

Research on Export Evaluation System of Guangdong Lixun Precision Industry

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Abstract: Consumer electronics industry is not only the core field for China to move from a manufacturing power to a manufacturing power, but also has become a new growth driving force of China's foreign trade and export industry. In recent years, China's consumer electronics exports have shown a strong growth momentum, with an average annual growth rate of 7%. However, with the increasing competition in the consumer electronics industry and the continuous rise of commodity prices, China's consumer electronics foreign trade companies have also encountered unprecedented challenges in the overseas markets.

In this study, Guangdong Lixun Precision Industry Co., Ltd. was selected as a case to make a comprehensive analysis of its export business. Through in-depth discussion of the company's export scale, market distribution, product structure and challenges, this paper reveals the problems in customer group diversification, production automation, product market risk and production delivery capacity. To solve these problems, this study proposes a series of practical countermeasures to enhance the market competitiveness and the sustainability of the export business. Suggestions include using sales channels such as e-commerce platforms to expand overseas markets, increasing investment in research and development to promote product innovation, optimize business structure to improve the ability to resist risks, improve automation level to enhance export delivery capacity, etc. By implementing these strategies, Lixun Precision is expected to further consolidate its leading position in the global consumer electronics industry and provide valuable lessons for other companies in the industry.

Keywords: Guangdong Lixun Precision Industry, Export, Status, Strategy.

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1 Introduction

1.1 Research Background

In the past 20 years, China's electronics industry has achieved rapid development, giving birth to the world's Huawei, Lenovo, Xiaomi and other famous consumer electronics brands. These brands, with their strong technological autonomy and brand influence, have won a place in the international electronics market, while changing the stereotype of foreign consumers about Chinese consumer electronics.

Guangdong Lixun Precision Industry Co., Ltd. ("Lixun Precision") is the major supplier of Apple Inc. Thanks to Apple's steady orders, Lixun company's export business has continued to grow rapidly in recent years. However, the long-term cooperation with Apple has led to the Precision's over-reliance on Apple, which also brings hidden dangers for the continuous development of The Precision.

1.2 Study purpose and significance

Lixun Precision, as a leader in the consumer electronics manufacturing industry, has established a long-

term and deep partnership with Apple. In addition to manufacturing basic products such as Apple's charging cables, connectors and headphones, the company is also involved in the whole machine assembly business. Apple's orders have brought significant revenue and market value growth, but Apple never wants any company in its supply chain (also known as the fruit chain) to dominate, and often encourages fierce competition. Historically, fruit chain giant Goer faced a sharp decline in exports due to Apple's order cuts, and Lixun Precision, which poses a huge challenge to the growth of its export business. Therefore, the purpose of this study is to deeply discuss the export status of Lixun Precision and provide practical suggestions for the optimization of the export business of Lixun Precision.

2 Comprehensive evaluation of export status of Guangdong Lixun Precision Industry

2.1 Selection of the evaluation index of the export status quo

A company's export situation is affected by multiple

factors, but the most critical factor is undoubtedly the size of exports, the growth rate and the share of the export market. Moreover, the gross profit margin of export, the proportion of R & D funds and the support of export funds can provide a key reference basis for enterprises to evaluate their sustainable development ability of export. Moreover, an enterprise's export delivery capacity is seen as a key standard for assessing the quality of its export services. Strong export production strength and abundant inventory of export goods can not only reduce the reputation loss and default risk of enterprises in the export business, but also ensure that enterprises can obtain more orders in the future, thus providing better guarantee. The dispersion of the export market helps to assess the future risks that the company may encounter in its export activities, and the higher the concentration of the export market, the higher the corresponding future export risk.

Therefore, in order to construct the export status level index system of Lixun Precision, this paper selects 9 key export indexes.

