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Impact of Strategic Direction on the Commercial Management of Indigo Dye

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ABSTRACT

This article analyzed the influence of strategic direction on the commercial management of indigo as the main chemical input in the textile manufacturing process for denim production between 2018 and 2019. The study identified three highly effective generic strategies to achieve better performance than the competitors in this industry sector: commercial leadership, differentiation, and business focus. The study concluded that applying strategic direction in the commercial management of indigo dye improves the company's competitive position in the local market, enabling it to secure large-scale commercial agreements with major manufacturing companies that use this dye in the Peruvian textile sector. Ultimately, it is demonstrated that implementing strategic direction in the commercial management of indigo dye increases the sales of this input, thereby improving the company's annual turnover.

Keywords: strategy, strategic direction, commercial management.

INTRODUCTION

This research study contributes to the understanding of commercial management through the application of strategic direction procedures that yielded satisfactory results in the sales of indigo dye in the Peruvian textile market. The main local manufacturing companies use pre-reduced indigo dyeing processes, making significant contributions and providing essential tools for commercial strategy and management in this textile business.

The main objective of this paper is to show the use of commercial strategy and management in the handling of a basic chemical input for the dyeing denim process. This makes the study unique in its field, as no other research has investigated, presented, and assessed real data on the commercial management of pre-reduced indigo dye in the Peruvian textile market.

The proposed hypothesis is that the sales of the company that markets pre-reduced indigo dye experienced significant growth in 2019 compared to 2018 due to the application of strategic direction in commercial management. This is supported by statistical evaluations and turnover figures of the company.

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Denim fabric is the base product for manufacturing and marketing the well-known jeans. It has a particular and unique manufacturing process. Even the machines used for their production are specific to this process, and the sole dye that can give jeans their distinctive blue worn appearance is indigo; no other dye can achieve this exceptional quality.

There are only two ways of working with indigo dye: in powdered form and as a pre-reduced solution at 30% by weight. The powdered form is the most widely used in Asia and Oceania because of its abundance, shorter processing time, and competitive price. Meanwhile, the pre-reduced form is cleaner, more controlled, and eco-friendly, albeit at a higher cost. It is important to mention that the quality of dyeing with pre-reduced indigo is superior to that achieved with powdered indigo.

According to Guevara et al. (2020), it is safe to say that most people today own at least one pair of jeans, as they pair well with almost anything and are an ideal piece for coordinating outfits. Jeans are versatile and suitable for a variety of situations and styles. However, people may not be aware of the environmental impact associated with their production. According to Federovisky (2019) and other sources, producing one pair of jeans requires 7500 liters of water, while one denim shirt requires 2900 liters. This issue is exacerbated by the purchasing rate of the fast fashion industry, which further harms the environment.

Di Alvarado et al. (2016) state that employees must acquire the essential skills to work in a changing global market. They also state that a strategic plan must be established to sustain operations in the short term and to direct resources and capabilities in the medium and long term. Companies should seek spinning mills that consistently provide high-quality products and form strategic alliances to achieve favorable delivery times, competitive costs, and high-quality products. Companies should also gather information on market trends. As main shareholders, customers have a say in management decisions, so it is essential for companies to continually innovate products and processes aimed at increasing quality and productivity while exploring new markets. A five-year strategic plan should be developed for the organization, serving as it serves as a technical tool to support the company's expansion and positioning in the market.

According to Aguilera (2010), the main objective of studying the theoretical foundations of corporate growth and strategic direction is to approximate the relationship between these two topics as much as

possible. This process aligns with the standards of a fundamental or theoretical study that sets a theoretical basis to achieve the established objective. It is possible to determine that there is a relationship between the two topics, because of the conclusion and the primary outcome of the research, which means that there is a relationship between business growth and the manager's strategic direction, as well as between business growth and investment.

According to Ramirez (2019), training programs are recommended due to issues with empiricism, deficiencies, non-compliance, and distortions in the commercial management of leading companies in the textile sector in Trujillo, which negatively impact their operational capabilities. Among these issues are the non-compliance with certain state provisions related to the necessary standards for achieving objectives, as well as a lack of knowledge or improper application of certain theoretical approaches related to this type of company.

