

International Opportunities for the U.S. Transportation Sector

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Establishing and guiding a framework for research and development (R&D) requires a strategy, which usually means setting priorities—deciding which things to do and which things not to do. Conducting R&D for the purpose of providing a superior quality of life for U.S. citizens through our infrastructure, related activities, and transportation may not be the same as conducting the R&D necessary for penetrating the international marketplace. To determine a grand strategy for guiding R&D, we must consider several trends. First, because transportation includes the movement of people, it is worthwhile to keep track of where people are. For example, the United States constitutes a relatively small portion of the world's population, somewhere on the order of 5 percent, and decreasing. China, the Indian subcontinent, and Pacific Rim countries account for well over half the world's population. Adding the populations of Europe, North America, and Japan does not increase the world's population by a significant percentage. The populations of South America and Africa are smaller than those of China, the Pacific Rim, and the Indian subcontinent.

Another important consideration is the location of wealth. Whether transporting people or goods, someone has to pay for it. Aiming for transportation market penetration, therefore, means aiming where there is wealth as well as where there are people.

Europe, North America, and Japan constitute 70 to 80 percent of the world's economic activity, but the emerging countries of China, India, and the former Soviet Union are coming along at a fast clip. Large segments of the populations of China and the Pacific Rim countries also could move into a new strata of wealth, putting these countries in a position to demand more transportation services for goods and people.

One also might want to consider where to find the skills needed to create transportation elements and where the technologies and industrial bases will be located. In constructing a strategy for guiding R&D to penetrate international transportation markets, it is important to know where the skilled workers are now, how their skills will continue to be developed, and what form these skills will take 5, 10, and 20 years from now.

Finally, regarding the movement of goods, it is worthwhile to know where goods will be produced and where goods will be consumed. In emerging nations, production facilities are

growing, wage rates are low, and the number of workers is large. As evidenced from the growth and distribution of the world's gross product, production increasingly will be accomplished outside U.S. borders. The United States will not be the dominant producer of goods and services in the next few decades.

At the moment, however, the United States is an important producer, and it will likely remain so. Trying to figure out where production is going to occur and where goods are going to be consumed, therefore, has a lot to do with defining where transportation will be required.

INTERNATIONAL TRENDS

Economic activity per capita worldwide is rising, and its distribution is changing. The United States accounts for 20 percent of the world's economic activity, and this proportion is dwindling toward 10 percent. The overwhelming majority of economic activity takes place outside the United States. To be successful, firms must compete in this environment and deal with these trends.

Another important trend—globalization—is occurring. Nearly everything is being globalized—knowledge, information, movement of goods and people, corporate governance, markets, industrial bases, and technological capabilities. It is unlikely that a company or country with substantial industrial activity will consider the future marketplace, industrial environment, economic environment, capital formation, or access to people skills in anything other than in global terms.

Technology is advancing at an unprecedented rate, producing complexity and an interdependence that accompanies and drives globalization. There also is a revolution in information systems, which is causing profound changes in people's lives.

All this leads to the increasing importance of systems, integration, and infrastructure. In addition, the economic system is embracing more people who historically have been at lower wage levels, which places more pressure on keeping costs down. The increasing importance of cost is becoming recognized worldwide. Cost is an important element in the success of ventures, and lowering costs is an area of opportunity for the transportation sector.

For example, the airline industry, which has been in financial difficulty for some time, is inhibited by cost. The airline industry might assert that it is an industry that produces "high-cost stuff." For instance, a new airplane probably costs between \$250 and \$300 per pound, whereas a domestic automobile costs about \$6 or \$7 per pound. A change of a mere factor of 2 in the price of an airplane would substantially affect the airline industry's market access.

Furthermore, the large number of people who are increasing their participation in the worldwide economic activities puts more pressure on energy resources and the environment. If the rest of the world uses energy at the rate North America did during the past century, we will have a real problem.

