Structure Analysis and Forecast of Traditional Chinese Medicine (TCM) Exports to Australia Under the Perspective of Product Segmentation

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Abstract: Traditional Chinese medicine (TCM), as a precious treasure of China has played an indispensable role in combating the COVID-19 epidemic, and receiving widespread attention and high regard. The Chinese pharmaceutical industry is gradually on the Road of Revival. However, there are still many bottlenecks restricting internationalization of TCM. How to specifically expand the international market, optimize product structure, and enhance the competitiveness of TCM exports are key and difficult issues. In light of this, this article selects "Australia" as a typical region with a solid foundation for the development of TCM, and innovatively classifies TCM products into four major categories based on its market access policies. By applying STATA to construct an ARIMA model, this study analyzes and forecasts the total export volume of TCM to Australia, the export structure of each category, and the export value for the Q_3 2024-Q_2 2026 based on data from 2016 to Q_2 2024. The results reveal that there is significant potential in the Australian market for the export of TCM. However, the export structure is heavily skewed towards primary products, with the growth rate of high-value-added products being relatively slow. The export of low value-added products is much higher than that of high value-added products. Consequently, it is recommended to increase investment in the research and development of TCM, promote the export of high-value-added products, strengthen the docking of international standards and export certification of products, reinforce brand building and bolster government guidance and talent cultivation to enhance the international competitiveness of the TCM.

Keywords: Internationalization of Traditional Chinese Medicine; Traditional Chinese medicine classification; New Requirements and Challenges; The export of Traditional Chinese Medicine; ARIMA Time Series Model.

1. Introduction

Traditional Chinese Medicine (TCM), a millennia-old treasure and distillation of Chinese cultural and philosophical insights, has been invigorated by its integration with contemporary medical practices. TCM classics like the "Treatise on Febrile and Miscellaneous Diseases" and the "Compendium of Materia Medica" have been instrumental in this integration, leading to innovative reforms in TCM. The COVID-19 pandemic in 2020 has also thrust TCM into the global limelight, underscoring its critical role in managing the health crisis.

China's President Xi Jinping affirmed the value of TCM, international market demand, and developmental potential, outlining strategic directions for its globalization and offering policy backing. The framework for TCM has seen continuous enhancement, with an improved policy environment and escalating governmental support. With the Belt and Road Initiative and favorable Chinese policies, TCM has seen a significant boost in exports, reaching 196 countries and regions worldwide.

Yet, amidst the rapid growth of TCM exports, numerous challenges persist. Common issues such as volatility in the international trade environment and shifts in China's foreign policies are compounded by specific constraints on TCM exports. Some scholars have analyzed and discussed the scale of Chinese medicine exports to Oceania and found that Chinese medicine trade still faces many obstacles [1]. For example, despite a diverse range of TCM exports, the trade is predominantly low-value-added materials and extracts [2]. These TCM products are low priced and offer slim profit margins, so the export threshold is relatively low. This leads to intense market competition with high volumes but low economic returns.

Cultural disparities have resulted in limited foreign consumer awareness and acceptance of TCM. Registration hurdles, frequent trade barriers, and a scarcity of TCM professionals with international expertise further impede exports [3]. Moreover, China's TCM sector lags in R&D and innovation, particularly concerning high-value-added products. This has led to a slow growth in high-value-added product exports and an imbalanced export structure.

Yuan.J&Tang.SL constructed a time series model to predict TCM export values, revealing a continued reliance on low-value-added products [4] . Huang, XX utilized a CMS model to empirically analyze the competitiveness of China's exports of TCM products to RCEP partner countries, reflecting the rapid growth of the export volume of and the continued growth of demand for TCM in the RCEP partner countries [5]. However, its export structure mismatched the demand structure of the importing country market. Therefore, it is subject to various restrictions from importing countries and needs to be optimized and adjusted. Fan, XJ used the stochastic frontier gravity model to analyze the factors affecting

the trade potential of pharmaceutical products from two aspects: core variables and trade inefficiency factors. He suggesting that TCM has seen significant growth under the Belt and Road Initiative, yet faces challenges related to time and government management levels [6] .

Overseas scholars have focused on understanding TCM's medicinal efficacy. Notable among them is Unschooled a German historian who has contributed significantly to the international understanding of TCM, emphasizing its cultural heritage and practical applications. He has made important contributions to the international dissemination of TCM and believes that future research needs to be more in-depth and innovative [7]. Chen. JK & Chen.TT delves into the pharmacological effects of TCM, particularly in metabolism regulation, immunity enhancement, and chronic disease treatment [8]. Fang&Wang highlighted TCM's promising future in Australia [9], while Bauer has pointed out the foundational role of acupuncture in TCM's acceptance in the U.S especially in promoting health [10]. Capodice&Jillian emphasizes the potential of TCM in COVID-19 treatment. believing that TCM, Chinese herbal medicine, and other formulas have significant biological activity and therapeutic potential [11] .