The company is currently facing challenges, as both internal and external factors have negatively impacted its performance. It is concluded that the company must implement a strategic plan that will enable it to continue operating in the short- and long-term while identifying improvement opportunities for growth and market positioning. For an organization to achieve its objectives, strategic direction seeks an appropriate combination and integration of its available resources. This suggests that if an organization's main objective is to grow, then strategic direction must create an action plan that facilitates this growth.

Company growth is a dynamic process that leads to improvements. Changes are often quantitative, or at least that is the expectation of most managers (financial, productive, and market growth, among others). However, to achieve this growth, organizations must also undergo internal and structural changes that will significantly impact how the results expected by managers are developed or materialized.

Taking into consideration the point mentioned earlier, it is important to outline the strategies proposed by the company to succeed in the indigo dye business:

- **Commercial Leadership:** The company aspires to be a leader in this sector, which implies a shared responsibility that requires effective communication, negotiation skills, and management of the market to which the business is directed. The motivation of the commercial

teams does not necessarily come from the manager but also from each team member.

- **Differentiation:** To propose a differentiation strategy, an action plan must be devised to ensure that the product is effectively positioned in the market and distinguished from competitors. This approach will help the brand attract customers and gain their recognition, attention, and loyalty, creating a competitive advantage that will help it stand out and grow over time.
- **Business Focus:** The company maps out the path to achieve its objectives using all the tools and aspects that comprise it, including administration, purchasing, logistics, operations, and sales, and other stakeholders aligned with the same objective.

Theoretical Basis

Indigo has been used for thousands of years to dye fabrics. The earliest records of its use date back 6 000 years in Peru; other regions where it was used include Mesopotamia, Ancient Egypt, Mesoamerica, Africa, India, Japan, and Southeast Asia. The plant was originally domesticated in India, which for centuries was the main supplier (hence the name “indigo”, meaning “from India”). In ancient Greece and Rome, as well as in Japan, India, and Europe, wearing garments dyed with the so-called *blue gold* was considered a sign of elegance and wealth.

In Ancient Egypt, there was only one boat with a purple sail, owned by the pharaoh. It sent a loud and clear message to other Nile users: make room for the royal family’s vessel. Even today, colors like crimson, purple, and dark blue are regarded as symbols of wealth, royalty, and luxury, due to the excessive cost and complexity of obtaining these shades with natural dyes. Natural dyes—derived from plants, animals, or minerals—were the only methods available for dyeing textiles until the invention of synthetic dyes a century ago. Indigo is a natural dye that can be sourced from specific plants and animals, and it was used to create the deep purple color of the pharaoh’s sail. We even know the methods that ancient civilizations used to dye their textiles thanks to Roman scientist Pliny the Elder. Through the project proposed by Farusi (2013), students can extract indigo from woad leaves, closely mirroring the techniques of pioneering chemists.

The definitive mechanism of indigo was established by Carl Heumann in 1890 and has been used since 1897. Heumann developed another useful synthesis using naphthalene as a raw material, which was

a waste product of the coal tar industry. His method of producing synthetic indigo quickly became the standard, as it was more affordable than natural dye. The first batches of artificial indigo were introduced by Bardiche Anilin und Soda Fabrik (BASF) and were made entirely from synthetic components (Campos, 2020).

The production of industrial indigo involves the use of numerous harmful substances, such as sodium hydrosulfite, cyanide, and formaldehyde. For this reason, a team of scientists at the University of California, Berkeley, led by John Dueber, recently sought a less environmentally damaging technique. Inspired by Chinese indigo (*Polygonum tinctorium*), another plant that produces the color, they took the genes responsible for indigo production and inserted them into the easily cultivated industrial bacterium *Escherichia coli*. They used the pigment and enzymes produced by the bacteria to dye the fabric in this way. This approach demonstrated that it is possible to revolutionize polluting industrial processes through genetic engineering to reduce the environmental impact, even if this method has not yet reached commercial efficiency. This advancement means that people can continue enjoying blue jeans guilt-free. The story of indigo in the fashion industry continues (Milenio, 2018). Figure 1 illustrates the shape of synthetic indigo and samples of indigo-dyed fabrics.

METHODOLOGY

According to Fernandez et al. (2014), quasi-experimental design aims to study the influence of treatments and/or processes of change in situations where the subjects or observation units have not been assigned randomly. This research is quasi-experimental, based on a commercial analysis of indigo dye (monthly turnover in 2017, 2018, and 2019) for Arch. Perú S. A., which is a company in the denim market that utilizes indigo.

