
Paint Manufacturing

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INDUSTRY PROFILES

Introduction

This Industry Profile is one of a series briefly describing small or medium-sized industries. The Profiles provide basic information for starting manufacturing plants in developing nations. Specifically, they provide general plant descriptions, financial, and technical factors for their operation, and sources of information and expertise. The series is intended to be useful in determining whether the industries described warrant further inquiry either to rule out or to decide upon investment. The underlying assumption of these Profiles is that the individual making use of them already has some knowledge and experience in industrial development.

Dollar values are listed only for machinery and equipment costs, and are primarily based on equipment in the United States. The price does not include shipping costs or import-export taxes, which must be considered and will vary greatly from country to country. No other investment costs are included (such as land value, building rental, labor, etc.) as those prices also vary. These items are mentioned to provide the investor with a general checklist of considerations for setting up a business.

IMPORTANT

These profiles should not be substituted for feasibility studies. Before an investment is made in a plant, a feasibility study should be conducted. This may require skilled economic and engineering expertise. The following illustrates the range of questions to which answers must be obtained:

- * What is the extent of the present demand for the product, and how is it now being satisfied?
- * Will the estimated price and quality of the product make it competitive?
- * What is the marketing and distribution plan and to whom will the product be sold?

- * How will the plant be financed?
- * Has a realistic time schedule for construction, equipment, delivery, obtaining materials and supplies, training of personnel, and the start-up time for the plant been developed?
- * How are needed materials and supplies to be procured and machinery and equipment to be maintained and repaired?
- * Are trained personnel available?
- * Do adequate transportation, storage, power, communication, fuel, water, and other facilities exist?
- * What management controls for design, production, quality control, and other factors have been included?
- * Will the industry complement or interfere with development plans for the area?
- * What social, cultural, environmental, and technological considerations must be addressed regarding manufacture and use of this product?

Fully documented information responding to these and many other questions should be determined before proceeding with implementation of an industrial project.

Equipment Suppliers, Engineering Companies

The services of professional engineers are desirable in the design of industrial plants even though the proposed plant may be small. A correct design is one that provides the greatest economy in the investment of funds and establishes the basis of operation that will be most profitable in the beginning and will also be capable of expansion without expensive alteration.

Professional engineers who specialize in industrial design can be found by referring to the published cards in various engineering magazines. They may also be reached through their national organizations.

Manufacturers of industrial equipment employ engineers familiar with the design and installation of their specialized products. These manufacturers are usually willing to give prospective customers the benefit of technical advice by those engineers in determining the suitability of their equipment in any proposed project.

VITA

Volunteers in Technical Assistance (VITA) is a private, non-profit, volunteer organization engaged in international development. Through its varied activities and services, VITA fosters self-sufficiency by promoting increased economic productivity. Supported by a volunteer roster of over 5,000 experts in a wide variety of fields, VITA is able to provide high quality technical information to requesters. This information is increasingly conveyed through low-cost advanced communication technologies, including terrestrial packet radio and low-earth-orbiting satellite. VITA also implements both long- and short-term projects to promote enterprise development and transfer technology.

DESCRIPTION

The Product

Paint is a fluid suspension of finely ground pigments in a resinous liquid known as the "vehicle." When applied to a surface as a thin liquid film, it changes to a solid. Paint is used in all countries to decorate and protect surfaces.

The many kinds of paint may be classified according to use: trade-sales paints are used to paint houses; commercial or maintenance paints are used for painting buildings and ships; and industrial paints are used on machinery, manufactured goods, and motor vehicles.

The Facility

This Profile describes a small plant that will serve local needs, mainly in the trade-sales sector. Its output may exceed 4,000 liters per week (L/wk). For economic reasons, at least part of its total output may have been imported in bulk, and then tested, modified, and repackaged for the local market.

Paint is made in batches because the huge variety of uses and variation in raw materials require adjustments of its properties. The kind of plant varies somewhat according to the kinds and amounts of paint to be made and whether the process starts with raw or partially processed materials.

GENERAL EVALUATION

Many people work in some aspect of the paint business; for example, distribution, application, or marketing. Some of them may recognize that the time is ripe for starting local paint manufacture. Operating a paint factory does not need large capital investment, but is technically complex and must take into account the special needs of the local market. Moreover, success requires careful planning and deliberate growth. A new business should acquire the services of an experienced consultant.

Outlook

The world's paint industry operates at an annual level of US\$20,000 million (estimated 1989 costs) with an annual, real increase of three percent. Rates of use depend on a country's geography, industrial development, and the income structure of the population. Lacking specific information on these factors, a rough estimate of annual trade-sales use is 400,000 L per million population. Of the total market, trade-sales paints make up about 40 percent, maintenance paints 20 percent, and industrial paints 40 percent.

Local manufacture should be considered when the costs of importing the finished product become too high. Government policy may encourage local manufacture. To help decide the best time to start in a country where labor costs are relatively low, estimate that half of the cost of imported materials is due to high labor costs in the industrial countries.

At the start, a business plan should be jointly prepared by the local entrepreneurs, appropriate government authorities, and the consultant. It includes levels of production, a developmental time table, and concurrent development of technical expertise and market knowledge.