The research gap is that at present, scholars' research on Chinese medicine mainly analyzes the total amount of Chinese medicine exports, the main Chinese medicine export products, the value of Chinese medicine, the challenges faced by exports, etc. However, few scholars explore the structural problems of Chinese medicine exports from the perspective of product classification. Therefore, this paper takes a new perspective and divides Chinese medicine into four categories according to Australia's market access policy, reflecting different added values. They are "Chinese patent medicine (low value-added products), Chinese herbal medicines (low value-added products), health products (high value-added products), extracts (low value-added products)".It examines the export dynamics of TCM products in Australia, including composition, structure, and trade data. A time-series model forecasts export values from 2024 to 2026, identifying products with export potential and challenges in the Australian market, and offers targeted strategies.

Australia (AUS)'s selection as a case study is significant. As the first country to regulate TCM and a PIC/S member and has mutual recognition treaties with over 20 European countries. The growing acceptance and demand for TCM in Australia make it a crucial market for TCM's internationalization. The paper's findings are instrumental for optimizing TCM's export structure, enhancing its global competitiveness, and fostering sustainable industry growth. It provides actionable recommendations for government strategies and promotes the international spread of TCM culture, facilitating innovative development through a deep understanding of market demands and industry practices.

2.Current status of TCM exports
2.1 Overview of the TCM exports
Traditional Chinese Medicine (TCM) represents a legacy and a source of pride for the Chinese healthcare system. Since the 1978 reforms, TCM has seen rapid growth in China. From 2019 to 2022, the cultivation area for TCM materials has been on an upward trajectory (Figure 1), laying a robust foundation for the industry's sustainable development. Concurrently, TCM's global reach has been expanding, with both export volumes and product diversity on the rise. According to the China Chamber of Commerce for Import and Export of Medicines and Health Products, in 2022, TCM exports amounted to $56.9 billion, boasting a compound annual growth rate of 6.8%. By the first quarter of 2024, TCM export values had already reached $12.85 billion.

The categories of TCM products exported are also constantly expanding. From traditional Chinese herbal slices and plant extracts to modern Chinese patent medicines, Chinese medicine preparations, and various health food or medicine products based on traditional Chinese medicine combined with modern technology. This diversification is making TCM increasingly popular in international markets.

Planting area of medicinal herbs/thousand hectares

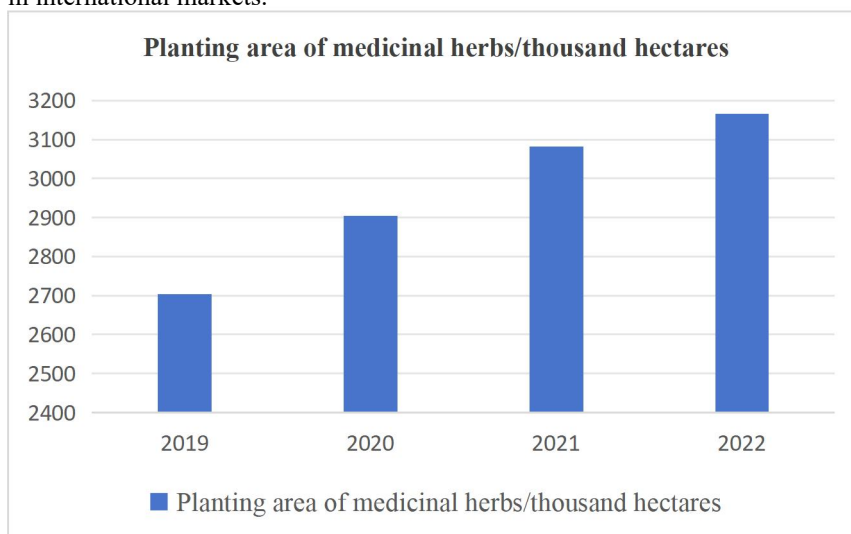■ Planting area of medicinal herbs/thousand hectares

Figure 1: Seed Area of Medicinal Materials (thousand hectares) from 2019 to 2022

Data Source: National Bureau of Statistics

2.2 Current status of TCM exports to Australia
China's strategic initiatives have provided substantial policy backing for TCM's internationalization. Taking herbal

extracts as an example, in 2015, exports to Australia were valued at only $17.845 million. Following the signing of the China-Australia Free Trade Agreement and the joint participation in the "Regional Comprehensive Economic Partnership Agreement" (RCEP) in November 2020, trade in TCM between China and Australia has been stimulated. By 2023, the export value of extracts to Australia had surged to $38.067 million.

