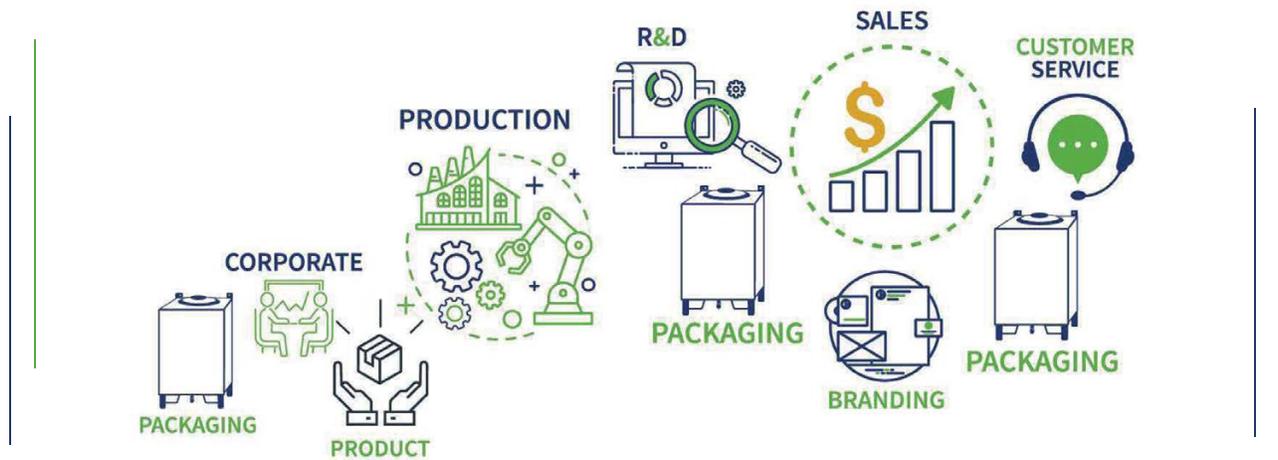


SUSTAINABILITY IN CHEMICAL PACKAGING

The chemical supply chain is highly complex and impacts all stages of the manufacturing process, from the development of base chemicals, to product delivery, to the end user.

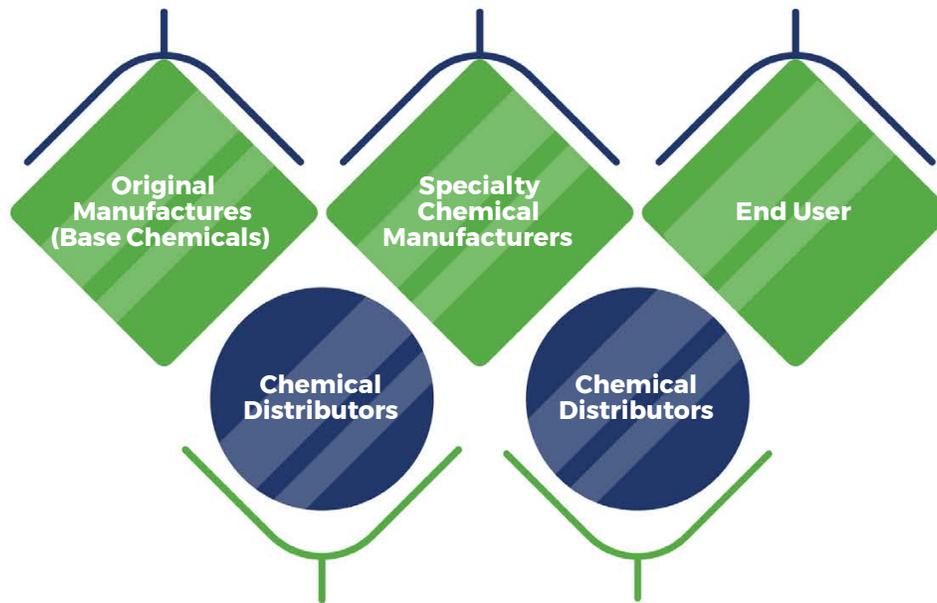


While there are many packaging options available to support this complex supply chain, sustainable chemical packaging optimizes water usage, recycling, transportation and other salient factors. The environmental, economic and societal needs of current and future generations benefit from the use of a sustainable chemical packaging business strategy. This white paper provides a closer look at the details and supportive rationale behind effective and sustainable chemical packaging.

