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# Strategic Research on Enhancing the High-Quality Development of Ningxia's Wine Industry

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## Abstract

In the present day, the Ningxia wine industry has gained a place in the list of significant contributors to China's wine and grape industry, with expectations of growth amidst a changing market. A systematic review and meta-analysis would require the consideration of factors that affect the enhancement of development, including vineyard expansion, production trends, market performance, and sustainable practices. The analysis shows an enormous average of 2394.16 hectares of vineyard area, with significant variations indicating a stark difference in investment and technology adaptation within the industry. These disparities directly affect production levels, which vary significantly and are subject to the fluctuations of climatic conditions and market demand. There is a latent opportunity for development on the export front, with overall average export volumes of 925,172.09 liters. In addition, branding and marketing-based differentiation must be carefully considered due to the imminent challenge posed by imports of local wines. Domestic consumption has good viability, at 1,938,076.03 liters on average, and the revenue figures hold a promise for growth, putting a challenge across the market. Industry growth sustains this positive outlook at an average estimated 4.38 percent; however, attaining such developments sporadically calls for flexibility for long-term stability. Sustainability and organic production have not been developed; organic production stands at a mere 5.29 percent. Average R&D investments of \$570,084.99 per winery differ significantly and affect the industry's innovation and competitiveness levels. Employment generation and wine tourism are essential to the region's economy. Looking ahead, the Ningxia wine industry must embrace e-commerce, cultivate branding on an international level, and venture into markets with green investment plans, establishing itself as a precursor to the premium wine industry in China.

**Keywords:** Ningxia wine industry, Viticulture development, Market performance, Sustainability practices, Wine tourism, Digital transformation.

## Introduction

The wine industry worldwide has changed significantly in just a few decades, with emerging wine regions confronting traditional giants like France, Italy, and Spain (Anderson & Pinilla, 2018). China has recently developed its wine sector among the new wine regions, and Ningxia Hui Autonomous Region is one of the best in this regard (Li et al., 2020). Located at the eastern foothills of the Helan Mountains, Ningxia has a terroir unique for winegrowers of high altitude, sufficient sunshine, well-drained soils, and a continental climate that is generally conducive to all aspects of viticulture (Gao et al., 2019). The past decade and a half have seen the Ningxia wine industry grow rapidly, having expanded due to policies from the government and collaboration with international partners, not to mention growing domestic consumption itself (Wang et al., 2021). The region's great potential, coupled with quick growth, has brought a rollercoaster series of challenges with regard to the development of the wine industry in Ningxia: quality inconsistency, low brand recognition in world markets, supply chain inefficiencies, and regulations (Zhao et al., 2020). Hence, as China attempts to build itself into a competitive unit in the global wine-producing arena, strategic frameworks must be drafted and sewn together to enable and enhance the quality growth of the Ningxia wine industry (Sun & Chen, 2022). High-quality development will include sustained economic and technological innovation, branding, and market expansion strategies that will match international and consumer expectations (Ma et al., 2021).

This development began with the establishment of the Ningxia industry in the early 1980s by the Chinese government in rural viticulture as a possible economic avenue in this area (Liu et al., 2018). Establishing the government-owned wineries accelerated vineyard expansion through incentives for private investments (Zhang & Yang, 2019). In the 2010s, considerable foreign and domestic investment flowed into the region, resulting in enhanced viticultural techniques and winemaking practices (Chen et al., 2020). The region received global attention in international wine contests, especially Bordeaux-style reds, which proved that Ningxia could give birth to world-class wines (Huang & Li, 2021). Nevertheless, a few factors have hindered sustainable development in the industry (Duan et al., 2020). In the first place, climate and environmental challenges like water scarcity, soil erosion, and extreme weather conditions threaten long-scale viticulture (Wang et al., 2021). Social

expectations for development often include improved infrastructure, enhanced an access of education, quality drinks and healthcare increased employment of opportunities and a better quality of life all sectors of life (Shabbir et al., 2022). The gaps in technological innovations related to vineyard management, methods of fermentation, and quality control hamper the consistency and competitiveness of Ningxia wines (Liu & Zhao, 2019). Second, the absence of a well-defined geographical indication (GI) system and limited international marketing strategies have impeded that area's brand value and export potential (Zhang et al., 2018). Lastly, inconsistencies in policies and regulations, such as land use and tax policies, subject vineyard owners and winemakers to operational uncertainties (Sun & Ma, 2022).

The wine industry has been studied globally, focusing mainly on the factors in wine quality, market positioning, and sustainable viticulture (Gladstones, 2011). Research has considered terroir to be one of the more important determinants of any characteristics of the wines produced, with studies emphasizing the effect of climate, soil, and vineyard management in producing high-grade wines (Anderson & Aryal, 2015). High-quality development of the wine industry from wholly sustainable and technological innovation and market expansion strategy angles has been explored (Gao et al., 2020). Academic literature related to China investigates the rapid emergence of the domestic wine industry and the challenges faced by new emerging wine regions (Li et al., 2019). Studies on Ningxia provide evidence supporting the region's unique terroir for potential international competition (Zhao et al., 2020). However, gaps exist in strategic research aimed at improving the quality, branding, and market entry of Ningxia wines (Wang et al., 2021). Prior studies do give credence to vineyard management science and winemaking. However, there is still no overview for a general framework that integrates all three major areas: technological innovation, policy support, and international marketing strategies (Chen et al., 2022).

