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Supply Chains and Rural Development in the Asia Pacific Region

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Abstract: Rapid income growth and urbanization are having profound impacts on the food system, food producers and rural areas in the developing Asia Pacific economies. Meeting the challenge of rural development will depend on better integrating rural areas with fast-growing urban areas where the composition of food demand is changing and the logistics of supply are growing more complex. Possible government options include investment in transportation infrastructure—roads, railroads and waterway—and providing rural communities and small-scale producers the tools they need to better adapt to the rapid spread of modern supermarkets and their supply chains.

Introduction

Rapid income growth and accompanying urbanization in developing Asia-Pacific economies is having major impacts on food systems, food producers and rural areas. These rapid changes mean that to sustain a strong food system, enhance farm sector profitability and encourage rural economic growth over the next 20 years, public and private-sector decision makers will need to embrace new approaches to streamline and modernize the food system.

As economic growth takes place in developing countries, consumer dietary habits change. There is increased consumption of animal protein, fruits, vegetables and processed products. To satisfy this demand, producers need marketing systems that provide information on demand patterns and efficient market access. The key to success in today's growing food markets is access to the marketing systems of new supermarket chains, which have dramatically increased their presence in the Asia-Pacific region over the past decade. The emerging middle-class consumer populations demand a continuous flow of safe, reasonably priced fresh and processed foods in an urban setting. Modern supermarkets meet this demand. Their supply chains have the potential to provide opportunities for small producers, but only if they are able to implement business strategies compatible with the supermarket's needs.

Public policy makers, as well as private-sector business leaders, must support producers and rural communities by promoting the development of appropriate physical and information infrastructure to facilitate rural linkages with expanding and modernizing urban markets. Roads, railways, waterways and ports are needed. These will help provide producers not only with good information and price signals to stimulate supply, but tools to increase productivity in agriculture. Policy makers need to address access to credit, extension education for farmers and facilitating business structures to allow

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producers with small operations to pool resources in order to participate in these supply chains.

This paper is based on the 11th Annual Pacific Food System Outlook meeting held in Beijing in July 2007, and the resulting publication *Pacific Food System Outlook 2007-2008: Linkages to Growing Urban Markets Spur Rural Development*. It also draws on previous Pacific Food System Outlook reports *A Revolution in Food Retailing* (2005), *The Role of Transportation Infrastructure in a Seamless Food System* (2004), and *Where Demographics Will Take the Food System* (2003), addressing major factors affecting the food system and possible public policies and private-sector strategies to deal with them.

The Changing Food System

Despite widespread growth in food imports in recent years, most food is still produced relatively close to where it is consumed because of perishability and the high cost of shipping bulk food products. The share of processed food and major bulk agricultural commodity imported around the world account for a relatively modest level six and sixteen percent, respectively (Regmi and Gehlhar 2005). Rapid economic growth and demographic change in the less developed countries will put increasing adjustment pressure on food producers and the rural areas in which they live. These producers will be challenged to keep pace with food system impacts from rapid urbanization and economic growth or loose ground to foreign suppliers.

In the Asia-Pacific region the most important demographic change is rapid urbanization, the inevitable result of fast-paced economic growth (Figure 1). In the region's developing countries, economic growth is expected to be approximately twice as fast as in the developed economies. This rapid economic growth will be sustained by institutional policy reform, but also by other demographic factors, namely the age profile of the population. In the developing economies, there is a lower median age and a larger working-age component of the population. This tends to boost growth rates relative to the developed economies where older populations have a lower propensity to save and invest.

Urban areas in the Asia Pacific region are expected to grow by 565 million people or 42% over the next two decades. This is about twice the growth of the region's total population. Three quarters of this growth will be in less developed parts of the region, particularly China, Indonesia, The Philippines and Mexico (Figure 2). Growing income will lead to greater concentrations of people and wealth in urban areas. Cities are the home of most middle and upper income classes and produce a disproportionate share of the region's output. For example, Mexico City has 20% of Mexico's population but provides a third of its national income, while Shanghai has 1.3% of China's population but generates more than 10% of the nation's GNP.

It is well known that as incomes rise consumers increase caloric intake but also improve composition of their diet. Further, they increase demand for convenience and away-from-home dining as higher incomes increase the opportunity cost of food preparation.