CURRENT STATE OF THE CHEMICAL SUPPLY CHAIN

A **successful chemical supply chain** enables the corporate needs for planning, sales, R&D, branding, packaging, profitability, growth, and sustainability goals while actively and efficiently supporting customer service, environmental, transportation, client and end user needs.

The supply chain is **complex and its mapping** can take several paths. Both base and specialty chemical manufacturers market and move products to their clients through chemical distributors and direct to end users, in some cases.



This diverse supply chain mapping requires different approaches to product packaging. These packaging differences are a result of not only product movement through the supply chain, but the requirements defined by the variables in R&D, production, branding, sales and customer service needs. Further, when considering the widevariety of applications chemical industries serve, the diversity of packaging needs is readily apparent.

WHY HAVE A PACKAGING STRATEGY ?



An effective packaging strategy will reduce operational risks, resolve packaging challenges and foster growth plans with impact to the following areas:

OPERATIONAL SAFETY PLANNING

Match safest packaging method for the product and its supply chain mapping.

CURRENT OPERATIONS AND FUTURE GROWTH PLANS COMPATIBILITY

To achieve success, operations and growth must be scalable over time and with market conditions.

PROMOTE FOCUS ON SUSTAINABILITY

The packaging strategy should consider environmental, economic and societal needs and impact.

CHEMICAL COMPATIBILITY CONTROL

Safety, sustainability and profitability depend on effective selection of chemical packaging material.

LIFE CYCLE CONTROL

Effective packaging requires standardized/controlled processes, from raw material delivery through to finished products.

INFORMED DECISION MAKING

Constant monitoring and feedback of all packaging-related factors is required throughout the supply chain process.

COST OPTIMIZATION

Carefully select packaging to meet branding, marketing, transportation and operational needs.



The following key considerations are important in the development of a packaging strategy.



- Customer satisfaction is priority –each customer situation is unique and there is no common, ‘one-size-fits-all’ solution.
- Efficient packaging strategies are developed in partnership with all involved parties including raw material suppliers and customers.
- The strategy must not cause disruption in operations during design or execution phases.
- All possible combinations of strategy options and variables must be understood and evaluated.
- A workable strategy will align to corporate goals and should provide benefits to all functions of the business including Health/Safety/Environmental/Quality, finance, operations, sales, sustainability and other related areas.
- The strategy must include measurable key performance indicators (KPIs), a feedback for operational improvements.
- The strategy must be capable of evolving with company growth.

CHEMICAL PACKAGING COST CONSIDERATIONS

Multiple factors contributing to chemical packaging cost must be studied. Primary cost factors are summarized in this section.

PACKAGING TYPES

Based on the supply chain requirements of chemical production being considered, the most cost effective and sustainable packaging option should be considered. These options include drums, plastic one-ways, biodegradable containers, reusable IBCs, injection units, bulk tanks and more.

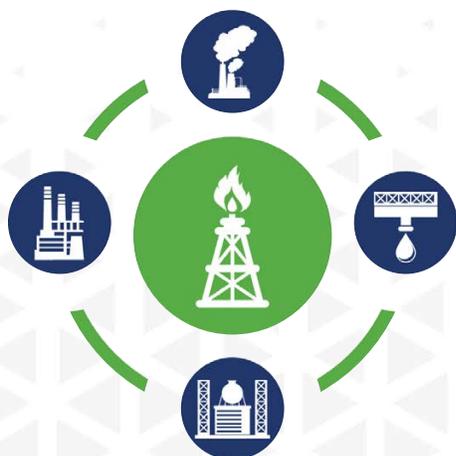
RECYCLING

When containers cannot be satisfactorily cleaned and reused in compliance with company and regulatory requirements, recycling or other means of disposal must be considered. The complete cost of all steps of recycling or disposal should be evaluated.



CLEANING

Each chemical stored and the type of chemical packaging utilized should be studied for cleaning and chemical compatibility requirements. Chemical disposal considerations/logistics, cleanliness testing/certification requirements, company/regulatory cleaning standards, and other cleaning-related factors must be evaluated.



