

Chapter 5

**International Competition in
Industrialized Buildings,
Components, and Appliances**

International Competition in Industrialized Buildings, Components, and Appliances

Penetration of the U.S. housing market by foreign building producers is not widespread, but is greater now than at any time in the past. A number of foreign manufacturers have decided that the potential gains outweigh the risks involved, and have entered the American market already; others plan to do so in the immediate future. Conversely, opportunities for U.S. penetration of overseas markets are, at best, limited.

During the last several years, foreign building system producers have expressed an increasing interest in the U.S. market. Evidence of this includes the substantial foreign presence at expositions like the National Association of Home Builders (NAHB) convention, the number of foreign housing manufacturers seeking U.S. building code approvals, and the actual number of foreign building projects under development in the United States.

Primarily, four factors explain this international competition:

1. a decreasing world building market, especially in the Middle East;
2. aggressive foreign pursuit of technological advances within the housing construction industry;
3. a greater interest in housing quality on the part of U.S. buyers; and
4. a decline of traditional markets to which foreign housing manufacturers export, and a corresponding excess in production capacity.

Foreign building products that may be exported to the United States fall in two distinct categories, systems and components. Building systems, de-

scribed in chapter 2, constitute either the whole or the major elements of a building structure in prefabricated form, and include panelized, modular, “manufactured” (mobile), and wet core systems. Components, which do not fall within the scope of this report, are minor assemblies, subsystems, or elements like roof trusses, cabinets, appliances, equipment, building materials, hardware, fixtures, and accessories. In the long run, however, foreign producers will influence U.S. housing markets more through technology transfer than with sales of entire structures. Joint ventures with U.S. firms represent a probable vehicle for this transfer.

Currently, only a small number of foreign building systems exist in the American marketplace. However, component imports have increased substantially over the last 5 years, including roofing, hardware, steel and steel products, wood and wood products, kitchen and bath fixtures, appliances, heating and ventilating equipment, and a variety of decorative finishes and materials.

Market penetration by foreign building manufacturers could change rapidly in the near future. A number of manufacturers plan to export wood-framed panelized systems to the United States, upon completion of their market surveys and once building codes are approved. A case study comparing two Swedish systems with the Council of American Building Officials (CABO) Code for one- and two-family dwellings found that with minor changes, the two systems could satisfy U.S. statutes. Most of these changes stem from the fact that while Swedish codes are performance-based, CABO’s—and most U.S. codes—are prescriptive. The arrival of other technologies, such as the Japanese ceramic house, does not seem imminent, but this may change with further technological development or market fluctuations.

¹Unless otherwise noted, the material in this chapter is based on research conducted by the Steven Winter Associates, New York, NY.

TRADE FACTORS AFFECTING EXPORTS TO THE UNITED STATES

Foreign building exports to the United States depend on the products' qualification as an acceptable building type, and also on market conditions, government policies and assistance, and related business strategies and decisions. These various conditions will affect the relative success of foreign products in the United States. Overseas manufacturers cite several incentives to risk penetrating U.S. markets.

Currency Exchange Rates

Fluctuations in the value of the dollar in relation to other currencies have, over the past decade, benefited foreign housing products. However, because component costs represent less than a third of the selling price of a house, changes in American tastes and expectations of quality may be just as important as changes in exchange rates.

Availability of New Markets

When compared to markets in most countries considering exports to the United States, the American housing market is enormous. Only Japan approaches the U.S. level, producing approximately 1 million units per year. As a result, the potential for new business is greater in the United States than elsewhere. The United States also holds various sectors, with opportunities for exploitation of specialized niches like vacation housing and condominiums.

Idle Plant Capacity and the Decline in Existing Markets

Companies that produced housing for the Middle East, North Africa, and developing nations have con-

tended with a shrinking market in recent years. Reductions in oil prices and oil production, as well as the increasing Third World debt, have limited large-scale housing programs.

In addition, some foreign exporters project a decrease in domestic housing markets due to satisfaction of post-World War II demand. In the last several years, Sweden's domestic output has declined from 100,000 units per year to 40,000. Japan has also reduced demand for housing, through various 5-year plans. One observer believes that the Japanese will turn to renovation instead of construction, largely because of high land values and a shortage of building sites.

Against decreasing demand in many industrialized countries, companies that expanded production facilities now seek new markets. The United States may absorb much of this excess capacity. Third World markets are vast, but these nations cannot afford most available products.

Experience in International Trade

Foreign building manufacturers have significant experience in international trade. The typical Finnish housing manufacturer exports 50 to 70 percent of its housing production. Other Scandinavian firms export housing to the Middle East, North and Central Africa, the Soviet Union, South America, the Far East, and continental Europe.

FOREIGN GOVERNMENT POLICIES AFFECTING INTERNATIONAL TRADE IN HOUSING

Foreign government actions can have a large impact on exports from their countries. Many nations provide incentives and aids that are not available to American housing manufacturers.

Overall Strategies and Planning

In most industrialized countries, government and industry cooperate more than they do in the United States. The decision to export housing to the United States may be more than that of a profit-oriented firm seeking a new market; it may also reflect goals for the national economy, and for long-range industrial planning.