The standards for finished paint usually are established by the customers. They relate to color, viscosity, composition and percent of solids, gloss, and so on. Tolerances to product variation are relatively broad in trade-sales products: an off-color white house paint may be acceptable. But industrial tolerances are narrower: a slightly off-color automobile paint will be unacceptable.

Regardless of plant size, each paint must be tested and warranted by the manufacturer to meet the specifications established by the supplier and the customer. Raw materials are never uniform, the process of dispersing the pigments in the vehicle is often unreliable and color matching is erratic. For such reasons every batch of paint, whether imported or locally manufactured, needs to be tested and approved, or modified to meet established standards. Inadequate or inefficient quality control can lead to business failure.

Manufacturing Equipment Flexibility

Tanks, mixers, dispersion mills and pumps exist in large variety. The usual justifications for dedicated, expensive equipment are to reduce labor costs and to meet production levels, factors that are of relatively low importance in many countries.

Each company should buy the most readily and economically available equipment and then operate it as skillfully as possible. In making decisions on equipment flexibility, the technical manager takes into account the properties of construction materials as well as fire and safety hazards.

Knowledge Base

Three kinds of experts are usually needed to start a paint factory. The entrepreneur, who must be identified first, has access to capital, knows the business environment, is influential in government circles, and is enthusiastically committed. The sales manager must capably manage cost accounting, marketing, and distribution. The technical manager, who should be an experienced, technically-trained engineer or chemist, manages the purchasing, as well as laboratory and manufacturing operations. Purchasing is a technical function because substitutions are frequently made, and delivery and manufacturing schedules require coordination.

Quality Control

Every factory requires a laboratory to test both incoming raw materials and outgoing finished products. It must be staffed by persons who can use testing equipment (e.g., viscometers, balances, colorimeters, calculators) and application facilities (spray guns, spray booths, dip tanks, brushes) and interpret the results. This phase of the business cannot be ignored or neglected.

Constraints and Limitations

Promised delivery dates of materials are frequently unmet. Materials that are received may be off specifications, with replacement both costly and time consuming. To help avoid these disappointments, the supplier, the paint maker, and the customer must work together. Substitutions can sometimes be agreed upon if the company can develop an alternative product or method of application by understanding the science behind the technology.

MARKET ASPECTS

Users

Paint is a luxury item that has critical users with requirements that differ from place to place. In countries where labor costs are high, trade-sales products must have the properties of easy brushing, high hiding, and extreme durability. Elsewhere, color and appearance are the main criteria. It would be too costly to duplicate the first-named properties where labor cost is not a critical factor. In addition, paints must be formulated for local conditions: climate, color preferences, materials and labor availability.

Maintenance and marine finishes must meet international standards. A few multinational firms distribute them throughout the world. Industrial finishes are designed for specific end uses. The users have modern application equipment and painting is an integral part of the manufacturing process. Most industrial finishes are imported, but a local paint company that has acquired market and technical experience can consider making industrial finishes to given specifications.

Suppliers

Raw materials are rarely manufactured in nonindustrial countries because the manufacture of pigments, solvents, and resins requires complex, capital-intensive operations. Thus, it is most often the large, multinational chemical producers that sell these materials to paint manufacturers. Some intermediates (vegetable oils, varnishes, alkyds, polyvinylacetate (PVA) emulsions) can be made in smaller plants. Additives are used in small amounts, but they are proprietary and are bought from the manufacturers. Raw-material suppliers are an important source of information. They provide formulas and technical assistance on the use of their products. Even so, products claimed to be "easy to use" (e.g., PVA emulsions) can be misused.

Multinational companies distribute their products widely and have agents in many countries. It is always best to work with the local agents. Because packaging and transportation are major cost factors, it is advisable to buy from companies located so that they can ship over short distances.

Sales Channels and Methods

Trade-sales paint outlets may be independent merchants or company-controlled shops. Sales channels thus must be selected with adequate market knowledge. New products can be promoted through radio, TV, newspaper advertisements, special offers, or locally appropriate means. Painting contractors should be directly approached. It is necessary to be part of the local business network to get the best results.

Maintenance-paint sales usually begin with social contacts. When accord has been reached, the technical people of both the supplier and the customer together sort out details and initiate a development and testing program. The paint company may need to import or license the product until a volume or skill level is reached to justify local manufacture.

In the industrial market, one deals directly with key executives of the manufacturing facility. Informal contacts often help key persons of the country or region to gain confidence in the entrepreneurs' manufacturing efforts, thus increasing sales.

Geographic Extent of Market

Sales may be limited to one country, a region or a large city that is both a population and an industrial center. If there is more than one city, each may require different marketing approaches. For example, paints for coastal areas differ from paints used at high altitudes. Satellite plants or local warehouses may be advisable, depending on labor conditions.

Competition

Imported trade-sales paints or locally repackaged, imported, bulk paints may compete with locally manufactured products. Multinational firms may establish local subsidiaries, offering them a guaranteed source of raw materials and competent technical backup. Their strengths are uniformity and reliability, but not versatility. Local entrepreneurs have the advantages of local contacts, lower labor costs, and a more intimate understanding of local needs. It is in the trade-sales area that local manufacturers have the best chance to meet foreign competition.