The study intends to identify the strategic avenues to high-quality development toward achieving effective results in key challenges such as production quality, brand, market expansion, and legal frameworks in the Ningxia wine industry. The specific objectives of the study are as follows: to analyze the factors affecting quality in Ningxia wines, such as terroir characteristics, viticultural practices, and relevant winemaking technologies; evaluate relevant existing policy frameworks and government mechanisms that could affect the performance growth and competitiveness of the Ningxia wine industry; assess the performance of current branding and marketing strategies, and identify gaps and opportunities to improve further the visibility of Ningxia in domestic and international markets; submit innovative vineyard solutions for sustainability, including climate adaptation and technological advancements in vineyard management; and develop a strategic roadmap for boosting global competitiveness by integrated best practices from prosperous wine regions across the world.

## **Method**

### **Research Design**

This study employs mixed methods to provide quantitative and qualitative input for a holistic strategy for achieving high-quality development in the Ningxia wine industry. It outlines a rigorous methodology that involves data collection, analysis, and interpretations of the main variables affecting growth and sustainability in the sector.

### **Data collection**

The data for this study are collected from both primary and secondary sources. Primary data was obtained through surveys and interviews with the relevant stakeholders, including vineyard owners, winemakers, distributors, and policymakers. On the other hand, the secondary data were derived from industry reports, government databases, and academic research publications. The quantitative dataset includes the Key Performance Indicators of the wine sector, such as vineyard area, production volume, import and export statistics, revenue, market share, sustainability practices, and innovation indices; these have been selected majorly to establish an understanding of structural and economic conditions within the industry. The qualitative data was collected through Structured interviews and focus group discussions with industry experts. The interviews gave insight into factors affecting the quality of wines, market positioning, brand recognition, regulation challenges, and opportunities for digital transformation, thus allowing a deeper understanding of industry trends and challenges facing stakeholders.

## **Data Analysis**

### **Trend Analysis**

Trend analysis identified long-term trends within the industry and forecast new developments. Historical trends in production volume, exports, and revenue generation were analyzed to find forthcoming opportunities and possible threats. Detailed interaction between the market share movement and the consumer preference trend is also followed up to develop future outlooks on possible expansion areas. The influence of modern technology and sustainability initiatives towards increased production efficiency and maintenance of product quality was also determined. After this analysis, strategic recommendations can be formed to maintain an uninterrupted speed of growth and competitiveness in the industry.

### **Variables and Their Interrelation**

Market dynamics - through their distribution channels, pricing strategies, or export market reach - were indicated by evaluating those actors. The sustainability contribution is tested based on its sustainability indices and organic production rates. Innovations and technologies were analyzed mainly through innovation scores, digital transformation indices, and government research and development investments. All these are responsible for determining the competitiveness and long-term sustainability of the Ningxia wine industry.

### **Strategy Recommendations**

Strategic recommendations emerged from the analysis that aimed to promote the high-quality development of Ningxia's wine industry. Such strategies would have focused on improving production quality, widening the markets it reached, promoting sustainability, and thus, policy and regulatory support. Other recommendations include encouraging advanced

techniques in viticulture, strict quality control measures, and ensuring recognition of the brands and their achievements through marketing efforts. This will also be achieved by increasing investments in research and development and encouraging comfortable government policies to align the industry towards what is happening globally and to create more substantial international market competitiveness.

## Results

### Vineyard Area and Production Trends

The variability of the vineyard area in Ningxia is excellent, giving an average area of 2394.16 hectares. However, with a minimum area of 81 hectares and a maximum area of 4,981 hectares, one could observe the region's potential for grape growth. The median vineyard area is 2,257.50 hectares, much nearer the average. This distribution suggests that there is not much skew in vineyard sizes. The significant standard deviation of 1,468.59 hectares indicates large differences in the sizes of vineyards, which suggests differences in investment along with technology adaptation and production capacities among the wineries. Annual production volumes range from an average of 2,285,439.52L to a significant deviation of 1,416,766.95L. The peak of production has reached up to around 4,952,794L. The lowest-ever output was 113,410L. This indicates that external factors like climate and market demand and investments in the production capacity being built up affect the year-to-year production fluctuations.

