Revisiting scope and scale

This August, two of the largest residential telephone providers, Verizon and Quest, announced that their customer loss rate had increased greatly in the second quarter. This reflected the impact of economies of scope and scale, which impact the transportation industry as well.

Two types of economies of scale exist, and both result in the average cost of production decreasing as volume increases. Internal economies of scale result when a firm increases production. This is common in industries with high fixed costs. (A piece of equipment that provides twice the output of a previous device does not cost twice as much to purchase, operate or maintain.) In many cases, companies may seek to become the dominant producer of a particular good or service. External economies of scale refer to industrywide benefits created from certain types of expansion.

Economies of scope are closely associated with economies of scale. Economies of scope reflect that a company can produce several products — at given output levels — at lower expense than a combination of firms, with each producing a single product at the same output level.

In the case of Verizon and Quest, internal economies of scale have benefited telephone and cable providers. Cable providers seeking economies of scale, such as Comcast, have expanded into providing voice phone service. Meanwhile, an external economy of scale — the widespread introduction of broadband — has enabled Internet phone providers such as Skype and Vonage to offer phone service, too.

In the transportation industry, the power of these economies has been demonstrated by the development of hub-and-spoke networks. A central hub location serves as a means of connecting numerous outlying points. This network structure is efficient because it funnels movements into fewer routes (e.g., economies of scale) — but allows for a higher frequency of service between all points (e.g., economies of scope).

Compared to traditional point-to-point networks, hub-and-spoke networks are inflexible. They require that items (or passengers) being transported be routed through the central hub prior to reaching destination.

The hub-and-spoke network design has become a core practice in transportation. Railroads (with classification yards) and less-than-truckload carriers (with intermediate sorts) grew through this network design.

FedEx created the air express industry by using Memphis as a hub. Following deregulation, most legacy airlines followed the example of Delta in Atlanta. In air express and airlines, competitors rushed to replicate these network designs to stay competitive.

The ocean industry has literally mortgaged its future on scale. To accommodate the rapidly growing international trade, liner shipping companies are buying increasingly larger vessels. The linehaul economies of scale are clear, but in some cases, the required landside investment and increased feeder services may actually consume the scale benefits. And customers may become intolerant of the amount of time necessary to load and unload the vessel.

Not surprisingly, the benefits of scale and scope are no longer taken for granted. Intermediate stops (and rehandling) increasingly are being eliminated.

The fastest-growing segment of the less-than-truckload industry is the "regional" sector, which loads freight directly from origin to destination terminal. Railroads also have focused on assembling trains that remain intact from origin to destination (and often on return as well). Such deployments can improve service and profitability. Increased system velocity also can reduce necessary infrastructure (and investment).

Some industries have seen participants assess scope and scale differently. In the aircraft industry, Boeing and Airbus have followed opposite paths. Boeing’s 787 aircraft represents a bet on point-to-point transportation. The plane’s smaller size will allow service between point pairs that could not support larger planes — such as the 747. It also will allow more frequent service. Airbus Industrie’s A 380 supports the notion that scale is always successful. The A 380 will replace the 747 as the world’s largest aircraft. It will focus on hub-to-hub transportation. (Like the new generation of liner vessels, its initial market is envisioned to be Asia-Europe.) Not only has the plane’s delivery been delayed by wiring problems, but many airports have had to make significant infrastructure investments to accommodate the large plane.

These developments signal a clear recognition that economies of scale and scope can only be achieved when they produce a service that customers are willing to use.

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