Urban concentration of higher income consumers is reflected in per capita diets richer in meats as well as fruits and vegetables than those in rural areas (Figure 3). In the Asia-Pacific developing economies, opportunities for food marketing will increasingly be in densely populated higher income urban centers (Figure 4). This includes such large population centers as Mexico City, Shanghai, the Hong Kong-Shenzhen-Pearl River Delta area, Manila, Jakarta, Bangkok, Santiago-Valparaiso and Lima-Callao.

Food production, however, remains broadly distributed in the Asia-Pacific region. Although some food is produced in most states, provinces and prefectures of the Asia-Pacific region, production dispersal may even increase as prime agricultural land is displaced by urban encroachment. This means that rural areas and food producers will need to be connected to the large urban markets through increasingly complex supply chains.

But rural areas and traditional producers will also be challenged by potential foreign competition in urban centers, many of which are located in coastal areas. Since modernizing port facilities is often the first infrastructure investment of coastal cities, increased access to foreign agrifood imports is facilitated. This leads to pressure for market driven international standards of trade and adoption of fast changing technologies. The private-sector has indeed played crucial roles in port and infrastructure development in many of the Asia-Pacific economies to create modern ports. Given relatively low cost ocean transport, foreign suppliers are frequently competitive with domestic producers in supplying coastal urban markets. Transportation infrastructure in developing economies often makes it difficult for inland producers to meet freshness and consistency standards of higher income urban consumers. For example China, Australia, and the United States can all deliver fresh produce to residents of Manila at prices lower than received by small scale producers in the chief salad bowl province of Benguet in the Philippines, where producers must truck their vegetables down a time consuming winding mountain road to Manila (Beattie 2007). While large areas of southeast Asia and southern China have good soils, they lack adequate infrastructure to profitably access markets as well as to obtain yield enhancing inputs, such as seeds, fertilizers and pesticides.

Transportation Infrastructure

The transportation network is a critical element of any countries' logistics chain to maintain a competitive food products and food services sector, allowing efficient resource allocation to take place. Generally, higher income levels are associated with more and better quality infrastructure which must be constantly upgraded and expanded to keep pace with a growing economy. In terms of rural development, expanding and enhancing infrastructure can lower transaction costs for marketing food products and purchasing farm inputs, reduce post harvest losses by increasing quality and quantity of transport services and bring higher returns for producers and lower food costs to the consumer. Although transportation infrastructure is necessary for rural development, an economies' agricultural, regulatory or trade policies may offset benefits from upgraded infrastructure. In early stages of development, it may be necessary to mitigate

government policies which raise domestic infrastructure costs such as licenses, tolls and fuel taxes.

Across the Asia-Pacific region, the quality and extent of road and rail systems vary significantly. The lower-income economies of China, Southeast Asia and Latin America significantly underinvest in road and rail infrastructure compared to the region's developed economies (Figure 5). This is measured by length of road or rail per square kilometer, a reflection of density, as well as length of road or rail per capita, which reflects service.

Infrastructure underinvestment leads to slower delivery and higher domestic shipping costs. For example, shipping overland from Chongqing in Central China to Shanghai, a distance of about 2500 kilometers, takes 10-15 days. This is similar to the time required to ship a container from Los Angeles to Shanghai, a distance four times as great. Many of the other developing economies in the Asia-Pacific region also suffer poorly developed infrastructure, sometimes due to fragmented geography as in Indonesia and the Philippines.

Since underinvestment in infrastructure is at least partially explained by the public goods nature of it, governments have a critical role to play in encouraging and funding infrastructure investment. This generally requires low-income and cash-strapped local and national governments to provide the money. Bond funds may need to be developed to allow governments to access the high-savings rates of PECC countries to finance those expensive, long term infrastructure projects.

China is working to connect interior provinces with coastal population centers and is spending multibillions of dollars to expand the nation's rail system and develop enhanced inter-provincial road systems. Government investment in the nation's rail system is expected to increase by a factor of four by 2010. The result should raise rails' share of commerce, including bulk agricultural products, since rail is more economical than truck transport over distances greater than 500 kilometer (Stanley 2007).

The widely publicized Three Gorges dam has increased navigability of the Yangtze River from Shanghai to Chongqing and the central part of China (Map 2). The result is barge shipping in that stretch is half as costly as rail shipment and even less than by truck and a few days quicker. Containerized barge traffic increased by four times from 2002 to 2005 (Biederman 2007). These developments are making food delivery to urban areas more efficient and less expensive, raising returns to farmers, lowering consumer costs and making China's domestic products more export competitive.