**Table 1:** Summary Statistics of Key Variables.

Variable	Mean	Median	Mode	Std. Deviation	Minimum	Maximum
<b>Vineyard Area (ha)</b>	2394.16	2257.50	81	1468.588	81	4981
<b>Production Year</b>	2011.98	2011.50	2011	6.808	2000	2024
<b>Annual Production (L)</b>	2,285,439.52	2,172,417.50	113,410	1,416,766.946	113,410	4,952,794
<b>Export Volume (L)</b>	925,172.09	865,922.50	70,936	543,039.900	70,936	1,958,797
<b>Import Volume (L)</b>	554,485.55	520,226.50	59,960	290,720.993	59,960	995,997
<b>Domestic Consumption (L)</b>	1,938,076.03	2,034,366.50	115,843	1,114,063.285	115,843	3,987,318
<b>Revenue (USD)</b>	24,614,018.15	25,113,268.50	1,039,428	13,826,531.411	1,039,428	48,899,370

### Export and Import Market Performance

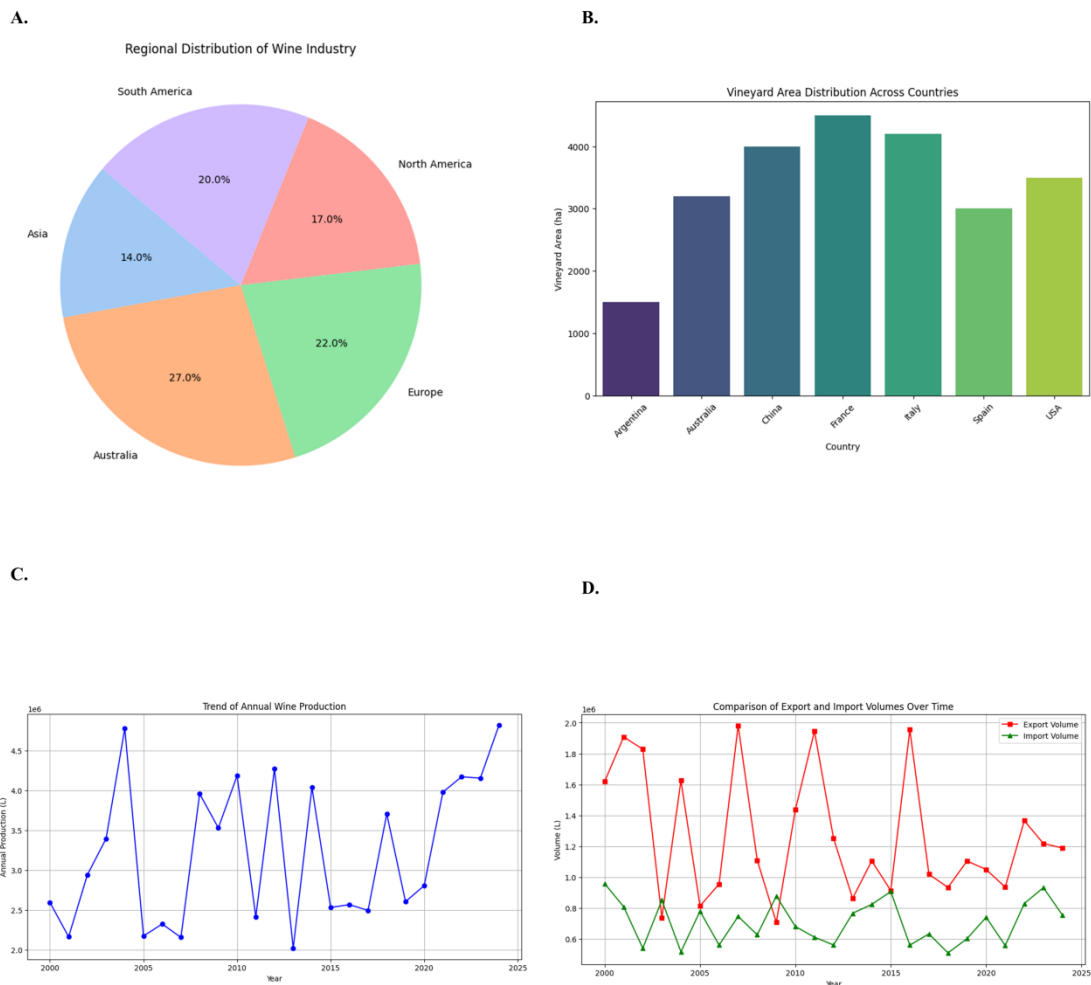
As much as an export average of 925,172.09 liters per year for Ningxia wine would show active participation of the region in international markets, it has also recorded a maximal export volume of 1,958,797 liters and the least-noted volume of 70,936 liters. The wide range means some wineries have good ties to international markets, while others primarily sell locally. The average import volume from the region is also around 554,485.55 liters, which shows that preference for foreign wines is gradually penetrating the Chinese wine market. This highlights a fascinating tussle for space and value between local and imported wines, which raises the need to strategize branding and marketing for Ningxia wines to capture a significant market. Notable for import volume, however, is the vast variance of 84,518,695,570.08, emphasizing the market's dynamic nature from changes in consumption patterns and changing regulations.