According to the export data on the official website of the Customs of the People's Republic of China, China's exports to Australia are mainly plant extracts, such as liquorice juice and extract, hop juice and extract, and other plant juices and extracts. Chinese health products follow, with major products including fresh royal jelly, beeswax, and royal jelly preparations. The COVID-19 pandemic has led to increased global demand for TCM, as recognized by the World Health Organization. The current structure of China's exports of Chinese medicine products is still heavily weighted towards low-value-added products such as Chinese medicinal materials and plant extracts (Figure 2 and Figure 3), with a comparatively smaller share for high-value-added products such as TCM health products.
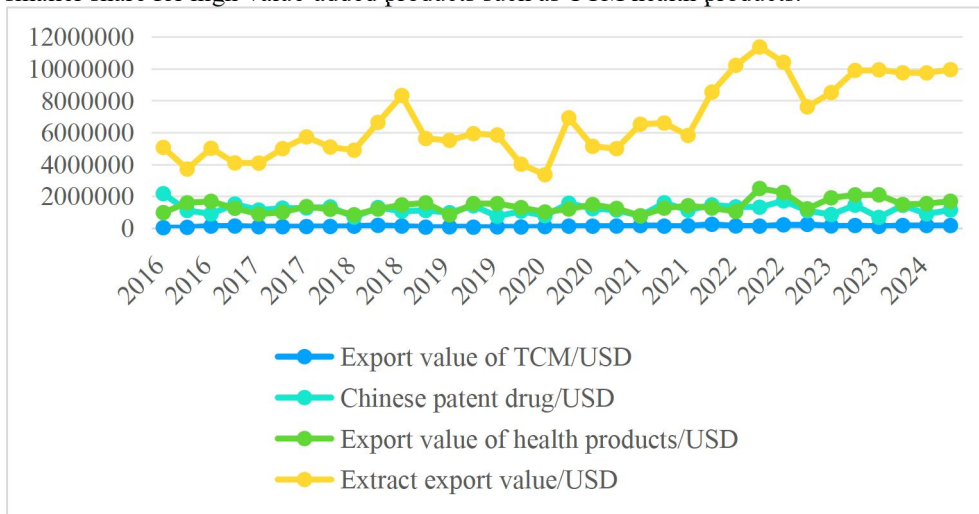

Figure 2: China's Export Value of Four Major Types of Traditional Chinese Medicine (TCM) from 2015 to 2024 (US$10 million)

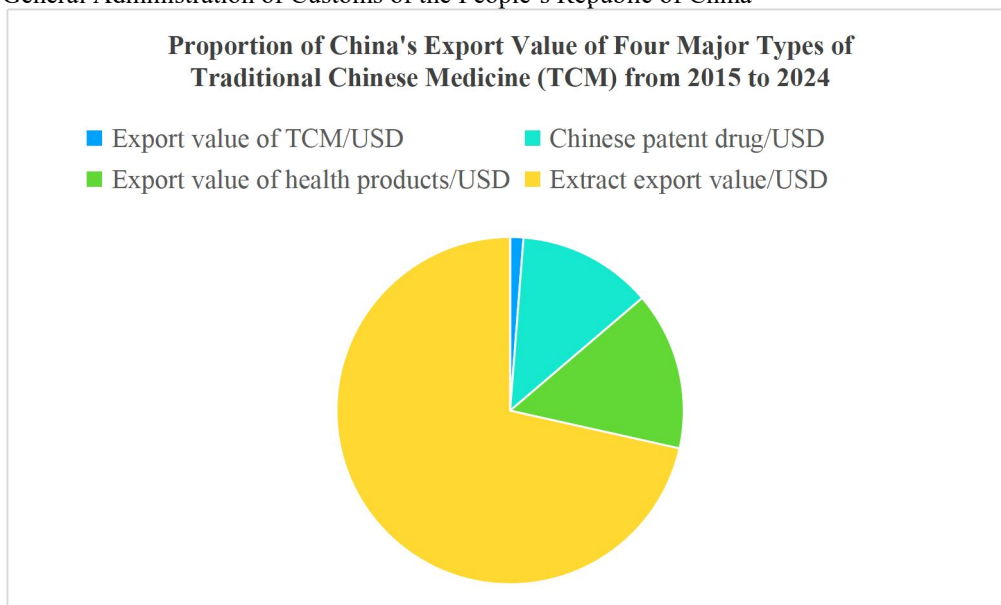Data Source: General Administration of Customs of the People's Republic of China

Figure 3: Proportion of China's Export Value of Four Major Types of Traditional Chinese Medicine (TCM) from 2015 to 2024

Data Source: General Administration of Customs of the People's Republic of China

3. Data and Methodology -- Forecast analysis of Chinese traditional medicine export based on time series model

3.1 China's TCM export data and sample selection.

This study applies quarterly data from 2016 to 2024 of four categories of TCM data including the total amount exports to Australia, the export data of Chinese patent medicine, Chinese medicinal materials and slices, plant extracts, and health products. The data obtained from relevant Chinese's institutions such as China Customs, China Chamber of Commerce for Import and Export of Medicines and Health Products, and the "Traditional Chinese Medicine Statistics Yearbook".