The current success of the Japanese housing industry has resulted from successive 5-year plans to achieve national goals in domestic housing. Development of such high-technology materials as ceramic wall panels was the direct result of the "House 55" research program, in which the Japanese Government funded advanced materials and systems research by leading Japanese companies. Pressure to increase domestic consumer spending may spur Japanese interest in supporting an innovative construction industry. The average size of a Japanese home was approximately 800 square feet in 1968, and 860 square feet in 1978; this is still less than half the size of an American home. Clearly, the Japanese cannot yet match Western standards of "adequate" housing.²

Market Information and Trade Representation

Many countries open their consulates and commercial attachés to domestic firms that intend to expand business prospects, another example of cooperation between the public and private sectors. The

Swedish consulate in Chicago has familiarized Swedish firms with opportunities in the American market, The Danish consulate in New York has coordinated the export activities of manufacturers, and arranged for a multifirm booth at the 1985 NAHB exposition. The Finns maintain commercial attachés in New York and Houston; the latter office assists efforts to sell panelized housing to builders. The consulates of France, West Germany, and Canada have acted as conduits to channel market information back to manufactured housing exporters in their home countries. U.S. consulates could be used in similar ways.

Financial Assistance

Foreign governments support domestic builders in a manner unheard of in this country. This includes:

- low-interest loans to clients of domestic contractors or materials suppliers,
- project risk/profitability insurance,
- low-interest loans or tax benefits to contractors to erect projects in politically important areas,
- direct government-to-government loans that help to purchase products from the lender country,
- special tax incentives for export initiatives like market surveys, and
- performance bonding of domestic contractors.

Also, foreign governments channel aid so as to benefit builders. Following the 1980 Italian earthquake disaster, the United States sent relief money. European countries sent housing or supplies from their own markets, which both determined how aid would be spent and gave business to their own companies. In contrast, "Buy American" programs in the United States often fall short of their goals, as when the Army Corps of Engineers allows the use of non-U.S. materials for mechanical, electrical, and infrastructural subsystems.

²James McKellar, "Industrialized Housing: The Japanese Experience," Alberta Department of Housing, December 1985.

IMPEDIMENTS TO MARKET PENETRATION

Obvious risks stand in the way of foreign housing manufacturers' attempts to export to the United States. Some are inherent in international trade, and others are peculiar to the practices of the U.S. building industry.

Changes in the International Market

Largely due to the currency exchange rate, foreign firms have had an advantage in the U.S. market. However, recent international monetary developments may leave these firms overextended. Some foreign manufacturers hope that other factors, such as product quality, will allow them to remain competitive in the U.S. marketplace. Others plan to adapt to changing currency rates by deemphasizing exports, instead establishing operations in the United States that resemble those of Japanese automobile and construction equipment manufacturers.

Lack of Understanding of American Markets

Foreign manufacturers of building elements come from smaller countries with more homogeneous populations, tastes, and climates than the United States. To understand the nature of a single market is a difficult task. The complexity increases when that market is composed of varying submarkets.

Producers may attack this problem by targeting specific market locations in the United States suitable for their products, based on such factors as climate and physical characteristics. This may mean the Northeast for Scandinavian insulated wood framed and finished panels, but southern California and Florida for Japanese ceramic panels, since these southern markets accept concrete and stucco-like products similar to the Japanese ceramics. Also, the ceramic material differs from traditional materials used in northern areas, and is unlikely to be accepted there.

Regional tastes, building traditions, and demographic trends also enter into consideration. This process worries foreign producers, who see the American market both as a great opportunity and as a place where they could go astray. A number of firms, including Norway's G. Block Watne in

Texas, have built housing by conventional U.S. techniques, in order to become familiar with the U.S. housing industry before introducing their own technologies.

Lack of Knowledge of Optimal Business Relationships

Foreign producers are unfamiliar with the U.S. business world. Firms risk a great deal by entering into joint ventures, acquisitions, and the direct import of components. Some companies are forced into certain practices. For instance, if no U.S. firm agrees to a joint venture, the foreign firm confronts the market alone. A number of firms leave their options open, postponing major decisions and commitments until they familiarize themselves with the market. Demonstration "model" houses and small projects test the waters, displaying the system's feasibility and encouraging potential U.S. partners. Often, however, these isolated test market attempts have little impact, and do not provide adequate marketing information. Another strategy is the purchase of U.S. companies in order to acquire "in-house" market expertise, but this leads to difficulties in holding on to key personnel.

Difficulties in Locating Interested U.S. Firms

As opposed to other industrialized countries, the American building industry is decentralized. Japan has 5 large house manufacturing concerns, Finland has 8, and Sweden has 12. When these companies look for potential partners in the United States, they choose from hundreds of firms. The "right" partner is not easily found.

In addition, due to the decentralized building industry and to the small size of most firms, American companies often lack the available capital to contribute to a joint venture, although the limited joint venture between Phenix International and U.S. Home to build housing in Florida represents a prominent exception. The larger firms are not easily convinced that a joint venture is in their best interest; major U.S. manufacturers have not leaped at the opportunity to join with Danish firms. Generally, Amer-

ican companies look for monetary gain, not technological improvement. Also, there is a tendency in the American building industry to continue in accepted patterns, ignoring innovative procedures until they have been proven effective elsewhere.

Materials Acceptance Problems

Foreign housing manufacturers use materials and techniques that may seem strange to Americans. Exposed materials and structures, highly textured cementitious finishes, steel frames, concrete and metal roofing tiles, and ceramic panels are not well known, and may not be accepted in many parts of the United States. This problem stems from the variety of American markets. Typically, U.S. building markets have resisted new materials technology; many top U.S. firms that entered the housing market with innovative products, such as Boeing, U.S. Steel, and Alcoa, have given up this practice. These firms discovered that marketing houses differed from marketing other products. However, recent developments point to changing public tastes, primarily in urban areas where new architectural styles—'post-modernism,' for example—have led to distinctive zero lot line and multifamily housing projects. In coming years, products now sought after as "high-tech" should become acceptable to the "trendy" marketplace.