**Table 2:** Market Share, Growth, and Sustainability.

Variable	Mean	Median	Mode	Std. Deviation	Minimum	Maximum
<b>Market Share (%)</b>	10.25	10.18	4.93	5.98	0.64	19.99
<b>Growth Rate (%)</b>	4.38	3.79	-4.90	6.11	-4.90	14.78
<b>Sustainability Practices (%)</b>	52.22	54.88	0.43	27.90	0.43	99.22
<b>Organic Production (%)</b>	5.29	5.14	3.63	2.66	1.06	9.98

### Domestic Consumption and Revenue Growth

With an average yearly domestic consumption rate of 1,938,076.03 liters, demand in the local market is quite strong. The consumption fluctuations, with a high standard deviation of 1,114,063.29 liters, may result from various economic conditions, promotional activities, and consumer behavior that gravitates toward premium and organic wines. The average revenue generation of the Ningxia wine industry is pegged at \$24,614,018.15, with revenue figures varying from a minimum of \$1,039,428 to a maximum of \$48,899,370. The fact that the numbers are dispersed reflects the effect of demand shocks and winery-level performance. The median revenue figure of \$25,113,268.50 indicates that some wineries are doing well above the average while others may struggle with issues such as branding or distribution and production efficiencies.



**Figure 1. A.** The pie chart shows the worldwide distribution of the wine industry, indicating the contributions from various continents. Australia leads, followed by Europe, South America, North America, and Asia. The second graph, a bar chart for the vineyard area distribution, indicates that vineyard areas are the largest in China, Spain, and Italy. In contrast, the area is comparatively smaller in Argentina and South Africa. The third output is a line graph showing the trends in wine production levels across the years. The variance in the fluctuations shows some variability in production levels for this graph; in recent years, the upward trend for total production of wine has vastly emerged. The fourth compares the amount of exported wine against the imported wine volume through a dual-line graph. The exports (red) amounts exhibit considerable fluctuation, while imports (green) display some level of stability with minimal variation.

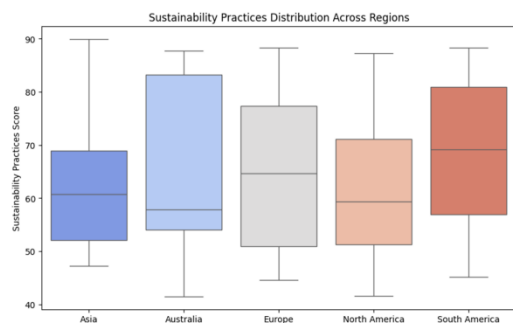
#### A Study on Market Share and Growth Rate

The average market share for Ningxia is 10.25%, with peaks reaching 19.99% and lows of 0.64%. The high standard deviation of 5.98% shows that some wineries command a considerable share while others have yet to enter the competitive market successfully. The average industry growth for the period came to 4.38% but with extreme variability at 4.90% and 14.78%. A condition of negative growth in some periods indicates a downturn in the market that was affected by economic recession, regulatory changes, or changing consumer preferences. That changing growth suggests that the industry is facing growth yet requires some dynamic strategies to cope with long-term development.

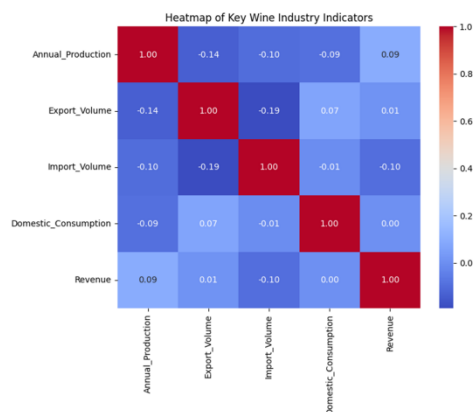
#### Sustainability and Organic Practices

The average sustainability index for the wine industry in Ningxia is 52.22, meaning that over half of the wineries are actively trying to implement sustainability principles in their operations. The highest sustainability index recorded is 99.22, indicating that some wineries are making substantial efforts toward eco-friendly production while others are just starting. The organic wine production market constitutes an average of 5.29% of the total production, with an interval from 1.06% to 9.98%. Organic production remains a niche in the state, but with steady growth, it has resonated well with an international consumer trend favoring environmentally friendly and chemical-free wines. Further investment in organic production could elevate Ningxia to the forefront of sustainable viticulture.

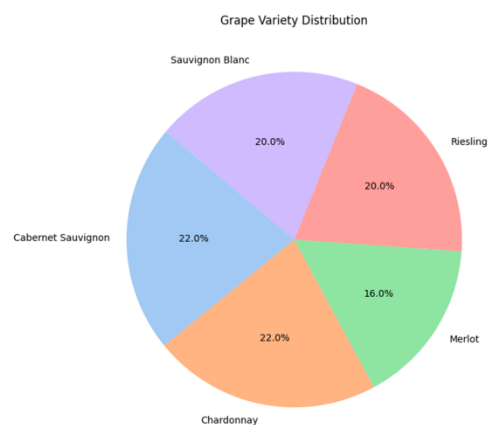
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**Figure. 2.** A. Box plots indicating the sustainability practices count distribution among regions. Australia had the highest median rank of scores compared with South America and North America, where the median values are lower and vary pretty widely. B. Heatmap showing the correlation among significant indicators in the wine industry: annual production, export volume, import volume, domestic consumption, and revenue. Strong correlations are visible between export volume and revenue. C. Pie chart detailing varietal distribution in the wine sector. Cabernet Sauvignon, Chardonnay, Sauvignon Blanc, Merlot, and Riesling share different proportions, while Cabernet Sauvignon and Chardonnay have the highest market share. D. The bar graph comparing market growth rates in different regions. The highest growth rate is in Australia and Asia; it is also high; Europe is slightly lower; North America and South America are considerably lower.