The greater Mekong subregion project will integrate China, Viet Nam, Laos, Cambodia, Thailand and Myanmar in the Mekong River watershed area (Map 3). This project is supported by the Asia Development Bank and national governments to link agricultural areas with urban centers and ports. Three economic corridors involving major roads are being developed as shown in the map. Customs procedures are also being streamlined to reduce time spent at border checkpoints. This project will ultimately benefit 70 million

people living in the Mekong Basin, many of whom are subsistence farmers in rural areas. Generally, travel times and transport costs across the region are declining and food produced in remote rural areas can more easily reach major urban centers, as well as export markets.

Under the North American Free Trade Agreement, the United States, Mexico and Canada have focused on developing infrastructure to better integrate Mexico with its more developed partners. Privatization of the Mexican rail system in the late 90's and the formation of joint ventures with other North American rail companies have improved service and raised the share of freight transported by rail. Further, Mexico's private and public-sectors plan to spend \$20-30 billion in the next ten years, largely for road infrastructure (Mexico... 2007). These improved road and rail systems are reducing the cost of transporting Mexican horticultural products to domestic urban markets, as well as more distant U.S. and Canadian markets.

Links to Modern Supermarkets

The rapid spread of supermarkets in the Asia-Pacific region developing countries is well documented by Reardon, among others. This phenomenon has taken place over the past 15 years, with foreign investment by supermarket chains such as Wal-Mart, Carrefour and Tesco in the Asia-Pacific region. Carrefour and Wal-Mart are expanding rapidly in China (Figure 6).

While large supermarket chains initially established themselves in a limited number of high income markets, they have since expanded to smaller cities and towns, reaching middle to lower income working class customers. This retail food transformation presents a major challenge for many rural areas and food producers, yet it provides opportunities. Many traditional wet markets, street vendors and mom and pop shops are struggling to compete and quickly losing ground to supermarkets. Supermarkets' share of retail food market grows most rapidly as incomes approach \$10,000 per year and levels off after \$20,000. Incomes are approaching this fast growth stage in many developing parts of the Asia-Pacific region (Figure 7).

Supermarkets expand the scale of food procurement and distribution, achieving large volumes and lower prices. Centralized warehousing and distribution centers lower overall costs and reduce handling, delivery times and shrinkage in fresh produce. Centralization broadens the geographic coverage of the firm's business to include more distant, regional and national suppliers, typically displacing traditional localized channels in the process. Reardon notes that procurement reorganization shifts to national, regional and global sourcing networks and involves the emergence of private standards to replace underdeveloped quality and safety standards in traditional markets and supply chains. It also fosters emergence of direct buying and specialized or dedicated wholesalers. Distribution centers use standardized equipment and organizational systems, including shipping containers, tractor trailers, forklifts, bar code readers and computerized inventory managing systems to enhance domestic and international transactions with large suppliers and with other distribution centers. The compatibility of major retailers

procurement and distribution operations across economies facilitates procurement of non-food products in, for example, China, for sale in Indonesia or other countries.

These structural changes increase the intensity of competition among foreign suppliers and pressure more traditional elements of the food supply system to adjust. The food sectors of all the less developed economies in the Asia-Pacific region do have technologically advanced and competitive food manufacturing segments well adapted to modern supermarkets and centralized procurement systems.

Supermarkets may also favor international suppliers, especially for products they cannot procure efficiently from the local markets. It allows them to expand the range of products offered consumers in each country. This includes out of season and tropical fresh produce, livestock products which require forage areas or grain supplies typically found in land extensive economies, such as some of the major developed economies of the world, and highly processed products with exotic appeal to high income consumers.

However, in developing economies, a significant share of food supplies still comes from the traditional sector. Expansion of modern supermarket chains does provide opportunities for some small scale food producers to link with supermarket supply chains. A key challenge for most small scale producers is to organize with others to achieve significant marketing volumes and to meet specifications of the supermarket chain such as timely delivery, quality assurance and food safety standards.

The Metro Cash and Carry supermarket chain in China is adopting strategies to deal with widespread concerns about food safety (Lambert and Bing 2007). This includes controlling the origin and setting up new supply chains focused on food safety. They typically obtain products from thousands of scattered household farmers, but meeting customers' expectations requires establishment of the supermarket chain's own sourcing base. Principal components of Metro's new supply chain for food safety involve four items likely to challenge the ability of smaller producers to participate in that supply chain. First, quality control from the origin, moving quality assurance from in-store to the sourcing base through training producers, environmental monitoring of soil and water conditions and screening seeds and young animals. The second element is standardization of all agrifood products which must meet the chain's specifications such as process flow, chemical and physical characteristics, microbiological characteristics, packaging and labeling, etc. The third element is traceability for any products entering the supply chain, with a sequence of labels which can identify the route and movement within the supply chain. The fourth is total process management to meet strict quality assurance during the whole process of production, packaging, storage, transportation and sale.