Problems of Materials Testing and Acceptability of Foreign Standards

Building materials from abroad must comply with U.S. standards of fire safety, strength of materials, and durability, which apply to steel and wood framing, interior and exterior finishes, electrical and plumbing system elements, insulation, and other factors. Few foreign standards and test procedures demonstrate compliance with U.S. codes. Manufacturers will be forced to undertake extensive and costly materials testing in order to meet U.S. requirements. This represents an added deterrent, as well as a time delay, for the producer considering exports to this country.

Building Codes and Inspection Systems

Factory-produced building systems used in the United States must be approved by each local build-

ing official who has jurisdiction over a given project. They can also obtain the National Evaluation Service inspection offered by the model code agencies and their umbrella organization, CABO. The latter course of action works when the system is used widely and in different locations, but it requires a significant time and money commitment, and does not guarantee acceptance of the ruling in all jurisdictions. Furthermore, each factory must maintain its own quality control and inspection program.

Although European manufacturers view the multiplicity of U.S. codes as a major impediment, European firms have begun to study code procedures in the United States. Several Scandinavian panelized producers are now obtaining code approvals. The Japanese have also started to gain approvals for their systems under the U.S. codes; recently, Misawa Homes of Tokyo obtained approval for a wood lattice panel system. However, no large-scale effort is underway.

Trade Restrictions

Foreign manufacturers recognize that calls for protection from foreign penetration would rise with their increased presence in the U.S. market. Eventually, foreign manufacturers may submit to voluntary export limits, as has occurred within the Japanese automobile industry. Of course, foreign manufacturers could instead establish production facilities in the United States, either by buying U.S. firms or by creating a U.S. subsidiary. This would allow them to circumvent import quotas while maintaining profits from the U.S. market.

Lack of Understanding of Real Estate Markets

The housing market in the United States reflects not only the complexities of the house and its associated features, but also the intricacies of the real estate market. Foreign manufacturers could become involved in unprofitable projects, where failure stemmed not from the quality and suitability of their building system but from a lack of understanding of the local real estate market. In this area, many foreign firms seek American partners or consultants.

Liability

Many Europeans fear the problems of confronting the complex issue of liability in the United States. The possibility of being saddled with lawsuits concerning product liability, an area of U.S. law that is presently in a state of flux, worries foreign manufacturers.

Shipping Costs

Shipping costs represent the principle economic impediment to exporting housing to the United

States. The cost of shipping a modular home from Europe or Asia to America is approximately \$25,000, which precludes large-scale exportation of such products to this country. However, shipping costs are not prohibitive for more compact housing forms. One Scandinavian manufacturer estimates shipping costs for a panelized home at 6 to 12 percent of home materials costs, or 2 to 6 percent of total costs. Even after shipping costs, many products can be priced competitively in the United States due to cost advantages in production.

IMPORT POSSIBILITIES FOR VARIOUS BUILDING SYSTEM TYPES

Opportunities for exports to the United States of the generic types of building systems, described in chapter 2, will now be examined in detail.

Precut Systems

Precut housing systems, except for log homes and those from nearby Canadian manufacturers, are not easily imported to the United States. Wood-framed "stick" systems cannot compete, due to the high cost of imports as compared with available domestic systems. "Stick" systems would require expensive U.S. labor to assemble the building, and would create the logistical problem of shipping many small pieces.

These systems perhaps best illustrate which elements make a product suitable for import to the United States. Normally, the cost of the structural frame accounts for only 10 percent of the total house cost, and the house shell for only 30 percent. Building systems that supply only the materials for these elements cannot realize substantial savings, even if the cost of the materials falls below corresponding domestic levels.

In order to penetrate the U.S. market, an imported building system could focus on elements that require skilled workmanship, emphasize concentration of cost in the elements shipped, or bring out the visibility, styling, or refinement of the product.

Panelized Systems

Panelized systems represent the most likely type of foreign building systems to enter the United States, now and in the immediate future. Unlike modular units, panelized systems can be packed compactly against each other. The manufacturer does not pay to ship an excessive amount of empty space, because this type of cargo is usually shipped at a rate proportional to its volume.

Concrete Panels

Shipping of heavy concrete panels would not be cost-effective. These units can be produced in the United States at a lower price and are not used to any great extent for residential projects.

Lightweight cellular concrete panels may play a more important role in the future, due to their reduced weight and superior thermal performance. Again, however, domestic production would be less expensive.

Although no evidence exists regarding prior imports of concrete panels, a number of Scandinavian manufacturers, including Denmark's A. Jespersen & Son, have expressed an interest in selling forming equipment and technology.

Steel-Framed Panels

Currently, steel-framed composite panel systems are produced in Great Britain, Australia, West Germany, Finland, France, Belgium, and the United States. Intended for export—often for use in the construction of camp buildings, where large amounts of worker housing must be built rapidly—this framing system has advanced primarily in nations that lack either a large supply of lumber or a strong tradition of wood framing. A major French producer claims that steel-framed houses imported to the United States could sell for 20 percent below the cost of comparably sized, conventional American houses. Attempts are now being made to sell this system in the United States.

The use of steel framing for single-family housing has met with little success in this country, although lightweight steel studs have been used widely for interior partitions in multifamily units. Conventional single-family housing can be erected in a cost-effective manner with light gauge steel, but wood remains the market preference.

Steel framing or steel panels do satisfy the requirements of noncombustible construction, generally in buildings over three stories and in the metal building industry. Steel-clad insulated spandrel and curtain wall panels shipped from foreign countries can compete with equivalent U.S. products. Furthermore, increasing interest exists in steel-framed modulars for urban housing programs and for low-rise commercial office space.