Adhering to the "Pharmacopoeia of the People's Republic of China" (current edition), the criteria of drugs listed in the "National Essential Medicines List," and the "National Economic Industry Classification," this paper categorizes the drugs

into Chinese medicinal materials, plant extracts, Chinese patent medicines, and health products. Based on the value-added hierarchy, these are further bifurcated into low-value-added products, such as Chinese medicinal materials, plant extracts, and Chinese patent medicines, and high-value-added products, exemplified by health products. To accurately identify corresponding TCM products and minimize misclassification, this paper references the main category codes of Chapter 30 (Medicines) from the official website of the General Administration of Customs of the People's Republic of China. It queries the principal pharmaceutical products marketable in Australia and conducts precise product segmentation using eight-digit HS customs codes. The trade value is denoted in current US dollars, with the detailed classification correspondence outlined in (Table 1).

Table1: Main Chinese Medicine Products Listed and Sold in Australia

Product Category	Segmented classification	Product Category	Product name	HS code
Traditional Chinese medicine	Low value-added products	Traditional Chinese medicinal materials	Chinese angelica	(12119011)
			Notoginseng	(12119012)
			Dangshen	(12119013)
			Coptis chinensis	(12119014)
			Mineral herb	(2530901)
		Plant extract	Liquorice juice and Extract	(13021200)
			Hop juice and Extract	(13021300)
			Ginkgo Juice and Extract	(13021940)
			Other Plant Juice and Extract	(13021990)
		Chinese patent medicine	Traditional Chinese Medicine Wine	(3004905)
			Cool oil	(30049054)
			Angong Niuhuang Pill	(30049055)
			Other Chinese medicine	(30049059)
	high value-added products	Health care products	Xianfeng Royal Jelly	(04109022)
			Wolfberry	(12119031)
			Beeswax	(15219010)
			Royaljelly preparation	(21069030)

Data Source: General Administration of Customs of the People's Republic of China

3.2 Methodology

The Autoregressive Integrated Moving Average (ARIMA) model, a statistical forecasting technique developed by Box and Jenkins, is extensively utilized in time series data analysis across various economic sectors, particularly for export forecasting. This model elegantly combines autoregression, differencing, and moving averages to effectively handle time

series data characterized by trends, cycles, and seasonality. Leveraging these capabilities, this study adopts the ARIMA model to scrutinize the composition, structure, and trade volume of TCM products exported to Australia. It projects the total TCM export figures and the export values of individual product segments from Q_3 2024 to Q_2 2025. Given the inherent volatility and trends in TCM export values, influenced by a spectrum of economic, policy, and cultural factors, the ARIMA model emerges as an apt analytical instrument.

The ARIMA model amalgamates autoregressive (AR) and moving average (MA) methods to manage time series data, potentially incorporating differencing to stabilize non-stationary series. The model is represented as follows:

$$AR: Y_t = c + \varphi_1 Y_{t-1} + \varphi_2 Y_{t-2} + \dots \varphi_p Y_{t-p} + \varepsilon_t \quad \text{Eq. 1}$$
$$MA: Y_t = \mu + \epsilon_t + \theta_1 \epsilon_{t-1} + \theta_2 \epsilon_{t-2} + \dots + \theta_q \epsilon_{t-q} \quad \text{Eq. 2}$$

Where:

Y_t represents the time series data at time

φ_1 to φ_p are AR model parameters, capturing the relationship between the current and past p time points.

θ_1 to θ_q are the MA model parameters, detailing the connection between the current value and the errors of the past q time points.

ε_t is the error term at time t.

This study commences by compiling and analyzing data on the quarterly export totals of TCM from China to Australia from 2016 to 2023, categorized into four segments: low-value-added Chinese medicinal materials, plant extracts, Chinese patent medicines, and high-value-added health products. Subsequently, an ARIMA time series model is constructed. Employing STATA 16.0 software, the model is used to forecast the aforementioned variables from Q_3 2024 to Q_2 2026.

This study predicts the total value of TCM to Australia and the export values for each of the four product segments. This predictive analysis facilitates an assessment of whether the overall export trend of TCM aligns with the individual trends of each product category, thereby validating the model's accuracy. It also enables the identification of potential challenges in upcoming years' TCM exports, allowing for the formulation of targeted recommendations.

3.3 Empirical analysis

The total value of TCM exports to Australia has exhibited a general upward trend from 2016 to 2024 (Figure 4). The rapid growth rate of TCM export to AUS from 2020 to 2022 attributed to the global outbreak of COVID-19. TCM's essential role in combating the pandemic has garnered widespread attention and appreciation worldwide, leading to a surge in demand and an increase in export volumes. Conversely, a notable decline from the third quarter of 2019 to the second quarter of 2020 is mainly attributed to the pandemic's disruptive effects on exports.