Specialized suppliers are emerging as transitional change agents. They are developing systems adapted to the needs of modern supermarkets, but doing business with small scale producers and traditional market channels, which are still dominant, though will gradually lose share to modernizing market forces. Specialized suppliers assume responsibility for aggregating production, packaging, assuring steady supply and

sometimes meeting traceability objectives of modern food retailers, providing large product volumes at lower cost. These specialized suppliers are held accountable for meeting quality, consistency and food safety standards. This is critical to supermarkets whose reputation depends upon not having lapses in quality and food safety, which could damage the supermarkets business prospects.

Policy Implications

Governments in the Asia-Pacific developing economies should consider options to help better integrate rural areas with rapidly developing urban areas. Direct government investment in infrastructure is critical but support may also be needed to provide rural communities and producers tools they need to adapt to the rapid spread of modern supermarkets and their supply chains.

Infrastructure Development

Lagging infrastructure in developing economies requires government attention. Creating the quality of internal domestic infrastructure to the same level as trade-oriented infrastructure investments in major coastal cities is necessary to help level the playing field for domestic food producers. This could provide significant incentive for much needed rural development. While infrastructure is not the only competitive challenge for small producers in rural communities, improving infrastructure is a necessary element for a competitive food system.

Since local or regional governments are the source of much financing in rail and road infrastructure, it is critical that they find the financial resources, either directly from government sources or through the equity markets or bond markets. This is necessary to facilitate the needed investments to establish modern roadways and maintain and upgrade existing rail facilities for connecting rural areas with major metropolitan population centers or port cities. Further, it is necessary that refrigerated railcars, containers and supporting intermodal infrastructure needed for transport of perishable goods to coastal markets and export positions be provided. This may require government incentives for private-sector investment through taxes, direct government grants or authority to level charges on users of newly developed road and rail infrastructure.

In addition to transportation infrastructure, warehousing and storage facilities are critical elements for marketing high value frozen and perishable foods to meet the growing demand in urban markets. Cold chain infrastructure and management must be improved in many of the developing countries, especially in rural areas where production and shipments are originated, but also in rapidly growing urban areas. Providing adequate amounts of controlled atmosphere and refrigeration equipment can greatly reduce spoilage loss which may be as high as one-third of perishable food in developing countries. Government may need to provide incentives for widespread use of such facilities.

Road improvements will strengthen economic linkages between countries, as well as within developing countries in the Asia-Pacific Region. Enhanced transport reliability helps raise agricultural productivity and improves income opportunities for rural areas. It also increases availability and lowers the cost of food supplies to growing urban populations. Linking dispersed surplus food producing areas with urban consumers contributes to more efficient, seamless domestic or regional food systems.

However, to complement well functioning transportation infrastructure requires competitive transportation and logistics services and policy reforms where existing policies may interfere with the development of those systems.

Connecting Rural Areas and Urban Consumers

Leaders in developing economies may need to provide incentives to modern supermarket chains to better integrate rural areas and domestic producers. This will allow domestic producers to participate in supplying rapidly growing urban markets in the developing economies. Any such incentives need to avoid restricting foreign trade, which is a vital element of economic development and providing low cost food for rapidly growing urban populations.

Small and medium sized participants in the food supply chain may need help from policy makers to respond to changes in the food system. The modernizing food systems with higher standards for quality, constancy of supply and food safety assurance will require that many farmers in developing economies take part in programs to create the necessary incentives and infrastructure at the local level to be able to participate in the food supply chains of modern retailers. Farmers and traditional merchants will need to improve their level of coordination, cooperation and quality control. This may require changes in policies that regulate how foods are produced and marketed, incentives for organizing institutional structures at the local or regional level and facilitating collaboration and improving marketing infrastructures to allow better interaction between suppliers and producers.

One option is providing government funded extension services to help farmers be more responsive to supermarket demands. Many producers in developing economies have relatively underdeveloped processes and production practices to allow them to meet the standards of modern supermarket supply chains. Education and demonstration of best practices in production and handling of products delivered to supply chain participants will be critical.

Another need may be for government to improve producer access to credit to ease the shift away from cash payments, the mechanism used in the traditional marketing sectors. Cash payments which are not feasible in the modern supermarket supply chain.