Wood-Framed Panels

Wood-framed panels with integral foam plastic or mineral wool insulation resemble their U.S. counterparts, and are imported into the United States already. Given this market acceptance, expansion may soon occur. A common method for residential construction in Scandinavia—up to 60 percent of the single-family detached housing and 30 percent of the townhouses are panelized in Finland, and over 80 percent in Sweden—wood-framed panels have been exported in large numbers to the U. S. S. R., the Middle East, and North Africa.

Japan's manufactured housing industry contains a large wood-framed segment, but Japanese panels employ a lattice of smaller framing members rather than 2 by 4s, and are assembled into small modules before transportation to the site.

Wood-framed panels are relatively small, 4 to 16 feet by 8 feet, and can be handled and erected without equipment. Some manufacturers offer larger, custom-designed panels, which require a small crane for erection. The framing protects the edges of the panels, and the voids between the framing contain either foam plastic or fiberglass/mineral wool insulation. A continuous vapor barrier maybe installed in the panel. Also, various surface finishes can be applied, such as plywood, fiber board paneling, and gypsum board.

Panels are used in the high-end residential market, where quality is a positive selling point, or in the low-end market of camp housing, since they can be easily assembled into modules. Imported wood-framed panel technology offers a number of advantages over conventional U.S. stick-built construction:

- high material quality and good craftsmanship;
- high levels of thermal insulation, up to R-37 in walls and R-47 in ceilings;
- adaptability to varying floor plans;
- higher degree of building tightness; and
- availability of sophisticated finish materials.

Spandrel Panels

Prefabricated metal spandrel panels, or curtain wall systems, are components, not building systems. As such, they are not part of this study's direct focus. However, they could become a significant import item. They contribute to facades of conventionally framed commercial buildings, and are currently imported to the United States from Italy, France, and Sweden. This foreign panel can fit easily into the U.S. market, since it does not involve changes in basic construction practice, European panels might replace American panels, although cost remains a consideration.

European Penetration of U.S. Panelized Systems Markets

Several European firms have entered or have expressed an interest in the U.S. market:

- Hosby of Denmark and Makroscan of Finland both exhibited panel systems in the United States, and desire to work with American builders. Hosby has built a model house to be evaluated for energy efficiency and technical advantages at Brookhaven National Laboratory in New York; Makroscan has built housing on Martha's Vineyard. The Hosby house received 4,000 visitors, including builders, architects, and potential homeowners, in its first weekend, and has averaged 400 visitors each weekend since then. This indicates substantial interest in Danish products.
- Phenix International and Filled of France are active in this country already, Phenix has purchased 16 percent of U.S. Home, and has joint ventured in Florida. Filled has built some steel-framed demonstration units, and markets its products through Modular Building Concepts, a New Jersey manufacturer.
- Such Swedish firms as Swedish Wooden House and Skanska, entered the U.S. market several years ago. At least six other Swedish firms have expressed an interest in expanding to the United States, and eight American importers of Swedish houses are now in operation. One hundred Swedish houses have been built in the Eastern United States, with 500 more expected by the end of 1986.
- Puutalo Oy of Finland and Norgips of Norway have also-eyed the U.S. market, and Norgips has applied for model code approval. G. Block Watne of Norway is building in Austin, Texas.

At least 20 other major European firms export wood-framed panel systems to other countries, and may pursue the U.S. market. The most likely first step for any foreign producer would be to work with custom homebuilders and developers in this country, marketing the appeal of high-tech craftsmanship. Once the system is in limited use, expansion might then occur. Without joint ventures or direct sales, foreign producers will have to become developers in order to introduce their products.

Wet Core Modules/Control Centers

While complete modules are too expensive to ship internationally, the wet core module provides an exception. It can serve as the high-tech, high-cost center of the house, incorporating plumbing, service controls, laundry equipment, bathroom and kitchen fixtures, cabinets, appliances, and surface finishes. Such a module would overcome the problem of shipping empty space, due to its higher proportion of expensive materials and labor costs to space. To reduce costs further, the module could be shipped in a knocked-down state, with fixtures like bathtubs "nested" together during shipping and attached in their proper locations at the site.

Presently, nothing points to the exportation of large wet core modules, which incorporate whole rooms, in the near future. However, certain advances in kitchen cabinet design, planning, and packaging facilitate the export of smaller modules that form part of a room, incorporating a prefabricated plumbing tree and its associated fixtures. Also, cabinets are being integrated with kitchen appliances at the luxury end of the market. Admiral displayed an imported line of appliances, with cabinets produced at its Italian subsidiary, at this year's NAHB show. Other European appliance manufacturers that market in this country, including Maltritus and Gaggenau of West Germany, also integrate cabinets and appliances.

Japanese manufacturers are developing the "smart" kitchen, with electronic integration and control of the various kitchen appliances. A central processor controls all appliances, rather than each appliance having its own timer, regulator, and controls. Controls and monitors for other building systems, such as heating, air-conditioning, intercom/control/security, and lighting, may be centralized and incorporated into the wet core module as well.

The development of this centralized, capital-intensive building service and control center may overcome the prohibitive costs associated with shipping modules. If the cost/bulk ratio rises above a certain threshold, wet core/control modules may be cost-effective. Such a module would revolutionize standard building practice, bringing plumbing, fixtures, electronics, cabinetry, and appliances into one indivisible import package.

Modular Systems

Modular systems account for only a small share of world markets. Certain aspects of modular construction make it unsuitable for export to the United States. Generally, prohibitive shipping costs prevent export, although Afford-A-Homes, a Canadian company, does export a modular that “unfolds” into a 735-square-foot house, and can be shipped in an 8 by 9½ by 20 foot container; several U.S. firms have experimented with this concept. From Scandinavia, shipping can cost \$80 per cubic meter, or roughly \$18,000 for a 1,000-square-foot house. The high price pays primarily to ship empty space.

