Gross price received				2,36,000
		Marketing cost				2596
		Net price received				2,33,404 (92.23)
7	Price paid by the industrial consumer/ manufacturer		**2,53,075 (100.00)**	**2,53,075 (100.00)**	**2,53,075 (100.00)**	**2,53,075 (100.00)**

Table 4. Price spread of marketing channels

S. No.	Particulars	Channel 1	Channel 2	Channel 3	Channel 4
1	Consumer price	2,53,075	2,53,075	2,53,075	2,53,075
2	Producers price	2,12,945	2,12,945	1,98,428	2,02,172
3	Price–spread	40130	40130	54647	50903
4	Marketing cost	7495	7360	7315	5424
5	Marketing margin	32635	32770	47332	45479

Channel efficiency

Channel efficiency refers to the effectiveness or competence with which intermediaries in the channel perform their designated functions. It is directly related to the cost of moving goods from the producer to the consumer and the level of service offered. A reduction in marketing costs without a decrease in consumer satisfaction indicates an improvement in efficiency. A higher level of consumer satisfaction at higher marketing costs might have resulted from increased efficiency if the additional cost is incurred on the marketing process. However, a change that reduces cost and consumer satisfaction may not indicate increased channel efficiency. In the present study, the channel efficiency of the different channels has been studied using Shepherds' and Acharyas' methods.

Acharyas' approach

Table 5 shows that, when calculated by Acharya's Approach, the channel efficiency was higher in Channel 1 and Channel 2, followed by Channel 4 and Channel 3. This approach analyzed the channel efficiency from the producer's point of view. So, when considering the producer, the channel efficiency was higher in Channel 1 and Channel 2 as they got the highest share of the consumers' price.

Shepherd's method

Table 6 shows that, when analyzed using Shepherd's method, channel efficiency was higher in Channel 4 than in Channel 3, Channel 2 and Channel 1. This approach considers all the marketing costs involved in the channel. Hence, all the stakeholders in the channel were considered for this model. Both approaches show different efficient channels. The differences in channel efficiency estimates using Acharya's and Shepherd's models stem from their unique calculation methods, focus on intermediaries and sensitivity to market conditions. These factors contribute to varying assessments of which marketing channels are efficient under each model. Understanding these distinctions is crucial for stakeholders aiming to optimize marketing strategies in agricultural contexts (18). Direct producer -to-consumer channels or those with minimal intermediaries exhibit the highest marketing efficiency and producer's share in the consumers' rupee. Conversely, channels involving multiple intermediaries, such as village traders, wholesalers and retailers, incur higher marketing costs and lower efficiency (16,19)

Table 5. Channel Efficiency by Acharyas' approach

S. No.	Particulars	Channel 1	Channel 2	Channel 3	Channel 4
1	Farmer net price (Rs. / kg)	212.94	212.94	198.42	202.17
2	Total marketing Cost (Rs. / kg)	7.49	7.36	7.31	5.42
3	Net marketing margin	32.63	32.77	47.33	45.47
4	Channel efficiency	5.30	5.30	3.63	3.97

Table 6. Channel Efficiency by Shepherds' Method

S. No.	Particulars	Channel 1	Channel 2	Channel 3	Channel 4
1	Consumer price (Rs. / kg)	253.07	253.07	253.07	253.07
2	Total marketing Cost (Rs. / kg)	7.495	7.360	7.315	5.424
3	Channel efficiency	32.76	33.38	33.59	45.65

Constraints faced by rubber growers in the production of natural rubber

The producers of rubber face several constraints both in the production and marketing of natural rubber. In the production of natural rubber, the producers face constraints like labour constraints, climate and weather conditions, cost constraints, lack of subsidy from the government for rubber production unlike other crops, accessibility to newer technologies in the market and the predominant smaller land holdings. Here in this study, the constraints faced by the producers were assessed using the Garrett Ranking technique. Table 7 shows the various production constraints for natural rubber. It could be seen from Table 7 that after Garett ranking analysis, weather conditions were found to be the significant constraint (54.4), followed by small land fragments (57.64), labour shortage and high labour costs (54.4), production costs (53.77), lack of subsidy from the government (38.96) and accessibility to new technology (36.1). These constraints, particularly the weather constraints, affect agricultural productivity and the small land fragments limit economies of scale. Additionally, the cost constraints restrict the farmers' ability to invest in resources and hinder the adoption of efficient practices.