Facilitating and encouraging farmers to form associations to deal more competitively with supermarkets and wholesalers may require additional government policy or subsidy. To get such institutions organized may require assistance through governments directly

or through intermediaries with proper incentives. Farmer-to-supermarket linkages through various institutional structures developing in countries within the Asia-Pacific Region may serve as a model for others. Providing technical assistance to enhance small producers' organizational, management and financial capacity to deal directly with domestic supermarkets and foreign buyers is an example.

Support for Traditional Markets

During the transition period of rapid development, policy makers may need to support traditional markets, helping them to maximize their declining but still significant role in the evolving food system and identify opportunities where they may play a role. Such strategies as assisting traditional retail shops and wet markets to upgrade food safety practices and the facilities in which they market is an example. Hong Kong, for one, has established blocks where traditional retailers can operate from covered market stalls, with access to safe water and utilities. Subsidies to small traditional market participants provides consumers with a public good of safer food supplies, and provides employment opportunities through smaller retail outlets.

Another option to support traditional markets may be providing testing laboratories for food borne pathogens, which could be either subsidized to provide the public with greater food safety or operated on a reimbursement basis to those in need of these services. Meeting more stringent market-driven or government-mandated standards will be critical in emerging markets as consumer expectations continue to increase regarding food quality and in particular, food safety.

An alternative which has been implemented in Thailand is to set up government sponsored distribution centers for small retailers, subsidizing those needing to adapt to market changes, and providing consumers with a safer food supply

A final option for supporting traditional markets may be to control supermarket growth by putting population or distance restrictions on their locations relative to traditional retail food outlets. This has been done in both Indonesia and Thailand. However, regulation is not normally an efficient approach relative to providing incentives to stimulate adaption to changing market conditions by traditional operators. At best, restrictions are stop-gap measures which should be phased out over some well defined period if the goal is to allow market efficiencies to benefit the economy generally and consumers in particular.

In summary, policies to encourage development of an improved distribution system in developing economies will be critical to continued competitiveness and growth in these economies. Combined with proper incentives for private-sector action, government policies can benefit the entire population. Consumers, producers and rural based businesses will all gain.

References

Beattie, Alan (2007). "Remove Farmers Dig in Over Tariffs." *Financial Times*. May 23.

Biederman, David (2007). "Rise of the Yangtze." *The Journal of Commerce*. June 4.

Lambert, N. and Ren Bing (2007). "Metro Cash and Carry China: Purchasing Food". PowerPoint Presentation at the Emerging Links between Retail Transformation and Agrifood Trade in Asia Workshop. Beijing: International Agricultural Trade Research Consortium. July 8-9.

"Mexico to Invest Billions in Infrastructure" (2007). *The Journal of Commerce*. January 15.

Pacific Economic Cooperation Council (2003). *Pacific Food System Outlook 2003-2004: Where Demographics Will Take the Food System*.

Pacific Economic Cooperation Council (2004). *Pacific Food System Outlook 2004-2005: The Role of Transportation Infrastructure in a Seamless Food System*.

Pacific Economic Cooperation Council (2005). *Pacific Food System Outlook 2005-2006: A Revolution in Food Retailing*.

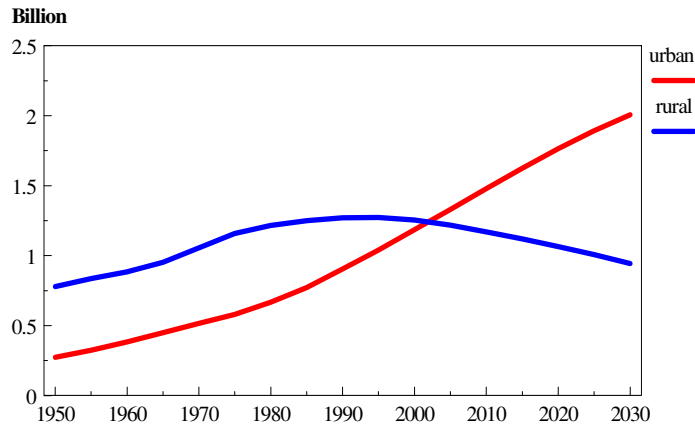
Pacific Economic Cooperation Council (2008). *Pacific Food System Outlook 2007-2008: Linkages to Growing Urban Markets Spur Rural Development*. Singapore.