European modular prototypes may also be unsuitable for U.S. markets. However, the experience of European furniture exports indicates that foreign manufacturers will design products specifically for America.

Modular systems can be broken down into a number of different types:

1. **Concrete Modulares.**—Concrete modules are rare outside of the U.S.S.R. and Eastern Europe. They best suit highrise, repetitive “boxlike” apartment-type buildings that have proven uneconomical and unpopular in the United States and Western Europe.
2. **Wood and Steel Modulares.**—Generally assembled from panels, wood- and steel-framed modulares are used primarily for camp construction. Certain Scandinavian firms, such as Huure Ureeta Oy, have produced panel systems that can be assembled into modules in the plant or onsite.
3. **Ceramic Modulares.**—*Recently*, much attention has focused on “precastable autoclave lightweight ceramics” (PALC). This material has resulted from extensive research by Misawa Homes of Japan, and is now incorporated into approximately 10 percent of Misawa’s modular units. In essence, ceramics resemble the autoclaved, lightweight concrete that is manufactured in Europe. It differs from normal concrete by substituting air or gas bubbles for the aggregate in the mixture.

However, the Japanese have taken the use of this material to a higher level. Whereas the Europeans fabricate lightweight concrete blocks

and small panels, the Japanese produce large, steel-reinforced, framed panels, which are incorporated into modular units. This system relies on a homogeneous material that requires no additional finishing or thermal insulation, and provides structure, waterproofing, and fireproofing. Its competitiveness in the Japanese market derives from the supposedly low material and labor costs, although the role of government and corporate subsidy remains unclear.

PALC is relatively new, and its full potential has not been realized. Claims that it is the material of the future should be examined closely. Less than 10,000 homes have been built with this technology in one Japanese plant, all in the past 3 years. This accounts for less than 0.3 percent of the Japanese housing market. And because it is an untested technology, no long-term studies exist on these houses or their performance. The Japanese, who see ceramic modulares as another high-tech item at which they excel and which they can export, give these systems widespread publicity. But the technology needs to gain greater recognition in Japan before it can enter the American marketplace.

Except in Florida and California, where stucco-like materials dominate, U.S. market acceptance of single-family housing is problematic without dramatic cost savings. In the case of PALC, this appears unlikely. Historically, materials that enter the conservative U.S. housing market, such as hardboard, aluminum, and vinyl siding, have simulated familiar materials like horizontal siding or tongue and groove vertical wood siding. As a rule, other types of panels have not been accepted by the domestic housing industry, which believes that prefabricated homes should appear otherwise. This technology would suit multifamily housing or commercial building, but only if it represented a cost-effective solution.

This material has received much publicity in the United States, and many U.S. delegations have been encouraged to visit the Misawa plant. However, these plant visits appear to be *more* of a “sales pitch” than a technical exchange. PALC represents an interesting alternative, but final judgment should await an analysis of its suitability for U.S. markets.

“Manufactured” (Mobile) Home Systems

U.S.-type “manufactured” (mobile) homes are rare in other countries, except as temporary or camp housing. However, the more advanced technological manufacturing systems of the Japanese and Scandinavians may produce salable and innovative models. Some observers believe that Japanese penetration of the U.S. market will occur in this untested area. The Japanese industrialized housing industry is geared towards high levels of production, which can satisfy the American “manufactured” (mo-

bile) home market. In addition, the U.S. “manufactured” (mobile) home is under a preemptive national code, which makes it more attractive to a foreign manufacturer who intends to build production facilities in this country. A problem exists, however: in order to make up for the cost of new, sophisticated equipment, minimum sales would have to reach several thousands of units per year—not an easy target to achieve. But Japanese firms are willing to absorb initial losses in order to capture long-term markets. A joint venture with a U.S. firm would reduce risks significantly.

MANUFACTURING EQUIPMENT

Foreign building technologies may enter the U.S. market through a modification of standard American manufacturing and construction techniques, rather than through direct importation of building elements. A producer may begin by shipping building elements to this country. As demand for the products increases, it may become more cost-effective to produce them in the United States. Possible openings in this area include:

- *Panelization equipment, which foreign manufacturers will sell to U.S. homebuilders and manufacturers.—These machines could vary from minor refinements of production line equipment at “manufactured” (mobile) home factories to sophisticated automated plants. A number of Scandinavian manufacturers have begun to market their equipment, but without a great deal of success.*
- *Onsite forming equipment, produced by foreign companies such as Outinord of France, for use in onsite casting techniques.—This equipment has been in the United States for 20 years, and would not require major outflows of capital.*

- *Board fabrication equipment, such as cementitious fiber or particleboard, used in European construction but not commonly available in this country. —Among others, Siempelkamp of West Germany exports complete fabrication facilities for such products.*
- *Particleboard, flakeboard and oriented strandboard, originating in Canada, or made in the United States with Canadian equipment.—This could replace American plywood.*
- *Admixtures, used by European companies to produce lightweight cellular concrete.—U.S. firms could manufacture this material domestically, through the use of such additives.*
- *Heavy equipment, produced by such companies as Komatsu, the Tokyo-based construction equipment manufacturer ranked second next to Caterpillar. Komatsu has announced plans to open its first U.S. assembly plant, which will avoid protectionist legislation. Their goal is to increase their U.S. market share from 7.5 to 20 percent.*

FOREIGN INVESTMENT AND DEVELOPMENT

Foreign firms interested in penetrating the U.S. construction market may pursue a variety of financial options, rather than market foreign-produced buildings or components. This would provide insight into the complexities of the U.S. market, useful contacts and knowledge, and a reduced risk for the foreign producer.