Weather-related challenges could be faced by promoting climate-smart practices and investing in weather monitoring systems (20). Land consolidation programs and cooperative farming initiatives should be encouraged to tackle small land fragments (21). Addressing labour shortages and high costs can involve promoting mechanization and providing skill development for agricultural workers. Reducing high production costs may require subsidies for inputs and support for organic farming practices. Increasing government subsidies and ensuring equitable distribution will help farmers financially while enhancing accessibility to new technology, which can be achieved through investment in research, demonstration centres and financial incentives (5). Together, these strategies can significantly improve agricultural productivity and resilience.

Table 7. Production constraints of natural rubber

S. No.	Constraints	Garetts' Score	Rank
1	Labour shortage and high labour costs	54.4	3
2	Weather conditions	59.12	1
3	Production costs	53.77	4
4	Lack of subsidy from government	38.96	5
5	Accessibility to new technology	36.10	6
6	Small land fragments	57.64	2

Constraints faced by rubber growers in the marketing of natural rubber

The significant marketing constraints faced by the rubber growers include changes in price, lack of market information regarding the rubber market, lack of proper storage for rubber sheets and latex, which results in losses, government policies and global market dynamics, no proper standardization and grading of rubber products, influence of intermediaries and marketing costs. Table 8 shows the various marketing constraints ranked. Table 8 shows that changes in prices were the major marketing constraint (Garett score-60.19), followed by no proper standardization and grading (58.91), the influence of intermediaries (50.51), marketing costs (49.43), lack of adequate storage (46.33), government policies and global market dynamics (45.8) and lack of market information (39.83). Significant constraint changes in price can impact farmers' profitability and planning. The ability to command better prices in the market was hindered due to the lack of proper standardization and grading of the products. Middlemen often distorted market prices, reducing farmers' earnings and straining farmers' finances. Post-harvest losses were another problem due to the lack of proper storage facilities.

These constraints emphasize the need for improved market access, better infrastructure and supportive policies to enhance farmers' profitability and sustainability in the agricultural sector. Establishing price stabilization mechanisms, such as minimum support prices, can help mitigate the impact of price fluctuations on farmers (22). Implementing standardized grading and quality control systems will enhance product consistency and marketability. The influence of intermediaries can be reduced by promoting direct-to-consumer sales models and supporting farmers' cooperatives (23). Additionally, efforts to lower marketing costs could include logistics and transportation infrastructure investment. Improving storage facilities is essential to minimize post-harvest losses while giving farmers access to market information through digital platforms, empowering them to make informed decisions. Finally, advocating for supportive government policies considering global market dynamics will help create a more favourable environment for farmers, enhancing their competitiveness and profitability (24).

Table 8. Marketing constraints of natural rubber

S. No.	Constraints	Garetts' Score	Rank
1	Changes in price	60.19	1
2	Lack of market information	39.83	7
3	Lack of proper storage	46.33	5
4	Government policies and global market dynamics	45.8	6
5	No proper standardization and grading	58.91	2
6	Influence of intermediaries	50.51	3
7	Marketing costs	49.43	4

Conclusion

The study on the marketing of natural rubber in Kanyakumari district highlights significant insights into the production, marketing channels and constraints rubber farmers face. The findings indicate that while the region is a traditional hub for rubber cultivation, challenges such as weather variability, small landholdings and high production costs hinder productivity and profitability. The analysis of various marketing channels reveals differing costs and efficiencies, with channels involving direct sales to primary dealers proving more advantageous for producers. However, intermediaries benefit from higher margins in other channels. The study underscores the need for enhanced marketing practices and infrastructure to improve the income of smallholder farmers. Addressing the identified constraints through targeted policies and support initiatives is crucial for fostering a sustainable and profitable natural rubber sector in Kanyakumari, thereby contributing to the livelihoods of thousands dependent on this vital agricultural industry.

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Authors' contributions

BT conceptualized the concept, employed methodology, collected data, performed statistical analysis and wrote manuscripts. DN did the literature review, defined the problem and derived the objectives and overall supervision of the work. RA contributed to editing the manuscript and conceptualizing the work. PM contributed by correcting formal analysis and with data analysis. KP assisted in the additional data collection and manuscript correction. All authors read and approved the final manuscript.

Compliance with ethical standards

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