Market Capacity

In many countries only a few people can afford paintable homes and purchase manufactured goods. However, because nearly all governments seek to improve general living standards, paint manufacture is a potential growth industry. As an example, the factory's business plan may assume (from the best available data) that two percent of the population are paint consumers and that in five years another two percent will become users; thus usage will double in five years.

PRODUCTION AND PLANT REQUIREMENTS

Infrastructure, Utilities

Land (large tract to allow for growth) Buildings (office, warehouse, laboratory, etc.)
Access to transportation Water Power (should allow for tenfold expansion)

Major Equipment and Machinery

Tools & machinery steel tanks or drums (200-L) 1 mixing tank (400-L) 1 mixing tank (1,200-L) portable mixers (several) 1 large paddle mixer 1 pebble mill (about 1,200-L capacity) 1 sand mill (about 120-L/h capacity) 1 small 3-roll mill several pumps filter press or centrifugal filter lift trucks stand-by electric generator storage tanks and filling line scales of different sizes

Support equipment and parts first-aid supplies fire-fighting equipment protective clothing

Cost Summary

Plant equipment \$30,000 Shop equipment 10,000 Fire and safety equipment 5,000 Laboratory supplies 10,000 . . . plus land, buildings, office furniture and supplies, miscellaneous. Cost not determinable.

These costs are conservative guidelines expressed in 1989 US dollars. More precise estimates require knowledge of local availability and market variables. Local government may assist by providing free land, temporary tax relief, venture capital, etc. Licensors may provide technical assistance and international agencies may provide financial assistance. Assistance from all sources should be considered in the business plan.

Materials and Supplies

Raw Materials (selected according to kind of paint): pigments solvents resins vegetable oils varnishes alkyds polyvinylacetate (PVA) emulsions additives

Containers. If they are not locally available, estimate \$10,000 to \$50,000 for a six-month supply.

Labor

Skilled: dispersion foremen color shaders warehouse supervisor, chief quality-control tester paint manufacturing foremen filling-line foremen chief mechanic chief electrician librarian (maintain technical records and organize literature files) fire chief first-aid technician

Semi-skilled: dispersion operators assistant shift foremen cook (if a kitchen is required)

Unskilled: mixers fillers warehousemen cleaning staff loaders housekeepers kitchen helpers (if required)

PROCESS DESCRIPTION

For both large and small plants the main steps in paint manufacture are as follows:

<FIGURE 1>

Mixing and Dispersion

Pigments are usually added to the vehicle by blending the ingredients in a paste mixer. The paste that is formed consists of poorly mixed aggregates of pigment and vehicle; this paste is brought to a specified fineness and uniformity by using an appropriate mill. "Grinding" or shearing wets the individual pigment particles with the liquid vehicle and further reduces the size of the pigment aggregates. For emulsion paints, such as the PVA's, the pigments must be dispersed separately in a mixture of surface-active agents and hydrophilic gums.

Thinning Down and Adjusting

The paste is usually further blended with vehicle, driers, fungicides, and other additives. It is then tinted with colored dispersions to match a desired color standard.

Testing

The paint is tested against standards for color, application properties, and other features. It is then adjusted to meet agreed specifications and released for marketing.

Filtration and Packaging

Filtration is often performed at the time of packaging to remove lumps from the product.

Shipping

REFERENCES

Technical Manuals

The most important and useful references are the publications of the raw-materials suppliers.

Periodicals

Unfortunately, no journals or texts specifically serve the needs of developing countries. However, a technically trained and experienced person can use the libraries and information centers available in many embassies and trade missions, and in local universities and technical centers.

Trade Associations

Industrial countries usually have specific technical and trade associations designed to assist local businesses. To gain access to these sources, consult the Economic Advisor attached to the embassy or trade mission of the country of interest. One example of such an association is Paint Research Associates (PRA), Waldegrave Road, Teddington, Middlesex TW11 B6D, United Kingdom. This organization provides information services in English for a fee.

Equipment Suppliers

For turnkey operations or for new equipment, there are many excellent companies. Many of these have local agents whom should be interviewed. However, it is more usual for a starting company to purchase used or locally fabricated equipment. It is assumed that the entrepreneur of the new company knows of these resources. If not, he may wish to seek a cooperative venture with an experienced partner in an industrial country. For further guidance on this matter, consult the Economic Attache of a favored trading country.

Consultants

Because the paint business is technical, every step must be constantly monitored by well trained technicians. Thus, it is imperative that the entrepreneur have constant access to an experienced, technically trained person, who should be the technical director. Even with such expertise, the entrepreneur should have the backup of an experienced consultant.

VITA Resources

VITA has a number of documents on file dealing with industrial processes.

VITA Venture Services

VITA Venture Services, a subsidiary of VITA, provides commercial services for industrial development. This fee-for-service includes the following: technology and financial information, technical assistance, marketing, and joint ventures. For information, contact VITA.