Table 2.1 Current Level index system of Lixun Precision Export

name	meaning	original variable
Export scale (RMB 100 million yuan)	Lixun precision total exports this year	X1
Export scale growth rate of (%)	(Total exports of this year / total exports of last year-1) * 100%	X2
Export gross profit margin of (%)	(Export sales revenue of this year's annual sales cost) / * 100%	X3
Export production capacity (KPCS)	Quantity of products produced by the company's export business this year	X4
Quantity of Export Goods (KPCS)	Quantity of products in stock of the company's export business this year	X5
Export market share of (%)	(Total sales of Lixun Precision / total market sales of this year) * 100%	X6
Export market dispersion	This paper uses the Hufendal index to measure the export market dispersion of Lixun Precision	X7
Export R & D investment accounted for (%)	Export business R & d expenditure / sales revenue * 100%	X8
Export capital support (RMB 100 million yuan)	Funds that the company can use for investment in its export business	X9

2.2 Data Sources

This study chose the financial reports of the past few years as the data source. In this study, we selected the panel data from 2013 to 2023 as the sample range and supplemented them using the interpolation method or exponential smoothing technique for partially missing variables. Export market dispersion cannot be obtained directly from public data and therefore needs to be measured separately.

2.2.1 Export market dispersion measure

The accurate quantification of the export market dispersion has always been a difficult problem. In order to more accurately measure the export and market dispersion, this paper uses the Herschzi index to measure the export market dispersion of Lixun Precision. The specific calculation formula is as follows:

$$HHI = \sum_{i=1}^N (X_i/X)^2 = \sum_{i=1}^N S_i^2$$

Among them, X represents the total size of the export market, and Xi represents the size of i enterprises. Si = Xi / X represents the market share of the i th enterprise, and N represents the number of major export enterprises of Lixun Precision.

According to the formula, we can finally calculate the export market dispersion of Lixun Precision from 2013-2023. The results are shown in Table 2.2:

Table 2.2 Export market dispersion of Lixun Precision in 2013-2023

a particular year	Export market dispersion
2023	0.56
2022	0.53
2021	0.54
2020	0.48
2019	0.31
2018	0.22
2017	0.15
2016	0.13
2015	0.07
2014	0.04
2013	0.05

2.3 Integration of the original data of the current situation and level index of Lixun Precision export

We will collect relevant data from 2013 to 2023 from the annual reports of Lixun Precision. After a series of calculation and processing, we will integrate the original data of the current situation level index of Lixun Precision export. The specific data can be shown in Table 4.3:

Table 4.3 Raw data of current level index of Lixun Precision Export

	Export scale (RMB 100 million yuan)	Export scale growth rate of (%)	Export gross profit margin of (%)	Export production capacity (KPCS)	Export inventory goods
2023	2067.56	6.68	10.96	4336890	351838
2022	1938.03	35.10	11.78	4233740	505965
2021	1434.53	68.68	11.73	3773559	277717
2020	850.46	48.00	17.76	3661402	361409
2019	574.65	79.52	19.73	2412810	171497
2018	320.11	65.27	20.82	1438739	130476
2017	193.69	67.10	19.34	779727	85943
2016	115.91	31.85	20.54	392632	39446
2015	87.91	41.83	21.98	270449	32029
2014	61.64	68.26	21.61	216516	27554
2013	36.63	44.09	17.43	128631	23632

Table 2.3 Raw Data of Current Level Index of Lixun Precision Export

	Export market share of (%)	Export market dispersion	Export R & D investment accounted for (%)	Export capital support (RMB 100 million yuan)
2023	2.65	0.56	3.50	336
2022	2.54	0.53	3.90	194
2021	1.83	0.54	4.30	142
2020	1.16	0.48	6.20	105
2019	0.79	0.31	7.00	61.8
2018	0.46	0.22	7.00	38.19
2017	0.29	0.15	6.80	40
2016	0.18	0.13	6.70	20.68
2015	0.14	0.07	5.70	20.42
2014	0.09	0.04	5.50	22.41
2013	0.05	0.05	4.40	7.37

2.4 Applitability test of principal component analysis

This study summarizes the annual financial report data and the main calculation indicators of Lixun Precision during the period of 2013-2023. Because the sample data is quite rich, we simplify these 9 export indicators to several independent main factors containing the original financial information through the dimension reduction technology. Before this, we need to use KMO values and Bartlett spherical test to verify whether these index data are suitable for factor analysis. The test results are shown in Table 4.3:

Table 2.4 Test results of vertical principal component analysis

KMO and Bartlett tests
Number of KMO sampling fit: 0.61

Bartlett's sphericity test approximates chi-square to 183.851

Degrees of freedom of 36

Significant degree was <0.001

According to the above table, the measurement value of KMO is 0.61, while the P-value of Bartlett is less than 0.001. Usually, when the test result exceeds 0.5, we can analyze the principal components. Therefore, we can use the principal component analysis method to study the export situation of the company precision.