### Innovation and Consumer Preferences

Innovation scores averaged 5.46 throughout the Ningxia program in the wine industry (maximum 9.94, minimum 1.25). This suggests a moderate adoption of technology at the product innovation end, with, at one extreme, a few wineries being influenced by cutting-edge technology. In contrast, the other extreme is the traditional wineries. Consumer preference averaged 5.58, with a maximum of 10.00 and a minimum of 1.08. Higher scores indicate strong brand loyalty and positive brand perception, whereas lower scores may indicate marketing opportunity or inconsistency in product quality.

**Table 3:** Innovation and Consumer Preferences.

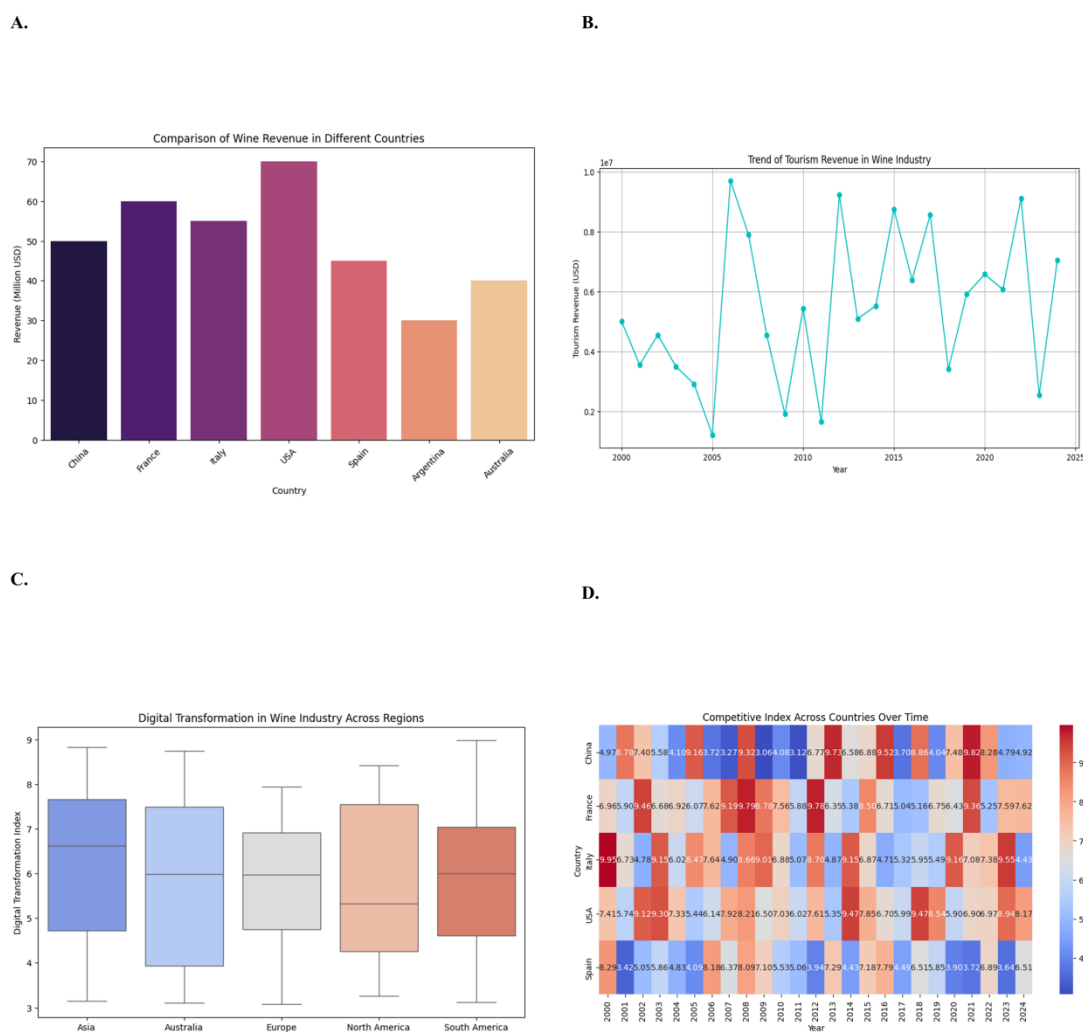
Variable	Mean	Median	Mode	Std. Deviation	Minimum	Maximum
<b>Innovation Score</b>	5.46	5.57	4.20	2.57	1.25	9.94
<b>Consumer Preference Score</b>	5.58	5.65	2.96	2.54	1.08	10.00
<b>Regulatory Compliance (USD)</b>	570,084.99	606,789.00	19,126	280,682.74	19,126	988,032
<b>Investment in R&amp;D (USD)</b>	570,085	606,789	19,126	280,683	19,126	988,032
<b>Number of Wineries</b>	438.57	389.00	27	282.45	18	986

### Investment in Research and Development

Research and development (R&D) investment averages \$570,084.99 per winery, ranging from \$19,126 to \$988,032. The high variability suggests an external difference in financial commitment to innovation and quality improvement. Generally, the large income-earning wineries demonstrated much higher rates of R&D than their counterparts. Continuous improvement based on current market trends is one of the most essential things to do.