The research design is structured as a time series format represented as follows:

$O_1 O_2 O_3 X O_4 O_5 O_6$

Where:

X: application of strategic direction in the commercial management of indigo

O_1, O_2, O_3 : indigo turnovers before applying X

O_4, O_5, O_6 : indigo turnovers after applying X



Figure 1. Powdered indigo and samples of indigo-dyed fabrics.
Source: Núñez-Reveco (2017).

For the detailed development of the implementation of strategic commercial management, the implementation of the strategic direction and the before and after stages will be considered.

Type and Approach

This study is considered experimental research with a quantitative approach, employing techniques and instruments such as:

- Survey (questionnaire)
- Observation (logbook)

Population

According to Arias-Gómez et al. (2016), the research population consists of a defined, accessible, and limited group of instances that will guide the selection of a sample meeting specific preset requirements. They sought to connect all the factors that should be considered when developing a protocol for participant selection, including the concepts of study population, sample, selection criteria, and sampling methodologies.

The research focuses on the indigo market for manufacturing denim, which is essential for making jeans. The study population will comprise the invoicing data from the three main denim fabric manufacturers in Peru: Cía. Nuevo Mundo, Tejidos San Jacinto, and Tejidos Pisco. The values to be studied will be the invoicing of these companies, provided by Arch. Perú S. A. in the years 2018 and 2019. The sampling method will be non-random since it relies on the company's invoicing data.

Inclusion and Exclusion Criteria

- Inclusion criteria: Only working days (Monday through Friday) and the months of the company's billing months were considered.
- Exclusion criteria: Non-working days, including holidays, Sundays, and corporate vacations, were also considered.

Techniques and Instruments Used

Data were collected from the information provided by customers regarding indigo applied to denim, as well as sales statistics from Arch. Perú S. A.

The research was conducted through readings, document analysis, and direct observation of relevant facts.

Additionally, an analysis of the indigo dye sales history was conducted before and after the improvement in commercial management.

Procedure Performed in the Pre-Experiment

Sales data from the company during 2018 were collected. In this year, the results of the application of strategic direction in the commercial management of indigo dye were not yet reflected. Sales data for 2019 were also gathered. During this year, the implementation of strategic direction in the commercial management of indigo dye yielded positive results, including improved market leadership positioning and an increase in sales of indigo dye.

Information Analysis Procedure

The information was classified and sorted according to competitiveness in the commercial textile sector of the indigo market and presented in the data analysis matrix. The Minitab 19 software was used to conduct the normality test (Anderson-Darling) on the company's sales data from 2018 and 2019.

A test for equality of variances was performed to demonstrate that the datasets shared points of coincidence. This test confirmed that the variances are statistically equal, as indicated by the p -value (0.124), which is greater than the significance level ($\alpha = 0.05$).

RESULTS

The effects of applying the strategic direction became evident in 2019, as shown in Table 1, which displays the kilograms sold per customer in USD.

Table 2 provides the total sales of the company for 2018 (before the application of the strategic direction) and 2019 (after the application of the strategic direction) in detail.

Notably, the total annual sales significantly increased in 2019 compared to 2018, with an increase in turnover of USD 1 800 888.17 (15.87%).

Likewise, Table 3 provides the statistical sales data for 2018 (before the application of strategic direction) and 2019 (after the application of strategic direction) in detail.

Figure 2 presents a box-and-whisker plot that compares sales in 2018 (before the application of strategic direction) and 2019 (after the application of strategic direction) in detail. It is observed that both the median and the whiskers are higher in 2019.

The Anderson-Darling normality test was conducted using Minitab 19 for the 2018 sales turnover (Figure 3).

A normal distribution is observed in 2018 sales.

Likewise. The Anderson-Darling normality test was conducted using Minitab 19 for the 2019 sales turnover (Figure 4).

It is observed that the sales values for the year 2019 show a normal distribution.

Table 1. Sales of Indigo Dye per Customer.