2.5 Determination of principal components

From the analysis results of the gravel plot, we can observe that the whole line has a turning point at the second factor position. Therefore, we selected the first two factors as the main components, where the first principal

component reached an eigenvalue of 7.122, which explained 79.138% of the total variance of the nine primary variables, showing a significant feature of large factors; the second principal component has the eigenvalue of 1.128, which represents 12.529% of the total variance. These two eigenvalues together explained 91.667% of the total variance, exceeding 80%. Combined with the broken line trend of the gravel diagram, we identified two main factors, namely the two common factors, which serve as the first principal components and the second principal components of the current analysis of The Precision export.

Table 2.5 The total variance explained in Table 4.5

Initial eigenvalue squares was extracted ingredient			The sum of the load variance percentage		
percentage	amount to accumulate%	amount to accumulate%	percentage	amount to accumulate%	percentage
1	7.122	79.138	7.122	79.138	
2	1.128	12.529	1.128	12.529	
3	0.477	5.305			
4	0.140	1.555			
5	0.077	0.857			
6	0.039	0.433			
7	0.015	0.168			
8	0.001	0.015			
9	3.425E-6	3.806E-5			
					100.000

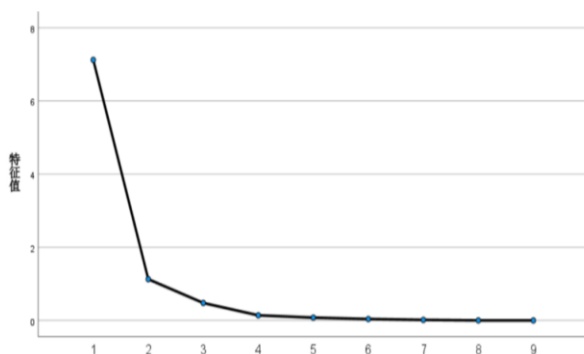


Figure 2.1 Stone e

2.6 Analysis of principal components

Through the score matrix table in Table 4.5, we can analyze the indicators represented by the two main components of the precision export level. In the first principal component, the load coefficient exceeded 0.65, indicating the relatively balanced load distribution of the first principal component. Therefore, the first main component mainly summarizes the information of export scale, export gross profit margin, export production capacity, quantity of export commodity inventory, export market share, export market dispersion, proportion of export R & D investment and export capital support. In the second

main component, only the load coefficient of X2 (with the growth of export scale) exceeds 0.65, so the second main component only summarizes the relevant information of the growth of export scale and has a quite high correlation with it. Therefore, the first and second main components can fully and effectively cover the export scale, export gross profit margin, export production capacity, export commodity inventory, export market share, export market dispersion, export R & D investment proportion, export capital support and the growth rate of export scale.

Table 2.6 Composition matrix table

ingredient		
1	2	
Export scale (RMB 100 million yuan)	0.993	
Export scale growth rate of (%)	-0.500	0.751
Export gross profit margin (%)	-0.940	0.086
Export production capacity (KPCS)	0.940	0.316
Quantity of Export Goods (KPCS)	0.920	0.263
Export market share of (%)	0.992	0.061
Export market dispersion	0.935	0.316
Export R & D investment accounted for (%)	-0.718	
Export capital support (RMB 100 million yuan)	0.948	-0.119

2.7 Principal component score calculation

To calculate the specific score of the principal component, first calculate the feature vector of the principal component. The specific calculation formula is as follows:

$$e_{ij} = \frac{a_{ij}}{\sqrt{\lambda_i}}$$

among, a_{ij} Represents the loading coefficient of the j th variable in the pre-rotation principal component load matrix. λ_i Represents the eigenvalue of the i -th principal component; e_{ij} Represents the corresponding values in the normalized orthogonal vectors. The score of each principal component is calculated from the product of the standardized eigenvector matrix and the normalized processed raw data:

$$F1 = 0.372X1 - 0.187X2 - 0.352X3 + 0.352X4 + 0.345X5 + 0.372X6 + 0.35X7 - 0.269X8 + 0.355X9$$

$$F2 = 0.043X1 + 0.707X2 + 0.081X3 + 0.298X4 + 0.248X5 + 0.057X6 + 0.298X7 + 0.487X8 - 0.112X9$$

Based on the calculation data of the scoring function, we were able to obtain a comprehensive score of the main components of xun Precision during the period 2013-2023 and the current level of export