SYSTEMS AND INFRASTRUCTURE

Systems and infrastructure are emerging as important aspects of the future of transportation. Currently, and certainly in the future, much of the added value of transportation systems will not be in the vehicle, but in the system and the infrastructure—whether roads, airports, seaports, rail stations, or cities, which are classic cost elements. Other elements to consider are air traffic control, global positioning systems, intelligent transportation systems, mapping, charting, and such systems as geodesy, surveillance, earth sensing, communication, and display. The information systems revolution is providing a proliferation of communication, processing, storage, and display technologies, which not only will affect all aspects of society and other elements of our lives but also will revolutionize transportation.

Another potential impact of advances in information systems must be considered: Will communication advances affect transportation? I believe they will in many ways and to a

greater measure than any other technologies introduced in the past. The question is, Will these communication technologies serve as an alternative to transportation, or will they serve as a stimulant? I believe they will do both. There certainly is a cause-and-effect relationship. People will rely more on information transportation when physical transportation is not available. For example, during the Desert Shield/Desert Storm operations, when terrorism put a drastic halt to much air travel, the revenues and activities of telecommunication systems increased remarkably.

On the other hand, the availability of telecommunications, processing, and information systems permits companies to try to achieve things they never would have tried before. These systems also stimulate economic activity, and they stimulate virtual proximity through telecommunications. Overall, they will be modest detractors and substantial benefactors for transportation.

To construct a strategy to help the United States take advantage of transportation opportunities in the international market, it is useful to examine the advantages the United States is fortunate to have. The following attributes gives the United States a tremendous advantage over other countries:

- The United States is part of a large continent that has developed separately from the rest of the world.
- The United States had to solve transportation problems as it developed; therefore, probably more so than any other country, the United States has experience in solving a wide range of transportation problems.
- The United States has a competitive industrial base to handle complex, technology-rich products and services, probably unparalleled in any other country.
- The United States has a superior systems integration capability and a diverse cultural background.
- The United States has experience and a leading market position in information systems, which is going to affect transportation in many ways.
- The United States has a top-notch university system.
- The United States has an entrepreneurial and diversified work force, which is a tremendous asset when it comes to integrating systems, cultures, and technologies.
- The United States has a large domestic market from which to operate.

STRENGTHS AND WEAKNESSES

The United States has a particular advantage in air travel. Our market position is good, and we are current leaders in most aspects of air travel. In addition, the United States is a leader in the motor vehicle arena—automobiles, trucks, buses, and so forth. The fact that we lead the pack in air and motor vehicle transportation is no accident.

In rail and ship transportation, however, the United States' capabilities are not as good. These modes of transportation are not our strengths, and we do not have as good a market position. This is important to keep in mind because the United States must decide whether to do something heroic to catch up with the rest of the world. If we follow this course of action, a strategy will be needed.

Without question, the United States has substantial competence in systems and infrastructure. Not only do we have the technologies and skills to understand systems and their integration, but we also have experience in integrating large projects on an international basis.

How should the United States design its slice of the international transportation pie? People need money to travel, and goods must be produced to create cargo. Making up 5 percent of the world's population and conducting 20 percent, and falling, of the world's economic activity, the United States, including its transportation industry sectors, must learn how to compete in the international marketplace.

Transportation needs, however, will exist in the international marketplace only if there are other successful economies. There is little the United States can do that is more powerful than to ensure continued growth in global economic activity so that there will be a continued market for transportation. This way, we can provide services in areas in which we are competent. Trying to be dominant in all aspects of transportation might not serve this objective.

CONCLUSION

If we were to develop a strategy for future transportation R&D and the role of government in it, it would include holding onto our current leading positions in sectors of the transportation business on a global basis. The strategy should exploit our systems' advantages and should provide a modest advantage in the standard of living for citizens of the United States.

Finally, the United States must lead the drive to improve standards of living worldwide, because it will not serve the U.S. transportation sector well if the rest of the world fails economically.

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