Customer	Nuevo Mundo Company		San Jacinto		Tejidos Pisco	
Indigo sales per year	Kilograms	USD	Kilograms	USD	Kilograms	USD
Indigo Turnover 2018	66 139.00	195 274.12	106 160.00	297 411.59	27 840.00	90 555.10
Indigo Turnover 2019	483 693.00	1 895 091.76	140 000.00	558 338.32	114 828.00	447 204.04
TOTAL	549 832.00	2 090 365.88	246 160.00	855 749.91	142 668.00	537 759.14

Source: Prepared by the author.

Table 2. Total Annual Company Sales in 2018 and 2019.

	2018	2019
Month	USD	USD
October	765 540.68	1 037 790.49
November	841 793.35	1 054 153.22
December	893 100.93	960 929.94
January	987 043.96	1 235 918.03
February	870 808.61	937 942.76
March	1 074 578.44	1 064 493.52
April	925 901.88	1 390 135.00
May	1 094 708.98	1 128 652.07
June	883 608.70	1 097 985.45
July	917 397.37	1 079 654.97
August	1 026 588.23	803 231.92
September	1 067 123.45	1 358 195.38
Totals	11 348 194.58	13 149 082.750

Source: Prepared by the author.

Table 3. Statistical Data in 2018 and 2019.

Statistics	2018	2019
Mean	945683	1095757
Mode	0	0
Median	921650	1072074
Standard deviation	103786	168212
Quartiles	874009/1056990	980145/1209102
Skewness	0.003969	0.336015
Kurtosis	-0.968340	0.085839

Source: Prepared by the author.

The test of equality of variances was performed to demonstrate that the datasets shared points of coincidence. This test confirmed that the variances are statistically equal, as indicated by the p -value (0.124), which is greater than the significance level ($\alpha = 0.05$), as shown in Table 4.

Figure 5 shows the variance test plot.

Hypothesis Testing

The statistical hypotheses are as follows:

H_0 : There is no variation in 2019 sales compared to 2018 sales using strategic direction in the indigo business.

H_1 : Sales in 2019 increased compared to sales in 2018 using strategic direction in the indigo business.

A confidence level of 95% will be considered and this results in $\alpha = 0.05$.

As explained in the runs with the Minitab software, it was found that $p = 0.008$, which is less than 0.05.

This indicates that the null hypothesis (H_0), asserting that sales have not changed between 2018 and 2019 using the strategic direction, is not valid and therefore is rejected.

As a result, the alternative hypothesis (H_1), asserting that sales in 2019 increased compared to 2018 using the strategic direction, is accepted. This is further supported by Table 5.

As confirmation of the veracity of the hypotheses, Table 6 also shows that, following the adoption of strategic direction in the commercial management of pre-reduced indigo, sales of this dye increased substantially.

This increase in sales is closely related to the import of indigo, as demonstrated in Table 7. Thus, there is a directly proportional relationship between imports and sales of indigo in the local textile market.

DISCUSSION

The validity of the accepted hypothesis (H_1) was confirmed through the box-and-whisker plot generated in Minitab, which clearly illustrates the increase in sales in 2019 compared to 2018.

Likewise, hypothesis (H_1) was further validated by the data in Table 7, which shows that imports of indigo dye were 87.53% in 2019, compared to 52.85% in 2018. This rise in imports is directly proportional to the increase in sales and the competitive positioning of the company, which is driven by the implementation of strategic direction.

According to Arango et al. (2008), identifying the various factors involved in supply chain management and focusing on the production subsystem aims to measure, analyze, evaluate, and suggest improvements to administrative procedures. This research is part of an empirical investigation conducted in the textile industry.

Águila and Diaz (2020) note that modern companies employ a variety of methods to position themselves in their markets, striving for optimal operational performance and maximum customer satisfaction while ensuring the quality of their products. This means that decisions must be supported by a thorough analysis of the company's history, potential future directions, and the advantages and disadvantages within its operational environment. Commercial management should guide the company toward increased sales revenue while defending against competitive threats.