Table 2.7 2013-2023 Principal component evaluation score scale

Year, F1, F2		
2023	4.83	-1.379
2022	4.075	0.034
2021	2.463	0.872
2020	1.133	1.001
2019	-0.821	1.65
2018	-1.549	0.841
2017	-1.859	0.503
2016	-1.987	-0.824
2015	-2.16	-0.957
2014	-2.412	-0.233
2013	-1.714	-1.51

Table 2.8 The comprehensive evaluation score table of 2013-2023

Growth rate of the year's comprehensive score ranking			
2023	3.65	1	0.421
2022	3.229	2	1.17
2021	2.059	3	1.037
2020	1.022	4	1.465
2019	-0.443	5	0.678
2018	-1.121	6	0.287
2017	-1.408	7	0.268
2016	-1.676	9	0.153
2015	-1.829	10	0.109
2014	-1.938	11	-0.392
2013	-1.546	8	-

2.8 Comprehensive evaluation and analysis of Lixun Precision export status level

From 2013 to 2023, the export performance of Guangdong Lixun Precision Industry Co., Ltd. increased overall, increasing from -1.546 in 2013 to 3.65 in 2023. During the four-year period from 2020 to 2023, Lixun Precision's export performance has exceeded 0 (average). We observed relatively few years above average, which was mainly attributed to the fast export rate of Lixun Precision. Although the company experienced a decline in exports in 2013, it has consistently maintained a rapid growth momentum. Lixun Precision's export level reached the highest growth rate of 1.465 in 2020, but the growth rate began to decline steadily.

Horizontally, from 2013 to 2019, its exports continued to be below average in 2019, but by 2020, its export level began to return to above average; From a vertical perspective, from 2013 to 2023, its growth rate showed a gradual decline. This means that although Lixun Precision Industries's export business has grown in recent years, its continued momentum is still lacking and the company's export business will face many challenges for some time to come.

2.8.1 Export market is too concentrated, the trade risk is bigger

In Continuing Table 4.3, we use the Huffinddal Index

to assess the dispersion of Lixun Precision's export markets. When studying the HHD index, we usually multiply it by 10000 for magnification. According to the guidelines set by the US Department of Justice, when the Huffindale index exceeds 1000, we can define it as an oligorepresented market and conduct an in-depth analysis of market dispersion accordingly. Since 2016, the export market of Lixun Precision has entered the oligarchic market, and since 2019, it has entered the market mode of high low proportion I [14].

Apple's monopoly in Lixun Precision's export market continues to rise. In the current environment, although Lixun Precision is expected to achieve good export returns in the short term, Apple will have significant constraints on its export level, which will undoubtedly bring huge trade risks to Lixun Precision.

2.8.2 Lack of independent innovation, the product competitiveness is weak

From the data in Table 4.3, we observed that the R & D investment of Lixun Precision Company decreased year by year. However, research and development funding is the key to the company to enhance independent innovation ability and enhance brand competitiveness. From the company's annual report data, we can also see that after the proportion of R & D investment decreased, the company's gross profit margin in the export business also showed a trend of decline year by year. Before that, Lixun Precision's gross margin had soared to 22%, but by 2023, its export gross margin had fallen to 11%. In this context, if competitors choose to cut prices, Lixun Precision may be in danger of being fired at any time. Compared with the high per capita profit obtained by other fruit chain companies due to a long period of high R & D investment, Lixun Precision has no obvious competitive advantage. If this continues, the competitive advantage of its products in the market will weaken year after year.

2.8.3 The structure of export products is unreasonable

According to the previous data analysis, in the nearly 11 years of export activity. Among exports, consumer electronics account for over 85%, while other exports are very low. In our export business, the variety of products exported is too monotonous. Although the company's total exports are rising, its growth rate has begun to slow. The revenue that a product brings is ultimately bounded.