Table 2 illustrates the types of Chinese medicine exports to Australia from 2016 to 2024, where low-value-added categories such as Chinese medicinal materials, plant extracts, and Chinese patent medicines continue to dominate and show an increasing trend. In recent years, there has been a decrease in the export share of proprietary Chinese medicines and Chinese medicinal materials, while the proportion of high-value-added products, like health products derived from TCM, has been on the rise annually.
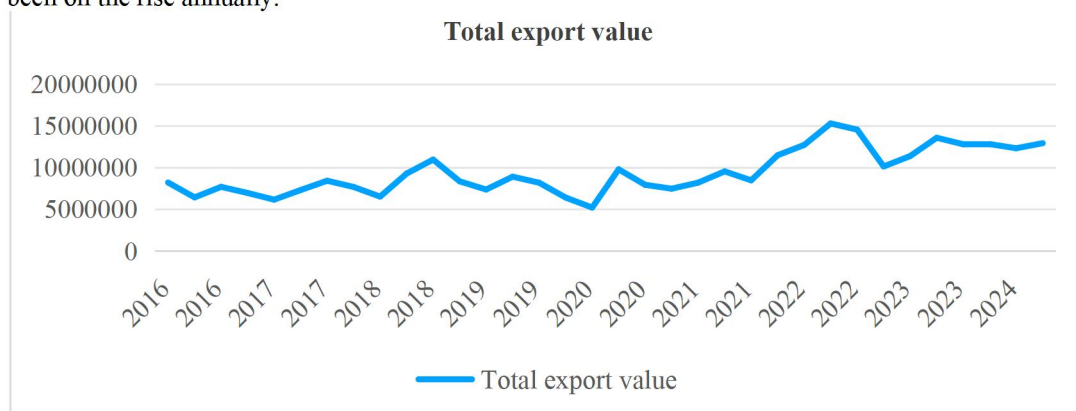

Figure 4: Annual exports of TCM by quarter from 2016 to 2024

Data source: Official website of the People's Republic of China Customs

Table 2: TCM exports to Australia from Q_1 2016 to Q_2 2024

YEAR	Export value/USD				
	TCM materials	Chinese patent medicine	Health care product	extractive	total amount
Q_1 2016	19864	2155861	968500	5057007	8201232
Q_2 2016	40390	1102349	1581689	3698943	6423371
Q_3 2016	120490	881575	1674108	5004838	7681011

Q4 2016	122948	1502922	1238740	4084514	6949124
Q1 2017	79657	1126071	873447	4072452	6151627
Q2 2017	79644	1246239	990355	4982146	7298384
Q3 2017	91854	1256966	1345979	5718353	8413152
Q4 2017	96430	1320320	1171431	5080722	7668903
Q1 2018	112081	688279	831795	4882615	6514770
Q2 2018	166429	1285046	1188996	6630834	9271305
Q3 2018	120604	1056806	1451720	8318479	10947609
Q4 2018	51687	1099568	1574833	5616787	8342875
Q1 2019	74822	960839	820132	5503282	7359075
Q2 2019	49942	1393734	1530449	5924868	8898993
Q3 2019	70506	735740	1529952	5839884	8176082
Q4 2019	62841	1053871	1278734	4005627	6401073
Q1 2020	87480	769385	1001678	3344069	5202612
Q2 2020	114494	1554571	1190521	6917565	9777151
Q3 2020	113021	1211422	1472293	5126384	7923120
Q4 2020	122308	1128055	1228369	4982357	7461089
Q1 2021	152086	751939	767105	6515452	8186582
Q2 2021	115015	1579993	1247577	6588715	9531300
Q3 2021	138151	1116017	1399704	5811446	8465318
Q4 2021	230541	1449102	1252557	8535547	11467747
Q1 2022	127238	1323620	1037890	10208871	12697619
Q2 2022	116646	1304450	2480936	11364596	15266628
Q3 2022	196147	1700198	2230441	10406843	14533629
Q4 2022	226385	1087941	1202011	7606379	10122716
Q1 2023	130159	840999	1895021	8501973	11368152
Q2 2023	155504	1431087	2079671	9889995	13556257
Q3 2023	105490	663212	2082136	9928875	12779713
Q4 2023	154118	1427652	1472377	9745251	12799398
Q1 2024	154371	882236	1531091	9735834	12303532
Q2 2024	155504	1132979	1679359	9939789	12907631

Data Source: General Administration of Customs of the People's Republic of China

3.3.1 Stationarity test of Data

To apply time series analysis, the stationarity of the original data is assessed using the Dickey-Fuller test. The results indicate a stationary sequence after one differencing, suggesting d = 1 inference

Table 3: Unit Root Test

Dickey-Fuller test for unit root		Number of obs.		31
		Interpolated Dickey-Fuller		
	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.851	-3.696	-2.978	-2.620

MacKinnon approximate p-value for (t)= 0.3553

Dickey-Fuller test for unit root		Number of obs.		30
		Interpolated Dickey-Fuller		
	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-6.489	-3.702	-2.980	-2.622

MacKinnon approximate p-value for (t)= 0.0000

3.3.2 Model Identification

With the determination that d=1 in the ARIMA(p, d, q) model, the next step is to identify the p and q values. Now we need to identify its p and q values. Utilizing STATA software to plot autocorrelation (AC) and partial autocorrelation (PAC) diagrams in determining p and q values. According to the Akaike Information Criterion (AIC), different models for

p and q values are constructed, estimated, and compared to select the optimal model.