Fontalvo et al. (2011) explain that the process of generating numerical results by comparing figures from the profit and loss statement or balance sheet produces financial ratios or indicators. However, these results are meaningless on their own, as the only way to obtain more meaningful insights and make inferences about the true financial situation of a company is to relate them to other results and

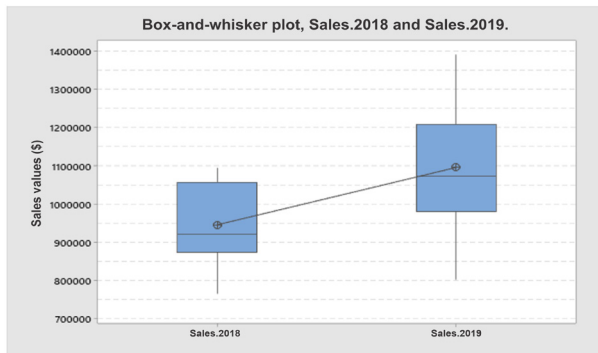


Figure 2. Box-and-whisker plot, sales in 2018 and 2019.
Source: Prepared by the author.

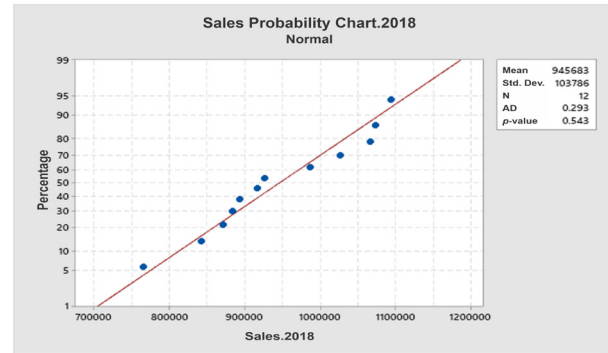


Figure 3. Normality test for 2018 sales.
Source: Prepared by the author.

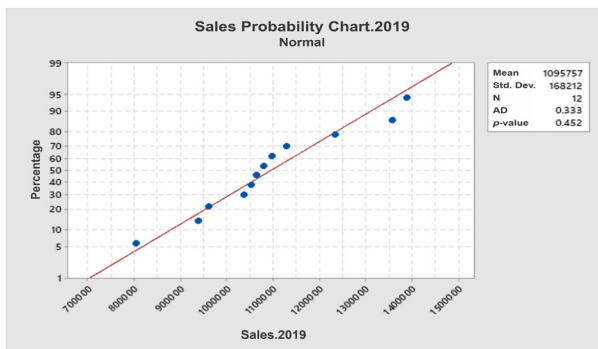


Figure 4. Normality test for 2019 sales.
Source: Prepared by the author.

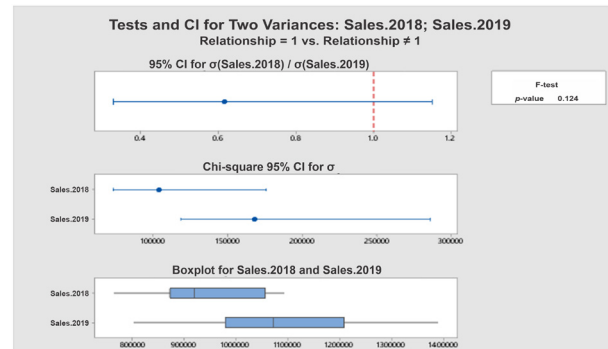


Figure 5. Variance test plot.
Source: Prepared by the author.

Table 4. Statistical Data - Tests of Variances.

Descriptive Statistics				
Variable	N	Std. Dev.	Variance	95% CI for σ
Sales.2018	12	103786.011	1.08E+10	(73521.507; 176215.987)
Sales.2019	12	168211.647	2.83E+10	(119160.315; 285602.858)
Relationship of Standard Deviations				
Estimated ratio = 0.616997				
95% CI for the ratio using F: (0.331;1.150)				
Test				
Null hypothesis	$H_0: \sigma_1 / \sigma_2 = 1$			
Alternative hypothesis	$H_1: \sigma_1 / \sigma_2 \neq 1$			
Significance level	$\alpha = 0.05$			
Method	Test Statistics	df1	df2	p-value
F	0.38	11	11	0.124

Source: Prepared by the author.

Table 5. *Runs Test Using Minitab Software.*

Method				
μ_1 : average sales.2018				
μ_2 : average sales.2019				
Difference: $\mu_1 - \mu_2$				
Equality of variances was assumed for this analysis.				
Descriptive statistics				
Sample	N	Mean	Std. Dev.	SE Mean
Sales.2018	12	945683	103786	29960
Sales.2019	12	1095757	168212	48559
Estimation of the difference				
Difference	Pooled Std. Dev.	95% upper bound for difference		
-150074	139762	-52098		
Test				
Null hypothesis		$H_0: \mu_1 - \mu_2 = 0$		
Alternative hypothesis		$H_1: \mu_1 - \mu_2 < 0$		
T-value	df	p-value		
-2.63	22	0.008		

Source: Prepared by the author.