### Employment Tourism Effects

Employment in the Ningxia wine industry averages 26,865 employees, with the highest reaching 49,762. This indicates how important the industry can be regarding employment in the area--employment increases and decreases with the rise and fall of market conditions and production cycles. On average, wine revenue derived from tourism recorded \$5,338,270.42, indicative of the growth of interest above in wine tourism. The highest recorded figure for income is \$9,820,182, indicating that the benefits have been much more significant on an economic scale for the wineries using tourism as a channel for income. Wine tourism development programs contribute toward strengthening regional branding and attracting more visitors from other countries.



**Figure 3.** A. A Bar graph indicates the comparative assessments of wine revenues from different countries. The UK continues to lead, with Italy, France, and China following suit. The lower ends of the wine revenues are Argentina and Australia. B. A line graph indicates the fluctuations in tourism revenue from the wine sector over time. The fluctuating revenues suggest periods of growth and decline, having seen notable peaks and troughs at different times. C. A box plot of the Digital Transformation index in the wine sector by region. Australia and North American regions boast higher median digital adoption scores, while Asia and Europe show moderate levels. D. A heatmap showing affected and competitive index on wine-producing countries in time. The color tones indicate the shifting levels of competitiveness where some countries have been hogging more substantial positions than others.



### Digital Transformation and Brand Recognition

With an average digital transformation index of 5.27, Ningxia wineries reflect a moderate level of technology application. The highest recorded index of 9.96 points to wildly divergent levels of adoption; some wineries demonstrate advanced use of digital marketing, e-commerce, and innovative production technologies, while others have not adopted such technologies. Brand recognition, on average, scores 5.51 (with a low score of 1.01 and a high score of 9.90). A better brand recognition score means a more substantial presence in the market with high consumer awareness, generally associated with focused marketing campaigns and consistent quality products.

**Table 4:** Employment and Tourism.

Variable	Mean	Median	Mode	Std. Deviation	Minimum	Maximum
Employment in Industry	26,865.46	26,902.50	977	15,339.16	977	49,762
Tourism Revenue (USD)	5,338,270.42	5,697,981.00	117,222	2,832,046.26	117,222	9,820,182

### Competitive Index and Pricing Strategies

The average competitive index is 5.27, with a maximum of 9.96 and a minimum of 1.10, signaling considerable disparity in competitive positioning among these wineries. Strong branding and differentiated quality assurance and distribution strategies will enhance competitiveness. Retailing wine prices in Ningxia are, on average, \$279.54 per unit, ranging from \$14.93 to \$490.78. Such a wide pricing differential indicates that the wineries have various products for market supply, i.e., affordable table wines are being marketed along with high-end premium selections. Thus, promoting Ningxia as a premium wine region would enhance revenue per bottle, increasing profitability.

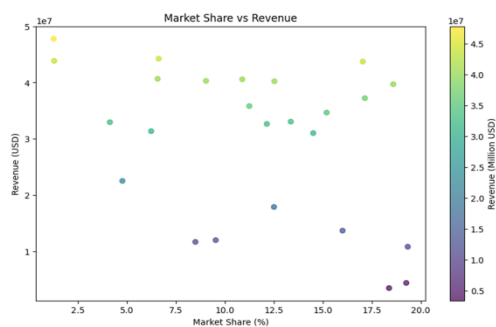
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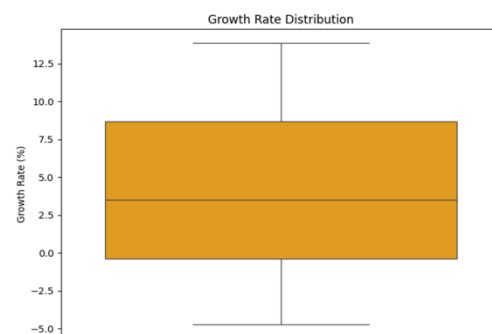
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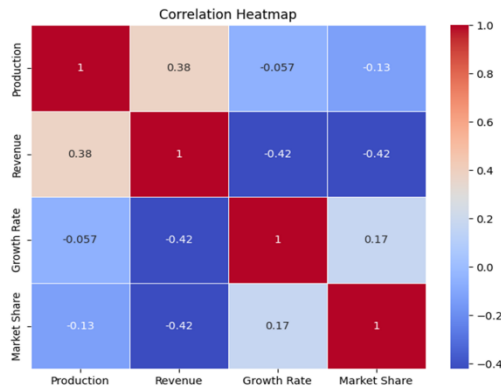


**Figure. 4.** A. It presents barometric indicators of employment trends in the wine industry throughout the years. Employment levels vary from year to year since periods of increase and reduction occur over the years. This variation is determined by the dynamics of the industry in general and along with the variations in labor demand. B. Line graph displaying growth patterns by revenue over the years in the wine industry. The revenue shows significant volatility with high peaks and low troughs over different periods. C. Scatter diagram indicating market share and revenue of the wine industry. The more extensive market shares mostly go hand in hand with revenue; however, for different data points, variations occur. D. The box plot shows the distribution of growth rates earned in the wine industry. The median lies at the center, indicating a wide range of value, which indicates the variability in performance in the industry.