Based on the figure 5&6, by observing the numbers beyond two standard deviations, we can conclude that the range of p-values is 2/3/4/. Similarly, we can conclude that the range of q-values is 2.
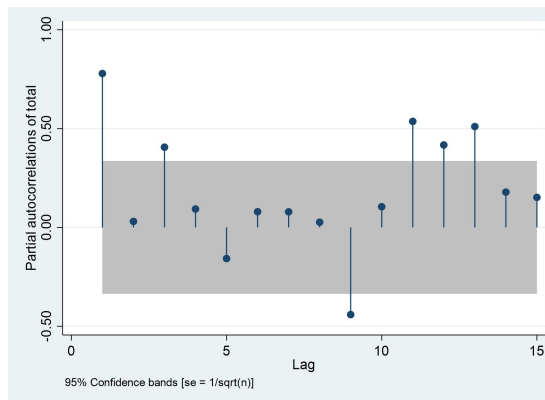

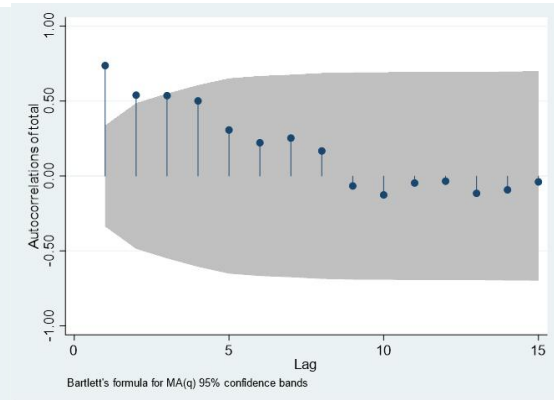Figure 5: Partial Autocorrelation Plot   Figure 6: Autocorrelation Plot

The model with the smallest AIC is chosen as the ARIMA (p, q, d) model. Based on Figures 5-6, the possible values for p are 2, 3, or 4, and for q is 2. The (2, 1, 2) model is determined to be the best model because it has the lowest AIC value. Table 4 Comparison of AIC values for all ARIMA model combinations.

Table 4: AIC values

ARIMA Model	AIC
(2, 1, 2)	1054.727
(3, 1, 2)	1059.461
(4, 1, 2)	1061.888

Data Source: STATA data

3. 3. 3 Model Test

The selected (2, 1, 2) model is then refined using SPSS to create an ARIMA time series model. The model statistics and parameters (Table 5 and Table 6) indicated a good fit, the R-squared is large, the P-value is also greater than 0.05, with no autocorrelation.

Table 5: Model Statistics

Model statistics

Model	Number of predictors	Model fit degree statistics		Young Box Q (18)			Number of outliers
		Stationary R square	R square	Statistics	DF	significance	
Total exports - Model	0	0.753	0.884	13.109	14	0.518	2

The value of AR is significant and reasonable, except that the value of MA is relatively large, the rest of the fitting degree is good fitted.

Table 6: ARIMA model parameters

ARIMA Model parameter

				estimate	Standard error	t	significance
Total exports - Model	Gross export	Unconvert	constant	35401.597	30811.659	1.149	.261
		AR	PF 1	-.172	.182	-.947	.353
			PF 2	-.530	.181	-2.923	.007
		discrepancy		1			
		MA	PF 1	-.009	2.606	-.004	.997
			PF2	.980	2.699	.363	.720

Secondly, the variation trends of ACF and PACF of the residual values in Figure 7 was found that they were both within 2 times the standard deviation, and the model was appropriate and white noise, confirming the model's suitability.
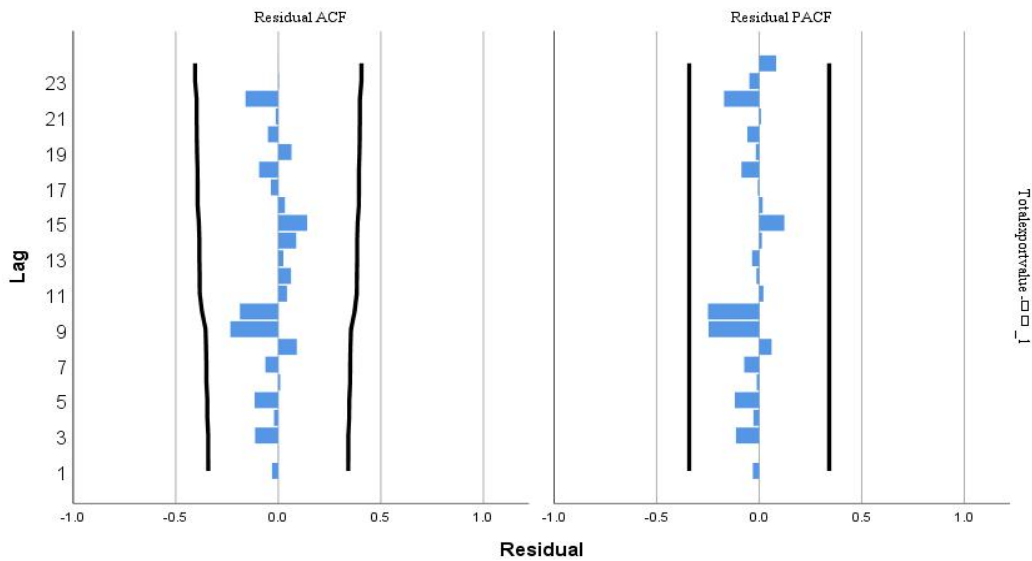
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Figure 7: Residual Value of ACF and PACF