Joint Ventures With U.S. Firms

Some foreign manufacturers have joint ventured already. In particular, the Japanese prefer this method, which combines Japanese production technology with an in-place American marketing and distribution network. Misawa Homes is seeking to co-

venture with an east coast homebuilding firm, and Sekisui Heim is reported to be working with Cardinal Industries, a modular manufacturer. Also, Maison Phenix International of France entered into a joint venture relationship with U.S. Home in Florida several years ago, and Scandinavian firms have expressed an interest in such an undertaking.

Foreign panel manufacturers may begin their market penetration by exporting panels to this country, which would build market acceptance and create demand. Then, these manufacturers can joint venture or license with previously wary American firms, and produce their panels in U.S. factories. However, few of these products are so unique that the added overhead and labor cost of U.S. production would offset their current competitive advantage.

Mergers and Acquisitions

Foreign firms have pursued the increasingly popular option of the merger or acquisition, in order to gain a foothold in the U.S. market and to pick up useful experience:

- Holtzman AG of West Germany owns J.A. Jones of Charlotte, North Carolina, a contracting firm, and Lockwood Greene Engineers, a design firm;
- Skanska, the largest builder in Sweden, bought the Koch Steel Erecting Co. of New Jersey;
- Archirodon of Greece purchased George Fuller of New York, a firm that builds highrises;

- Alganin Industries of Kuwait bought Kirby Building Systems in 1975; recently, the American branch of the firm returned to U.S. owners;
- several American elevator companies are owned by foreign firms, including Haughton, by Schindler Holding of Switzerland, and Armor, by Kone of Finland; and
- the Clark Equipment Co. of Michigan has merged heavy equipment production with Volvo of Sweden, forming the third largest heavy equipment firm in the world.

Companies that acquire these firms may then compete for U.S. Army Corps of Engineers projects, under the "Buy American" program.

Foreign Development and Construction

Foreign developers, including Cadillac Fairview, Olympian, and York, have been involved in major urban projects for a number of years. More recently, European builders have developed housing projects in less urban areas of southern Florida and California. The British firms of Barrat Homes, Taylor Woodrow, and John Laing Homes are all active in this country, as well as the French firm of Premier Homes, a subsidiary of Les Nouveaux Constructeurs. Some of these companies started by acquiring established U.S. building firms. Several South Korean firms have expressed an interest in this area, but their asset of low-paid labor cannot be utilized in the United States, reducing their leverage.

APPLIANCES

While the United States enjoyed a favorable balance of trade in residential "appliances for many years, foreign producers have begun to penetrate domestic markets with improved products and production technologies. Accounting for inflationary increases, U.S. exports of household appliances fell by approximately one-third between 1979 and 1984, while imports increased by over two-thirds.³ This trend will continue, assuming that foreign manufacturers expand production.

U.S. exports of appliances have never been large; in 1983, U.S. firms exported about \$990 million in appliances, or 0.5 percent of total output.⁴ U.S. citizens stationed abroad purchase a significant fraction of these products. Japan, on the other hand, has expanded household appliance exports from \$1.4 billion in 1979 to over \$2.25 billion in 1983. Japanese appliances are widely available on the U.S. market, and Japanese companies invest heavily in new technologies. Whereas US. appliance manufacturers

³U.S. Department of Commerce, Bureau of the Census, EA 275.EA 675. SIC Code No. 363.

⁴The Stirling Hove Corp., Building Equipment Division "A Comparative Analysis of US and Selected Foreign Household Appliance Industries." Department of Energy contract, October 1984

spend 1 or 2 percent of their sales on research and development, Japanese firms spend 4 to 7 percent.⁵ Their efforts are beginning to pay off.

Panasonic marketed a full line of products for 1985, some of which will be built in the Orient and some in Canada. Panasonic, Sanyo, and Daikon have captured 5 percent of the U.S. market for room air-conditioners by offering efficient, quiet units with rotary compressors. The units use 13 percent less energy than comparable U.S. products. Sanyo now imports small refrigerators—1 3 to 14 cubic feet—to the west coast, with an average energy consumption of approximately half that of the best U.S. models. They are beginning to offer “full-size” refrigerators in test markets,⁶ and showed a full line of appliances at the NAHB exposition. The Japanese have introduced a number of innovations in refrigerators, including microprocessor temperature controls that maintain three to five compartments at different temperatures.

Some major U.S. appliance manufacturers have moved manufacturing operations abroad. General Electric, the largest domestic manufacturer of room air-conditioners, announced that it will phase out production at its main factory in Louisville, Kentucky, next year. Carrier has drastically curtailed production at its New York plants. The firms plan to purchase units assembled abroad, probably in Japan and Brazil.

At the high end of the market, European appliances are available in this country—from Maltritus and Gaggenau of West Germany, for example. These same manufacturers are working to integrate cabinets and appliances. Electrolux of Sweden owns Tappan in the United States and has acquired an Italian appliance subsidiary, making it one of the world's largest appliance manufacturers. They may attempt to sell European designs to American builders. Appliances such as range hoods may also come from Singapore and Korea.

⁵Howard @her, “Energy Conservation R&D, Innovation, and Industrial Competitiveness: The Case of Household Technologies,” ACEEE Background Paper, January 1986; Sterling Hove Corp., op. cit.

⁶Geller, op. cit.