Reardon, Tom (2007). *The Supermarket Revolution in Emerging Markets: Implications for the Produce Industry*. Brief prepared for the Produce Marketing Association. Produce Marketing Association. December.

Regmi, Anita and Mark Gehlhar (2005). "Processed Food Trade Pressured by Evolving Global Supply Chains." *Amber Waves*. Washington, D.C.: Economic Research Service, United State Department of Agriculture. February.

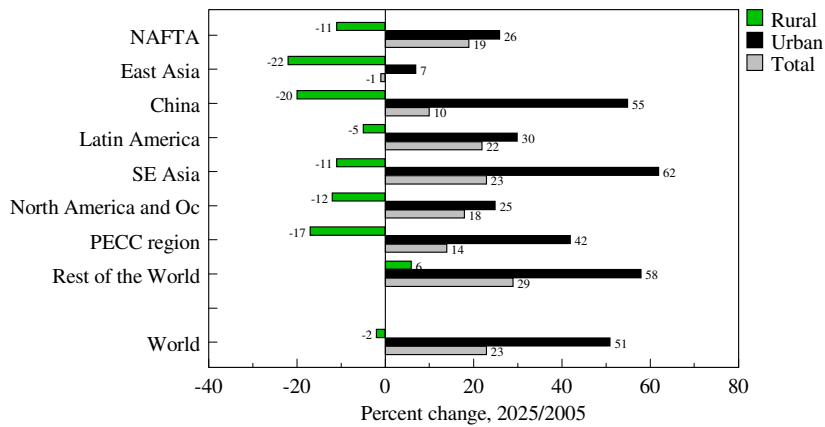
Stanley, Bruce (2007). "China Expands Rail Systems in Effort to Narrow Prosperity Gap." *The Wall Street Journal*. March 20.

Figure 1—Rapid Urbanization is Changing the Region’s Food System



Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2005 Revision, <http://esa.un.org/unpp>, Tuesday, October 30, 2007; 3:49:59 PM.

Figure 2—Urbanization is Advancing Most Rapidly In China and Southeast Asia



Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2005 Revision, <http://esa.un.org/unpp>, Tuesday, October 30, 2007; 3:49:59 PM.

Figure 3—Income Growth and Urbanization Boost Demand for Animal Products

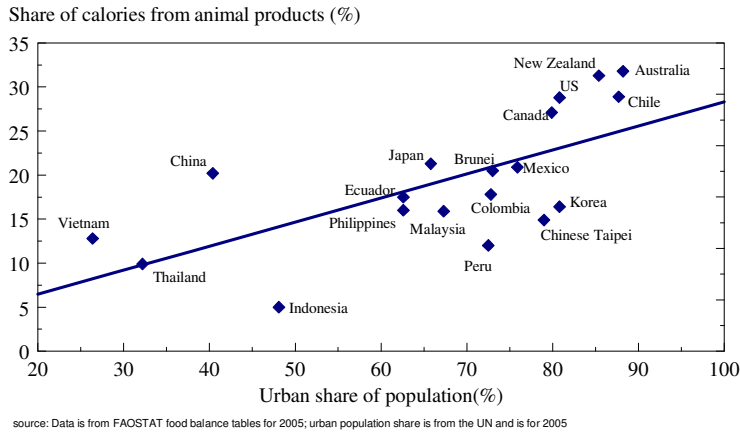
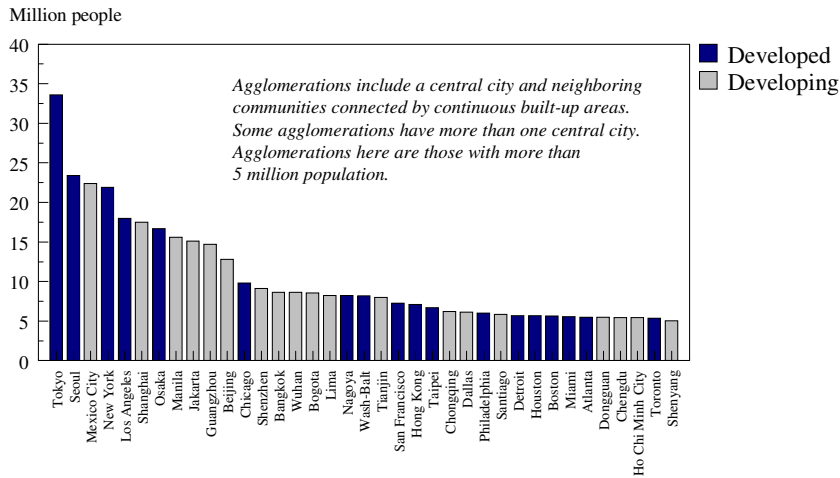
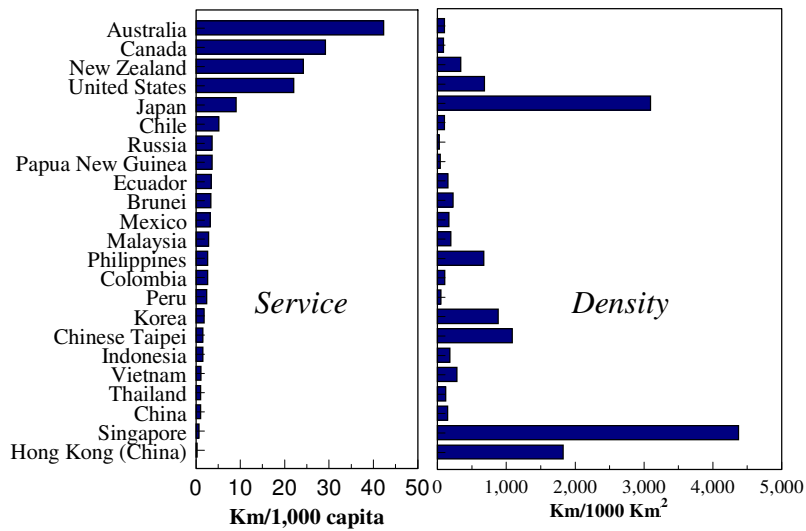