3.3.4 Prediction of TCM Exports

Using the ARIMA model, SPSS software is employed to forecast the quarterly exports of Chinese medicine from China to Australia for 2024-2026. The results (Table 7 and Figure 8) show that a general upward trend in exports, albeit with a relatively slow growth. It may affects by multiple factors, some quarters even experienced declines, showing the complexity and uncertainty of the market.

Table 7: Total Export Value of Chinese Medicine from China in Each Quarter of 2024-2026 Forecast

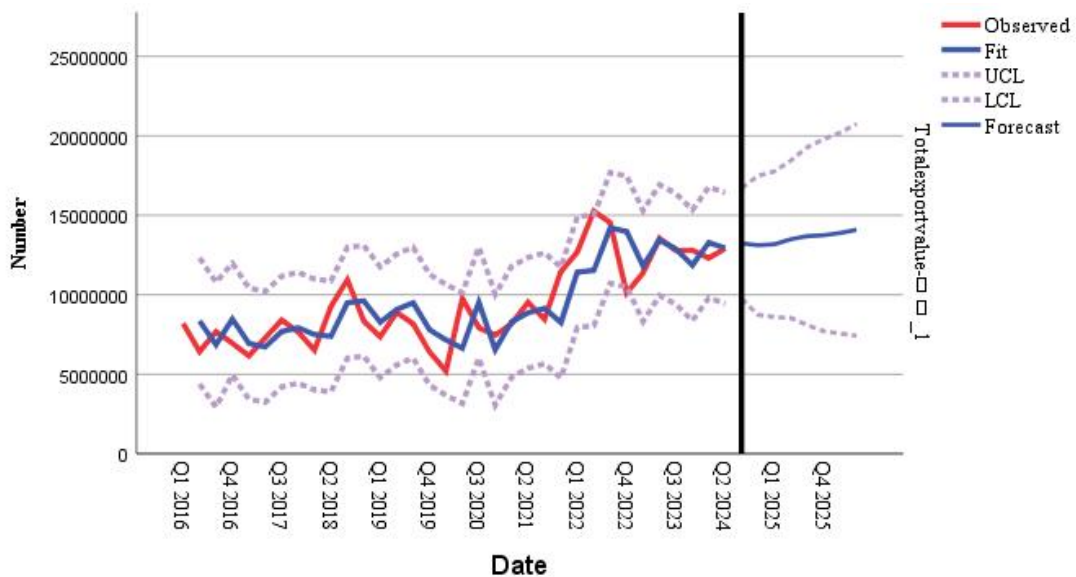|		Forecast							
Model		Q_3 2024	Q_4 2024	Q_1 2025	Q_2 2025	Q_3 2025	Q_4 2025	Q_1 2026	Q_2 2026
Total exports - Model _1	Predict	13232084	13114765	13182172	13494558	13690432	13751070	13884354	14091928
	UCL	16717650	17492164	17763511	18449682	19289597	19792344	20208842	20750521
	LCL	9746517	8737366	8600832	8539433	8091267	7709796	7559866	7433335

Figure 8: Line Chart of Total Export Value of Chinese Medicine from China in Each Quarter of 2024-2026

The forecast results (Table 8) indicated that while the export volume of Chinese medicinal materials and proprietary Chinese medicines shows stable growth with a slowing rate, the export value of health care products experiences significant fluctuations. Extracts maintained a slow rising trend, accounting for a substantial portion of the total export volume, highlighting their importance in the TCM export market.

Table 8: Types of Chinese Medicine Export Prediction Value

Model		Q3 2024	Q4 2024	Q1 2024	Q2 2024	Q3 2025	Q4 2025	Q1 2026	Q2 2026
					Forecast				
Chinese herbal medicine export value/USD - Model _1	Predict	160186	164077	168145	172173	176210	180245	184280	188315
	UCL	251483	279700	306225	329055	349967	369358	387596	404904
	LCL	68889	48455	30065	15291	2453	-8868	-19036	-28273
Export value of proprietary Chinese medicine/USD - Model _1	Predict	1078599	1091553	1076970	1073648	1065720	1059677	1052862	1046363
	UCL	1753961	1780591	1793195	1792354	1793600	1793408	1793618	1793570
	LCL	403237	402514	360744	354942	337841	325945	312107	299156
Health products exports/USD - Model _1	Predict	1770095	1450693	1384442	1655767	1718808	1503998	1460556	1645807
	UCL	2473758	2223160	2165254	2547463	2793168	2630449	2604584	2862536
	LCL	1066433	678225	603629	764070	644448	377548	316529	429078
Extract export value/USD - Model _1	Predict	10365746	10682040	10933786	11252416	11601948	11931420	12263365	12615882
	UCL	13284061	14578159	15106853	15820021	16735063	17509590	18209890	18955721
	LCL	7447431	6785921	6760719	6684811	6468833	6353250	6316840	6276043