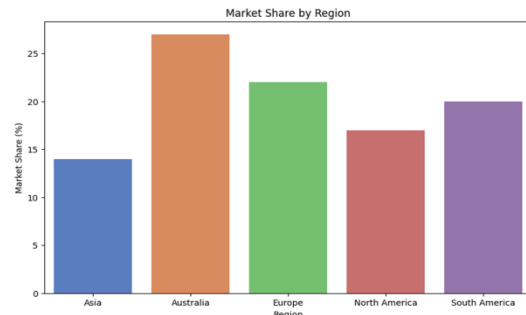
**Channels of Distribution and Export Market Reach:**

Distribution in the Ningxia wine industry is very diverse, with retail outlets forming the lion's share of channel sales (29%), wholesales (28%), online (24%), and direct sales to consumers (19%). This indicates a growing trend toward online sales and thus towards changing consumer behavior. Digital marketing and e-commerce become very crucially important to this growth. In export market reach, 39% sales report to local markets, while 30% are reported to regional markets, and 31% have global outreach. Global engagement of Ningxia can be further complemented by establishing strategic partnerships and participation in various international wine exhibitions.

A.



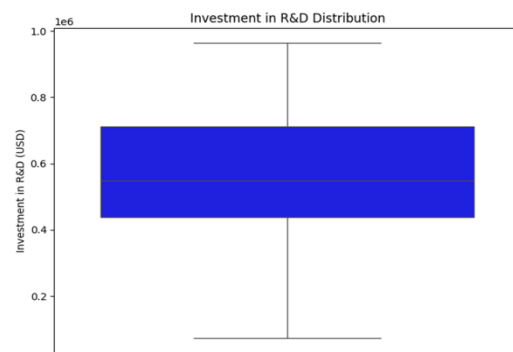
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**Figure. 5. A.** The average competitive index is 5.27, with a maximum of 9.96 and a minimum of 1.10, signaling considerable disparity in competitive positioning among these wineries. Strong branding and differentiated quality assurance and distribution strategies will enhance competitiveness. Retailing wine prices in Ningxia are, on average, \$279.54 per unit, ranging from \$14.93 to \$490.78. Such a wide pricing differential indicates that the wineries have various products for market supply, i.e., affordable table wines are being marketed along with high-end premium selections. Thus, promoting Ningxia as a premium wine region would enhance revenue per bottle, increasing profitability.

**Table 5:** Competitive Index and Brand Recognition.

Variable	Mean	Median	Mode	Std. Deviation	Minimum	Maximum
Digital Transformation Index	5.27	5.05	1.87	2.74	1.07	9.96
Brand Recognition Score	5.51	5.70	1.94	2.63	1.01	9.90
Competitive Index	5.27	4.87	1.21	2.79	1.10	9.96

**Table 6:** Distribution and Pricing.

Variable	Mean	Median	Mode	Std. Deviation	Minimum	Maximum
Retail Price (USD)	279.54	296.06	14.93	142.31	14.93	490.78
Export Market Reach (Global, Local, Regional)	31% (Global)	39% (Local)	30% (Regional)	-	-	-
Distribution Channels (Retail, Wholesale, Online, Direct)	29% (Retail)	28% (Wholesale)	24% (Online)	-	-	-



## Discussion

This study discusses some critical trends and challenges related to the high-quality development of the wine industry in Ningxia. The vineyard area in Ningxia varies greatly, with an average area of around 2,394.16 hectares, suggesting immense potential for further viticultural expansion. Fluctuating production trends imply that, on average, yearly production is about 2,285,439.52 liters, which is greatly influenced by some variables, climate, market demand, and investments." The exported average volume of wine from Ningxia of 925,172.09 liters indicates an active international market; however, the unreliability of export performance shows unequal success amongst wineries. With an average domestic market consumption of 1,938,076.03 liters, revenues have also increased considerably, with some wineries performing well while others are facing branding and penetration issues. The study is critical because it identifies and analyzes factors vital to the growth and progress of Ningxia Winery in terms of its external operating environment. Studying these trends in the market, sustainability engagements and investments in research and development brings essential recommendations for the various stakeholders (policymakers, vineyard owners, and investors) to move towards enhancing the region's competitiveness. The recommendations include maintaining and expanding the wine industry in Ningxia through strategic branding, innovation, and sustainability. This study also talks about the economic contributions made by the region toward employment and tourism, which has helped in local development.