From the current situation, the cooperation between Lixun Precision and Chery Automobile enables Lixun Precision to quickly enter the field of automobile manufacturing through a joint venture and investment. However, Lixun Precision also made it clear that in this strategic cooperation with Chery, they did not intend to build complete cars, but to work with Chery to explore the ODM model of the whole vehicle, that is, to build high-quality vehicles for others.

Lixun Precision appears to plan to reduce competitive

pressure in its consumer electronics business by optimizing its export business structure, but the new business segment never accounted for more than 5% of the company's total export revenue. Obviously, the automobile manufacturing business can not be completed in a short time, which requires a long time of fine accumulation.

In view of the special demand for safety of automobile products, there are some uncertainties in product quality and quality control. However, self-built plants can not only more effectively circumvent this problem, but also reduce production costs through mass production and help control the pace of production and delivery.

Therefore, on the whole, the vehicle ODM model may only be attractive to third-line and fourth-line car manufacturers and crossover players, but for those with ambitious and certain strength, this model is less attractive. Therefore, this time, the optimization of the export business structure is not a wise and comprehensive choice.

At the same time, Apple's car-building project is also under way. Through the partnership with Chery, Lixun Precision was able to quickly enhance its overall performance as a core component of the Tier 1 manufacturer, facilitating subsequent partnerships with Apple to build vehicles. From this point of view, Lixun Precision's car manufacturing business is likely to take over apple's car parts production in the future. While this may facilitate revenue growth and structural optimization of the company's export business in the short term, in the long term, it will only increase the company's reliance on Apple.

Therefore, the export structure of The precision products is not reasonable, and the existing measures can not solve this problem well. The structural problems of export commodities remain an obstacle to the healthy growth of Lixun Precision exports.

2.8.4 Insufficient export delivery capacity

Based on the index coefficients calculated in Table 4.6, we observe that the absolute coefficient between the inventory quantity of export goods and the export production capacity exceeds 3.5, which makes their impact on export levels among the top of all indicators. This further highlights the critical role of export delivery capacity in determining export levels. However, we can observe from Table 4.2 that although the export delivery capacity of Lixun Precision still shows a trend of increasing year by year, its growth rate has begun to slow down. However, there is a complex link between the slower growth in export delivery and the low level of automation.

Before 2020, Lixun Precision Company's export inventory and production capacity will show a rapid growth trend, mainly due to an increase in the proportion of R & D revenue, which improves the overall level of automated production. However, after 2020, we observed a significant slowdown in the improvement of delivery capacity due to a decrease in R & D funding and a slowdown in the

automation process. Looking ahead, if export orders grow, Lixun is likely to face capacity shortages.

3 Export countermeasures of Guangdong Lixun Precision Industry

3.1 Expand diversified sales channels and enhance the customer base

Combined with the concept of comparative advantage in classical trade theory, Lixun Precision should continue to make use of its comparative advantage in the field of precision manufacturing and expand the international market through diversified sales channels, such as e-commerce, direct selling, distributor network, etc. [15] This will help companies better leverage their productivity and cost advantages, while reducing their reliance on the single market. This should not only include the e-commerce platform, but also cover the following aspects:

Cross-border e-commerce platforms: Continue to use cross-border e-commerce platforms to expand overseas market coverage, and attract more international buyers through the broad user base and market influence of these platforms.

Direct selling and distributor networks: Building direct selling teams and developing a regional distributor network can help companies penetrate deeper into regional markets while reducing reliance on a single large customer.

Trade exhibitions and conferences: Regular participate in professional exhibitions and industry conferences at home and abroad, which can not only display the company's products and technologies, but also establish direct contact with potential customers.

Partnership: Establish strategic partnerships with other enterprises to promote and sell products through the marketing channels of the partners.

Social media and digital marketing: Use social media platforms and digital marketing tools to enhance brand awareness and build more direct communication and interaction with consumers.

Localized market strategy: develop localized market strategies according to the characteristics of different regional markets, including language, culture and consumer preferences.

Through these diversified sales channels, Lixun Precision can effectively expand the customer base, reduce the risk of single customer concentration, and enhance the market competitiveness on a global scale. [16]

3.2 Strengthen investment in research and development to achieve product innovation

The theory of backwardness advantage emphasizes the possibility of achieving rapid development through learning and adopting advanced technologies. Lixun Precision should increase investment in research and development, enhance product competitiveness through technological innovation, and actively absorb and apply international advanced technology, accelerate product upgrading and iteration, so as to quickly respond to market demand.