In conclusion, while the export trend of TCM in Australia aligns with the overall export value, the export structure remains dominated by low-value-added products, primarily plant extracts. This suggests a need to focus on enhancing product value and optimizing the export mix to better adapt to international market demands.

4. Discussion

The export market of TCM to Australia shows great potential and broad prospects. The forecast results show, by the end of 2025, the export volume will reach 14.15 million US dollars. In recent years, the export volume of TCM has grown steadily, and plant extracts and Chinese patent medicines have become the main driving force for export growth. However, there are still many challenges for the internationalization of TCM.

Firstly, the current export of TCM is mainly primary products and concentrated on low-value-added products such as plant extracts, with low technical content. The proportion of high-value-added products such as health products remain relatively low and with slow growth rate. This affects the competitiveness and profitability of TCM in the Australian market. According to the predicted data, the export volume of low value-added TCM products will reach 13.85 million US dollars in the second quarter of 2026, which is eight times that of high value-added TCM products. This disparity not only underscores the insufficient output of value-added TCM products but also highlights the urgent need to enhance production capacity to meet market demands and improve the export mix.

The export structure of the TCM indicates the insufficient invest in research and development (R&D). It becomes a bottleneck limit the high value-added products. Therefore, it is necessary to continuously increase R&D. As Peng noted, China's TCM industry has yet to fully develop a high-value-added product chain, with companies remaining fragmented and small-scale, and the study emphasized that the industry's high-quality growth is contingent upon improving the industrial chain [12].

Secondly, the predominance of low-value-added products in export values can be attributed to a lack of strong branding and insufficient brand impact. Due to cultural differences consumers from different countries have insufficient awareness and acceptance of those products [13]. In the comparison of the domestic and international TCM market, noted the vast

scale of the market and a vibrant development in new-high-value-added TCM. To address this, there is a critical need to enhance brand development and market penetration. It should emulate successful brands like "Tong Ren Tong" which has established brand stores in 28 countries and regions across five continents. By leveraging the inheritance and promotion of traditional culture, these brands can overcome cultural barriers and continue to expand their international presence.

Thirdly, enhancing the company's research capabilities, brand influence, and overseas presence is crucial. To achieve this, we require professional talents who possess a deep understanding of international pharmaceutical trade and marketing. These individuals should be well-versed in foreign laws, regulations, and drug standards, which are essential for promoting TCM products to meet international benchmarks. Therefore, in order to foster the growth of TCM and boost its value and market competitiveness, it is imperative to strengthen the development of relevant talent teams. This approach will nurture a new generation of talents with innovative mindsets and robust R&D skills. By investing in human resources, it can drive innovation, improve product quality, and expand the global reach of TCM.

Finally, all the strategies mentioned above require the support of national policies and funds, so the issue of export structure reflects the insufficient positioning and support of the country for the entire industry, requiring more policies and financial support to strengthen the leadership role of the government. As an integral part of Chinese culture and philosophy, the government should take a proactive role in promoting the international dissertation of TCM culture [14]. By leveraging cultural outreach, the government can facilitate global awareness, comprehension, and acceptance of TCM. The government should develop export policies, including subsidies, and create regulations that align with international standards to foster the global export of TCM [15].

In addition, government should guide the industry to leverage national policy support, integrate industrial resources, and accurately target new TCM product [16]. This approach would enhance industry concentration, establish a stable TCM industry model, and contribute to the healthy and sustainable growth of the TCM sector. Consequently, it is essential to reinforce the leadership of the Chinese government in advancing the internationalization of TCM.

5. Conclusion

This paper innovatively classifies TCM products into low-value-added groups like extracts and patent medicines, and high-value-added groups such as health supplements, aligning with Australia's market access policies. Using ARIMA modeling, the study forecasts export values and highlights the substantial potential for TCM in Australia, along with challenges like limited product variety, slow growth in high-value-added segments, and branding issues. It suggests intensifying TCM research, optimizing the industry chain, and enhancing governmental support to drive the industry towards high-value-added growth.

The research provides theoretical support for the global expansion of the TCM sector and offers a scientific basis for policy formulation based on market demand and industry practices. However, it acknowledges limitations due to unpredictable factors like policy changes, production issues, and geopolitical events, which could affect export and prediction accuracy. Despite referencing official data, potential discrepancies in customs codes may also impact the study's conclusions.

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