Table 6. *Indigo Dye Turnover in 2018 and 2019.*

	Totals (USD)
Indigo dye turnover in 2018	583 240.81
Indigo dye turnover in 2019	2 900 634.12
Total in 2 years	3 483 874.93

Source: Prepared by the author.

Table 7. *Indigo Dye Imports in 2018 and 2019.*

Dye Indigo Imports			
Company	Year 2017 (kg)	Year 2018 (kg)	Year 2019 (kg)
The competition	607 348.00	342 300.00	112 170.00
Arch. Perú S. A.	152 640.00	383 740.00	787 690.00

Source: Prepared by the author.

compare them with those of previous years and with companies in the same sector. This is a crucial point used in this paper to understand everything about the company's performance.

Novoa and Sepúlveda (2009) state that organizations have achieved remarkable results by optimizing their functional tasks (such as manufacturing, finance, and sales) yet they have exhausted potential improvements in these areas to the point that there is currently no room for enhancement. However, insufficient attention

has been given to cross-functional work, such as supply chain management and tasks performed by separate organizations. In other words, there is significant potential for improvement in these areas, particularly by addressing issues such as the cost of managing links in the same chain and transaction costs between economic sectors, as discussed in this paper.

According to Jaramillo (2016), it is critical to emphasize that there are differences in profitability and working capital management across industries

and countries, complicating comparisons with findings from other studies. Certain industry subsectors may require holding large inventories, while others may not. In addition, there may be a large difference in the profitability levels among industries.

Valdivia and Stefanu (2018) argue that any company aiming to develop a business plan that focuses on the future should adhere to specific guidelines, avoiding myths that should not be upheld, as they may simply be deceptions that lead to market chaos. There is a common belief that the company with the largest customer base will dominate the market.

In the past, strategic direction in commercial management was primarily applied in intangible businesses, such as insurance and bank shares, among others. Nowadays, there is a growing challenge to extend these tools to all types of businesses. Textile manufacturing and industrial chemical companies are already embracing strategic direction. One of the main reasons for this shift is that these industries have a clear understanding and control of their products, which allows for better inventory management without raising their operating costs.

CONCLUSIONS

The generic strategies proposed for the objective set have been successfully implemented: commercial leadership, differentiation, and business focus. In terms of leadership in the sector, the company managed to displace the competition by differentiating itself using a superior commercial strategy focused on achieving the set commercial objectives (Tables 5 and 6).

It has been demonstrated that the strategic direction in the commercial management of indigo dye increases the company's sales and improves the company's annual turnover (Table 2).

The company's annual balance sheets reveal significant cash inflows between 2018 (USD 11 348 94.58) and 2019 (USD 13 149 082.75), due to the implementation of strategic direction in the management of the indigo sector.

Furthermore, the sales values for 2018 and 2019 follow a normal distribution, as confirmed by tests conducted using Minitab software.

For commercial strategic direction to succeed, all areas of the supply chain must be involved, especially since the product is manufactured in Asia

and must be imported at the correct times and under suitable conditions to ensure customer satisfaction.

The import volumes of the core product are directly proportional to the increase in the company's sales. This relationship is a crucial factor for the company's growth and financial stability.

It can be added that this research study aims to further technify the sales of chemical inputs in general, as this process can be applied to any imported or locally manufactured industrial additive. By technifying the sales of chemical inputs, the role of engineers across various industrial sectors will be supported by a valuable management tool such as strategic direction. There are industrial sectors where sales must be focused on technical and logistical aspects, which creates a specific commercial executive profile for engineers in general.

Moreover, this research study can be adapted and extended to different industrial sectors such as the paper industry. In the same company, a similar work philosophy to that used with indigo dye was implemented, resulting in positive commercial outcomes. Therefore, implementing a strategic direction can be viewed as a necessary condition for large-scale industrial chemical input businesses, that is, those reliant on significant imports of products and/or chemical inputs.

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