Companies should build a cross-functional team composed of people from multiple departments, including R & D, marketing, sales and customer service, to promote the exchange of knowledge and the generation of creativity. We are committed to attracting and retaining innovative talent, including innovative research and development engineers, project managers, and market research experts. Following the trend of technology development, invest in cutting-edge technologies such as artificial intelligence, the Internet of Things, big data and robotics, which can significantly improve the quality of export products and market competitiveness. We need to optimize the product development process and adopt flexible development strategies to enhance the efficiency and adaptability of the development. The research and development process was optimized. In the research and development phase, appropriate risk management strategies need to be established. Assess the potential risks of the R & D project, and develop the corresponding risk management strategies to ensure the smooth progress of the project. Periodically evaluate the progress and results of the R & D projects, and make corresponding adjustments according to the market and business changes.

Lixun Precision has the ability to establish partnerships with other companies, research institutions or universities to jointly develop research and development projects to expand its technical vision.

By implementing these strategies, enterprises have the ability to create a healthy research and development atmosphere, promote technological innovation, and enhance the market competitiveness of their products, so as to maintain their leading position in the fierce market competition environment.

3.3 We will optimize the export business structure and improve its ability to resist risks

Drawing on the theory of new production factors, Lixun Precision needs to pay attention to the role of non-traditional production factors such as technology and innovation in the development of enterprises. By optimizing the business structure, such as increasing the proportion of services and solutions, companies can improve their resilience to risks and reduce their reliance on a single product or market.

At present, the optimization scheme of Lixun

Precision's export business organization does not seem to be working. Similar to Huawei, Lixun Precision follows the strategy of "building cars on a curve". In contrast, Huawei's car-building technology can directly provide vehicle manufacturers with hardware solutions such as autonomous driving chips, smart cockpit and smart connectivity, as well as provide autonomous driving technical support for their partners' vehicles. However, from the perspective of Lixun Precision, the controlling shareholder first invests in an ODM platform, and then conducts a "dynamic entry". This could slow the pace of business optimization, where it can learn from Huawei and provide vehicle manufacturers with hardware solutions such as autonomous driving chips, smart cockpit and smart network connectivity. Combined with the unique nature of the company itself, efforts to shape the unique advantages of the product. Only this car-building strategy can meet the real needs of the current auto industry, thus enhancing the competitiveness of the products, achieving real business improvement, and getting rid of Apple's restrictions on the company.

Looking ahead, Lixun Precision needs to invest more resources and energy in automotive manufacturing to provide manufacturers with more attractive smart vehicle hardware solutions, which will help diversify its export business structure and ensure the company's sustainable and steady growth in the future.

3.4 Improve the automation level of industrial line and strengthen the export delivery capacity

For years, Lixun Precision has attracted workers by setting up factories and expanding production lines overseas, and accumulating delivery capacity through simple manual operations. However, this has its limitations. Combined with the theory of late-development advantages, Lixun Precision should use modern information technology and automation technology to improve the automation level of production line, so as to improve production efficiency and export delivery capacity. This will not only improve the company's production capacity, but also enhance its competitiveness in the international market through its technological advantages.

It first needs an in-depth evaluation of the current production and delivery processes to determine which links can be automated. Based on the evaluation feedback, we set clear automation goals and strategies, and determined the direction of short-term and long-term automation optimization.

Based on the actual demand of production, the company has independently developed or purchased appropriate automation technologies and equipment, such as robots, automatic assembly lines and automated warehouse management systems. We provide our employees with critical technical and operational training to ensure that they can operate the automation tools and systems efficiently.

With the advanced technology of the Internet of Things (IoT), we can ensure seamless connectivity and intelligent monitoring between devices, thus enhancing the transparency and management of production processes. By using big data analytics, we can better optimize production planning and inventory management, and speed up the response based on a data-driven decision-making mechanism.

We must understand that automation is an evolving process, so it needs to continuously evaluate and optimize existing systems, as well as continuous technology development. To adapt to the changing market and technological environment. In the process of introducing new technologies, we also need to assess possible risks and develop risk management strategies accordingly.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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