Lighting and wiring equipment have become vulnerable to foreign competition as well. Between 1979 and 1984, accounting for inflation, U.S. exports in this sector increased by \$50 million, or 3.5 percent, while imports rose by approximately \$500 million, or 40 percent.⁷ Japanese and German firms have taken the early lead in the development of innovative lighting products. Compact fluorescent lamps, compatible with standard “screw in” sockets, use one-third the electricity of a standard lamp, last 10 times as long, dump less heat into a room, and provide a light color that most people find more attractive than standard incandescent. Neither General Electric nor Sylvania, the largest U.S. lighting producers, manufacture these advanced products; rather, they offer foreign products under their own names.

As concern about indoor air quality increases, Americans may pay increased attention to home ventilation. The Swedes have invested heavily in equipment that ensures adequate air flow to each occupied room in a residence, while minimizing the heat or cooling lost in the process. Primarily, American houses rely on faulty workmanship to provide adequate ventilation, such as cracks around windows and doors and under sill plates. This guarantees that air enters the house, but rates of air exchange vary widely from house to house and with local weather conditions.

Only an active forced air system can ensure adequate ventilation. Both the French and the Swedes have developed inexpensive devices that control the amount of fresh air reaching each room in a home. The Swedes offer a variety of interior ventilation designs, including one which ventilates a home over the coils of a heat-pump water heater that extracts heat from the exhaust air. Their technical lead may put them in a position to enter U.S. markets rapidly, if demand for equipment to improve indoor air quality increases.

⁷U.S. Department of Commerce, op. cit.

MATERIALS, COMPONENTS, AND EQUIPMENT

Foreign fixtures, building materials, appliances, and accessories are now exported to the United States, and may become more common. These items include:

- *Metal Roof Systems.*—A number of metal roofing producers have entered the U.S. market with roofing systems that imitate conventional materials like tile and slate, and suit both the single- and multi-family housing markets. Primarily, these systems come from Finland, France, and Sweden.
- *Plywood.*--Currently, high-grade Scandinavian plywood incorporates a number of plies and veneers not otherwise available in the United States.
- *Hardware.*--Much building hardware is imported from Europe. Two European manufacturers have built U.S. factories to reduce costs.
- *Door Frames.*—A metal door frame producer from Holland exhibited at the NAHB show, intending to export to the United States.
- *Elevators.*—In addition to purchases of American elevator companies by foreign firms, the Japanese manufacturer Fujitec has built a factory in Ohio.
- *Heat Pumps and Heat Exchangers.*—A number of Japanese manufacturers, including Mitsubishi, distribute residential heating and air handling equipment.
- *Cabinets.*—European kitchen cabinets have gained widespread use at the high end of the U.S. market. The European kitchen has become a new standard of elegance in American homes;

domestic producers imitate European styling. Imported cabinets from West Germany, England, and Scandinavia are used by custom builders or are sold through kitchen dealerships, advanced through mass marketing or distribution systems. Soon, Korea may import inexpensive cabinets as well. These would enter the manufactured housing industry, where direct sales to manufacturers eliminate the need for an elaborate marketing and distribution network.

- *Plumbing Fixtures.*—Fixtures from Europe have been sold in the United States for some time, primarily from Scandinavia, France, Italy, and West Germany. Again, these custom items aim for the high end of the market.
- *Finishes.*--European plastic laminates are now distributed in the United States.
- *Floor Tile.*—Floor tiles from Mexico and Europe have been available to custom markets for many years.

Although building materials and fixtures lie beyond the scope of this report, their presence cannot be ignored when conducting research on building systems. The use of imported materials and fixtures is significant for several reasons: they can be incorporated into American buildings without disrupting standard American construction practices; they are subject to narrower testing requirements; they indicate foreign interest in penetrating the U.S. building market; and they provide an avenue for manufacturers to establish recognition and acceptance, from which they may advance the exportation of building systems or components.

IMPEDIMENTS TO U.S. PENETRATION OF OVERSEAS HOUSING MARKETS

U.S. international contractors, and industrialized housing manufacturers in particular, have witnessed diminishing overseas markets since the euphoric 1960s and early 1970s, when they operated in Iran, Saudi Arabia, and the Persian Gulf States. Today,

these same major contractors service a reduced work load and few international housing projects, except for occasional “tag-along” housing components in a larger infrastructural or industrial project. The leading U.S. contractors, including Bechtel, Fluor, and

Blount, operate with as little as half the manpower of several years ago. Few analysts predict that the international building activity of the 1970s will resurface. Several reasons for the drop in international building activity are discussed below.

Increased Competition

Many new international contracting companies have assumed active, worldwide roles, especially in the Middle East, North Africa, Malaysia, and Indonesia. These include the aggressive European and Scandinavian firms, and also firms from Greece, Turkey, the Philippines, India, Taiwan, and South Korea.

Initially, the Koreans were encouraged by the U.S. Government. They have now become a dominant force, due to their organizational and technological sophistication. They also control the low-cost manpower that permits competitive bidding. However, even the Koreans are having difficulty now, as smaller projects allow for bidding by small local contractors with a fraction of the overhead of the major international—especially American—contractors.

Lack of Understanding of Foreign Markets

With the exception of established U.S. international contractors and a handful of housing manufacturers, such as ATCO, Port-a-Kamp, and National Homes, the obvious difficulties of working overseas appear to have discouraged U.S. firms. A number of medium-sized panelized and modular manufacturers have been approached regarding the export of building systems during the past 10 years, but they have declined to participate. Typical reasons given include:

- unfamiliarity with market requirements, international business law, and payment conventions;
- the uncertain political climate within many countries, and the difficulty in gaining code approval and binding commitments from appropriate government agencies;
- concerns over the reliability of payments, the frequent use of local currencies, and the difficulty of bringing money out of individual countries;
- the high cost of project development, including the need for overseas personnel who de-

termine realistic opportunities, and the high cost of large-scale proposals;

- low profit margins that arise from the current increase in competition; and
- the belief that other U.S. firms have had trouble penetrating overseas markets, or sustaining profitable operations once the markets were established.