TRANSPORTATION EFFICIENCY

Whether packaging can be stacked or palletized, handled manually or by forklift and how packaging is secured for transport, the type and capacity of transport and hazardous nature of the chemical are important cost factors to consider.

LABOR

Many aspects of chemical packaging operations have a significant labor element that must be understood and efficiently managed throughout the packaging life cycle.

STORAGE

The cost varies and must be evaluated individually for onsite, offsite, covered or open storage. There are options for lease storage and 3rd party packaging solutions that can also be considered.

TRACKING & SECURITY

Either by company or regulatory requirement, some products require tracking and security measures to be implemented during various or all parts of the supply chain process. Some security solutions are policy or procedure based and some involve electronic tracking and control of volume, temperature, humidity and location. Tracking is a reliable proof of delivery and facilitates timely invoicing and payment.



COST METRICS

When considering various packaging options (drums, plastic one ways, reusable IBCS, etc.) it's important to understand the required quantity of each to package the forecasted production amount.

PURCHASE OR LEASE

This factor is best evaluated after the other costs in this section are known since there are commercial options which can vary, depending on the packaging and marketing situation being considered.



SUSTAINABLE CHEMICAL PACKAGING STRATEGY IMPLEMENTATION

A **chemical packaging strategy** is a four-phase process and implemented with current and future operations in mind. A summary of each phase is contained in this section.

PREPARATION

key to promote the development of a suitable strategy and considers:

- Project goals and scope definition. As an example, will the strategy consider the whole company, a region, a group of customers and/or suppliers or specific chemicals?
- Scope and goal must align with corporate goals.
- The project is most effective with a multi-disciplined team such as purchasing, supply chain, sales and engineering.
- Identify information that will be required such as quantities, type of packaging plant of origin, plant of final destination, type of chemical, volumes, 'order date' and 'lead time', etc.
- Start gathering and compiling information.

ANALYSIS AND DEVELOPMENT OF A PACKAGING STRATEGY

involves transforming collected data into meaningful insights and operational scenarios.

- This phase is key, not only to ensure data in use is appropriate, but to interpret and convert that data into meaningful insights useful for successful packaging strategy development.
- Development of business process workflows is helpful to understanding strategy variables such as vendor/customer/packaging locations, chemical inflows/outflows, transportation, test requirements, storage locations and other relevant factors.
- Select and monitor KPIs such as average distance for every shipment, average delivery time and average volumes.
- Review and interpret the performance indicators in terms of your workflows.
- Review the cost/benefit of technologies such as GPS, barcoding, RFID, level monitoring, inventory management, etc.
- Explore solutions to reduce repackaging and logistical transloading.

SELECTION OF PACKAGING

is based on informed decisions throughout the process.

- Safety must always be a first priority.
- Ensure sustainability of the chosen packaging strategy, not only in terms of Corporate Social Responsibility (CSR) and cost, but for the sustainability to remain valid and accommodate future company growth.
- Always be aware of chemical compatibility.
- Develop rental vs. purchase calculators.
- Build Request of Quotation Scorecard.

EXECUTION

strategy without action is a waste of time.

- The solution and the execution should be tailored to your operations and time requirements, and aimed to deliver improved performance, operational efficiency and have a sustainable impact.
- Special focus should be placed on:
 - Safe operations at all times
 - Avoiding disruption to operations
 - Team training
 - KPI establishment and monitoring



BENEFITS OF AN EFFECTIVE PACKAGING STRATEGY

Minimize packaging challenges, reduce operational risks and meet growth expectations.

Sustainable chemical packaging optimizes water usage and promotes social responsibility.

Processes from raw material inflow to finish product delivery, are better controlled.

KPI monitoring throughout the supply chain process provides informed decision-making information.

Packaging strategies that address branding, marketing, transportation and operational needs result in cost optimization.

SUMMARY

An effective chemical packaging strategy is a safe, efficient and cost effective solution, with sustainability, social responsibility, controlled chemical compatibility, optimization of costs and profit, informed decision making and reduced logistics at its core. In short, an effective strategy is about finding the right solution that provides equilibrium and growth potential for your organization.