Figure 4--Urban Agglomerations Will Change Food Demand



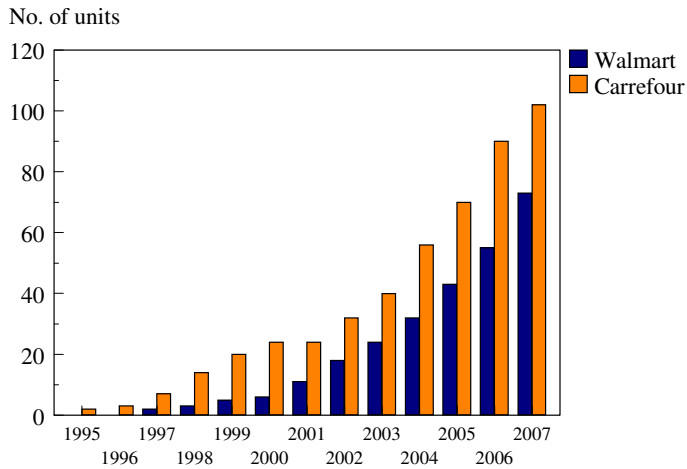
Source: Thomas Brinkhoff: The Principal Agglomerations of the World, <http://www.citypopulation.de/>, Sept. 30, 2007-09.

Figure 5--Road Service and Density Lags in the Less-Developed Economies



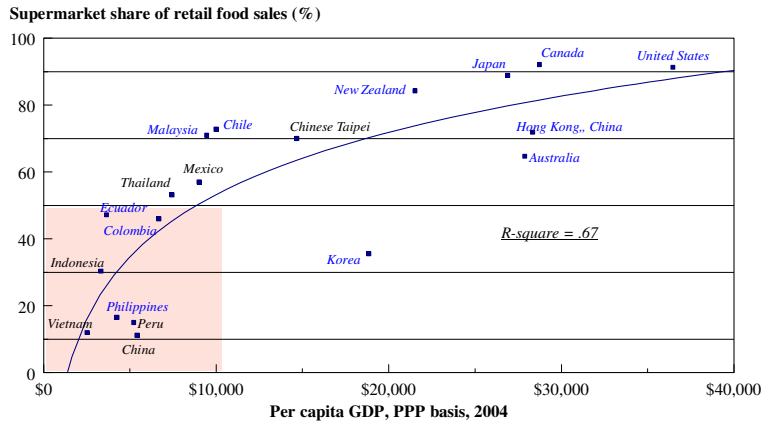
Source: Pacific Economic Cooperation Council (2004). *Pacific Food System Outlook 2004-2005: The Role of Transportation Infrastructure in a Seamless Food System*. November.