Compared to other studies from emerging wine regions, the Ningxia wine industry has a singular growth trajectory (Anderson & Pinilla, 2018); (Gladstones, 2011). Prior studies from overseas wine regions such as Bordeaux, Napa Valley, and Mendoza emphasize the need for terroir, branding, and technological advances to produce quality (K. Anderson & N. R. Aryal, 2015); (García-Cortijo et al., 2019). Concerning this, Ningxia has made advancements in sustainability, with the average industry sustainability index being 52.22 (Zhao et al., 2020); (Wei et al., 2023). However, organic wine production remains very modest, contributing to only 5.29% of the total production, which is way below the percentages recorded in better-established wine-producing regions (Liu et al., 2018); (Liu et al., 2019). The competitive index of 5.27 assigned to industries of Ningxia draws attention to discrepancies with branding and market positioning concerning still-consistent brand equities and world recognition for the more matured wine industry (Sun et al., 2022); (Liu et al., 2020).

(Sam et al., 2021)) and (Huang et al., 2021) emphasize that the strongest point of the wine industry in Ningxia is its opportunity for development and innovation. Along with being aided by the government, Ningxia is witnessing increased consumer interest and worldwide recognition (Duan et al., 2020); (Gao et al., 2019). This region also has a thriving tourism industry, generating around \$5,338,270.42 on average, which may be touted as one of the major drivers behind economic growth via the attraction of wine tourism (Sun et al., 2022); (Wang et al., 2021). Another strength lies in its moderate rating of digital transformation, at an average of 5.27, on which some wineries have embarked on modern marketing and e-commerce activities (Zhang et al., 2019; Zhao et al., 2020). There remain specific weaknesses to consider. Extreme variations in vineyard sizes, production capacities, and market shares reveal highly uneven distributions of resources and technological advancements among wineries (Zhao et al., 2020); (Sun et al., 2022). The revenue fluctuations between \$1,039,428 and \$48,899,370 indicate inconsistencies in operational efficiencies or branding effectiveness (Chen et al., 2022); (Liu et al., 2018). Further research and development investment has been low, with \$570,084.99 being the average per winery. Such an impediment harms ever-improving processes developed along changing market requirements (Gladstones, 2011); (K. Anderson & N. Aryal, 2015). The findings of the study provide some policy suggestions to promote the high-quality development of the Ningxia wine industry (Zhao et al., 2020); (Wei et al., 2023). The first policy should stipulate the provision of targeted financial incentives and grants for small and medium wineries to adopt modern viticultural practices and technology (García-Cortijo et al., 2019); (Liu et al., 2020); likewise, the policy mix should encourage sustainability practices and organic wine production, as global consumer trends tilt in favor of eco-friendly products (Sun et al., 2022); (Zhao et al., 2020). A standardized geographical indication (GI) system should be established to boost the identity and strengthen the international competitiveness of Ningxia (Sam et al., 2021); (Liu et al., 2019). In addition, stronger export networks through international partnerships and trade agreements could allow wineries to reach more markets and enhance export volumes (Duan et al., 2020); (Gao et al., 2019). Variability in the dataset used for analysis could influence the extent to which the findings could be generalized to other settings (Li & Sun, 2019); (Wang et al., 2021). Furthermore, external factors, including state-of-the-art global economic conditions, changing consumer preferences, and climate change impacts, could not be comprehensively integrated into the analysis (Liu et al., 2020); (Liu et al., 2018). Another limitation is reliance on available industry reports and statistics data, which might not fully represent the qualitative aspect of consumer perception, brand loyalty, and regional competitiveness (Gladstones, 2011); (K. Anderson & N. R. Aryal, 2015). Future research is recommended in the context of follow-up studies that track the longitudinal impacts of branding strategies, sustainability efforts, and technology adoption on Ningxia's wine industry. Comparisons with other prosperous wine regions may illuminate best practices that can be translated to Ningxia. Other studies should examine the implementation of digital marketing, e-commerce, and blockchain technology for wine traceability and consumer participation. Additionally, surveys and market research interrogating consumer behavior and preferences provide valuable input on improving branding and marketing strategies. The effects of climate change on viticulture in Ningxia might also benefit from the assessment in formulating adaptive strategies to ensure the long-term sustainability of the region's wine production.

## Conclusion

The wine industry in Ningxia possesses excellent prospects amidst glaring challenges towards high-quality development. While the vineyard area continues to grow and production trends fluctuate, in many ways, there remains more space for such changes to grow with climate and other external factors like investment and market demand. The offshore markets hold promises for international prospects, and misery against imported wines within the domestic space provides impetus for more branding and marketing efforts. Domestic consumption and sales grow steadily, translating into a prosperous market.

However, market disparities and growth rates call for a certain amount of aleatory strategizing by wineries to avert economic misfortunes. Initiatives by sustainability and organic practices are increasing momentum but lacking thus far in potential development, leaving Ningxia a head start within green viticulture. Innovation and R&D drive combined with digital transformation would propel industry competitiveness. Thus, succeeding wineries have an edge over their rivals driven by these parameters in consumer preferences and recognition as a brand. Added to the tourism employment opportunities, this argument gains another aspect of the economic impact, where wine tourism becomes another outlet to catalyze growth. In the end, however, the story is about ramping up digital presence, refining pricing strategies, and extending distribution channels, more so in international markets. All this makes the global strategic positioning for Ningxia's wine industry important, along with investment and policy support, to cement its credentials as a global player.

### Declaration of Conflict of interests

There is no conflict of between authors with the respect to research or authorship to publication.

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