Most American manufacturers have had enough difficulty in coping with the changing nature of the U.S. construction market. Generally, they view the uncertainties of offshore markets—with the possible exceptions of Canada and the Caribbean—with strong misgivings.

Materials Acceptance Problems

Just as foreign materials have to meet U.S. standards, American materials must comply with foreign codes. This may require extensive testing. Not only is this a disincentive for direct export of U.S. products; it may put a U.S. firm at a disadvantage relative to a foreign firm when both wish to export to a third country. Many countries, particularly in Europe, test their materials according to international standards. A foreign firm may have conducted the necessary international testing already.

Building Codes and Inspection Systems

Each country maintains a different code and approval process, which leads to varying approval times. Export success could be facilitated by a better understanding of the complexities of each code, relative to the size of the potential market.

The countries of the European Economic Community plan to adapt interchangeable codes, based on West German building standards. Once this occurs, European firms will not have to understand or comply with a foreign code when they wish to export within Europe, placing the United States at a disadvantage.

Trade Restrictions

The possibility of limitations or quotas on imports to a given country always exists. These restrictions may be direct or indirect; Japanese practices in reg-

ulating and testing imports are an example of the latter. Such practices have eliminated potential profits on many products that would fare successfully in an open Japanese market.

Lack of Experience in International Trade

Even firms experienced in foreign trade meet with unanticipated difficulties, due to the customs or laws of particular countries; experience in one country may not help in another. For example, one builder reported that six American trucks were left on a dock in Trinidad when the government, citing the fact that the driver sat on the left side of these vehicles, refused entry. Also, documentation requirements and bureaucracy in a certain country may place an extreme burden on a builder.

International Volatility

Much of the demand for housing is in politically and economically volatile parts of the world. Projects are at the mercy of economic disruptions, such as oil embargo and its resulting price increases, or political disruptions, where the government instability endangers the completion of a project. Iran, Iraq, Libya, Lebanon, and certain South American countries are cases in point. In one instance, a drop in oil prices led to problems in the Venezuelan Government, which in turn became unable to provide

U.S. builders with enough support to continue with a large-scale housing project. The involved firms lost a substantial amount of project development costs.

Corruption

Payoffs and kickbacks are an accepted part of business in many parts of the world. U.S. companies have withdrawn from such practices, due to the 1971 Foreign Corrupt Trade Act. Although some U.S. firms may avoid these strictures by joint venturing, or by using agents to distance themselves from such transactions, much work has been taken by manufacturers whose governments tolerate or condone bribery.

Distance

Some U.S. firms will operate in North and Central America, but view the rest of the world as too far away. Also, the traditional American disregard for foreign practices, customs, and ways of doing business may make American firms less willing to enter an alien culture.

Lack of U.S. Government Support

The U.S. Government provides less support for housing manufacturers than do other governments. Few prospects exist for the development of imaginative financing programs, performance bonding support, or profitability support.

INCENTIVES AND OPPORTUNITIES FOR U.S. PENETRATION OF OVERSEAS MARKETS

Incentives for U.S. firms to penetrate foreign markets are limited. While large markets do provide American companies with the opportunity to export industrialized housing, the cost-effectiveness of such actions would be negative within current economic parameters. Given the incentives and disincentives listed above, some conclusions may be drawn about increasing U.S. exports in the building industry.

Exportation of Materials

The expanding Japanese market for 2 by 4 construction represents an obvious area of opportunity

for U.S. exporters, Japan is the largest importer of wood from the United States and Canada, and accounts for about 30 percent of American wood exports. Primarily, this wood serves the traditional Japanese wood-framed building, which takes up most of Japan's housing construction. Industrialized housing constitutes only 15 percent of the market. It has not yet displaced traditional building.

The 2 by 4 frame method of construction, which accounts for less than 10 percent of the Japanese housing market, is a growing alternative to both conventional and factory-built housing. This may increase demand for wood products from the United

States, and for American machines that fabricate 2 by 4 panels. Daiwa, one of the five largest Japanese home manufacturers, has studied U.S. factory production techniques utilizing 2 by 4 construction. This may indicate that 2 by 4 panels will replace the current Japanese wood panel, which employs a wooden lattice composed of smaller wood members.

Marketing Strategies

Package deals incorporating housing and financing may stimulate exports of building systems. Given the current state of the international economy and the lack of funds available for building, many projects are assigned based on what company can obtain the most favorable financing arrangements. In this situation, a strong dollar benefits U.S. firms.

Possible New Incentives for Trade by the U.S. Government

The U.S. Exim (Export-Import) Bank does not finance housing, except as part of larger overall de-

velopment. In contrast, foreign export-import banks sponsor housing projects from their own countries with loans that are 2 to 3 percent lower than those of the Exim Bank. In light of the recent budget reductions for the Exim Bank and of its decreasing role, assistance from this source may not arrive soon. Currently, opportunities exist for projects in Iran, Iraq, and the Soviet Union, but European and Japanese firms have significant leverage” due to government willingness to provide financing. The French are financing housing in Sudan at 4.5 percent, with a 5-year moratorium on payment.

The U.S. Agency for International Development may finance American construction overseas, through sending American building systems as aid to Third World nations instead of direct financial aid. This would resemble the European practice of delivering aid in the form of domestic goods.