Figure 6—Foreign Supermarket Chains Expand Rapidly in China

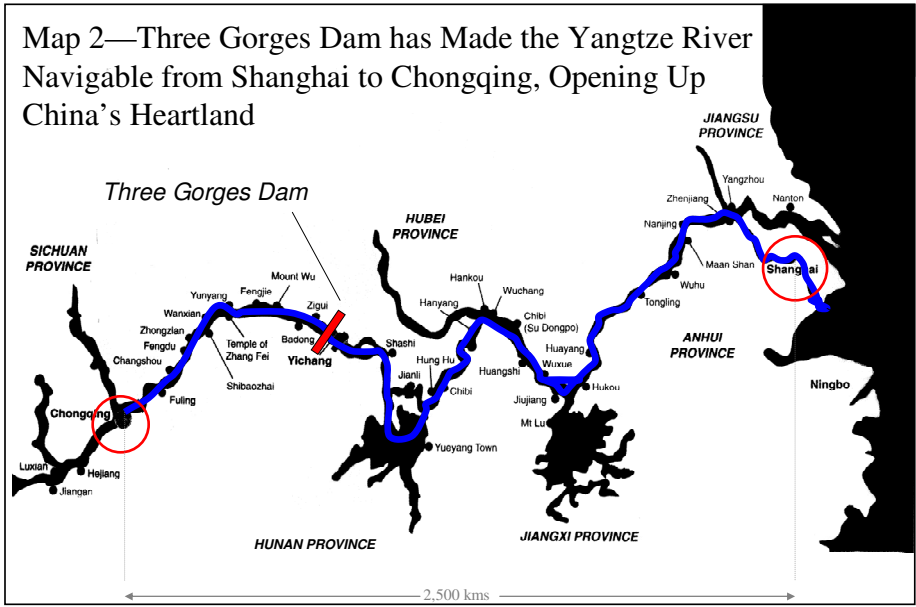


Source: Company annual reports found on their websites

Figure 7—Rising Incomes Lead to Rapid Expansion of Modern Supermarkets And their Supply Chains

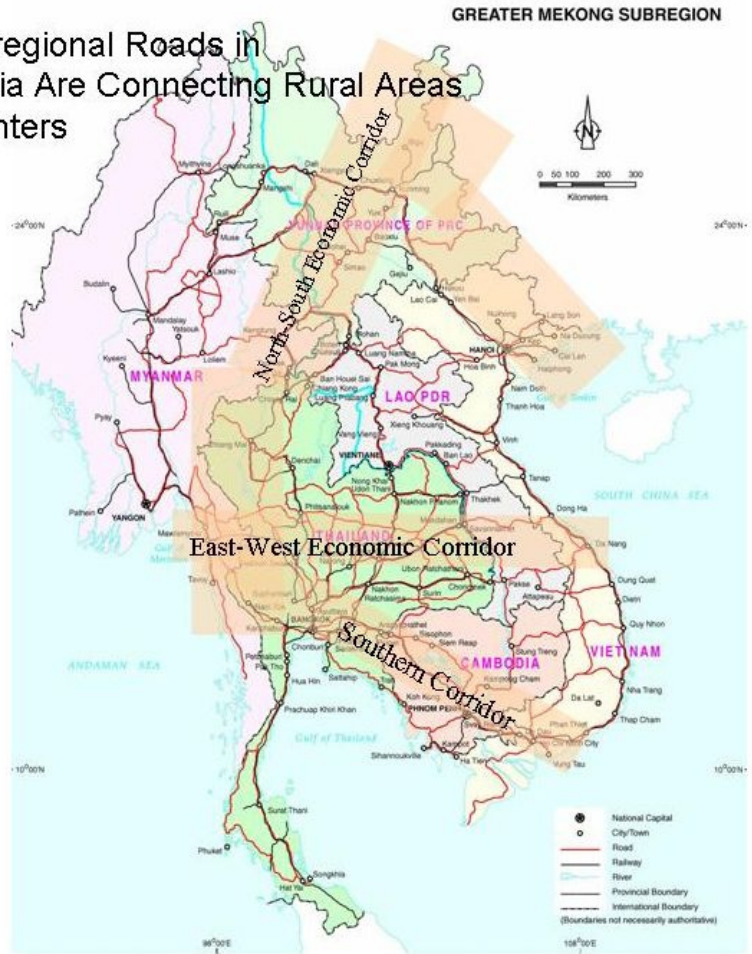


Source: World Bank World Development Indicators; Euromonitor data for 2003 in blue; other data from other sources, including data from PFSO meeting in Kunming, China, May 2005.



Source: Journal of Commerce, December 1-7, 2003

Map 3—Interregional Roads in Southeast Asia Are Connecting Rural Areas To Urban Centers



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