Innovation and Visions for the Future of Transport

Experts Session
Paris, 26 January 2010

Leading experts on transport and innovation met in Paris on 26 January 2010, where they discussed scenarios and visions for the future of the sector, and how innovation might impact on these. The list of participants is included in Annex A.

Presentations from the session are available on the Forum web site, as are related papers (www.internationaltransportforum.org/2010).

The main points put forward by participants are listed below. They are not attributed to any individual, nor do they represent the views of the International Transport Forum or its Member Countries.

Drivers of Future Demand in Transport:

The major constraints on the growth of global transport demand in the foreseeable future will include energy costs and scarcity; climate change; congestion; urbanisation; scarcity of available funding; the aging population in developed countries; the growing economic and demographic importance of non-OECD countries; and security and safety.

Current patterns of transport use are, in several ways, not compatible with the aims of lessening transport's contributions to climate change and fossil fuel consumption, maintaining reasonable travel speeds and reliable travel times, and reducing negative impacts on human life.

There are also inherent contradictions in some of the pressures on the system as it is currently managed, such as the need to reduce energy consumption and GHG emissions while also moving more goods and people more rapidly. In some instances there are also co-benefits in addressing some challenges, and it is important to identify these.

The fall-out from the global financial crisis will continue to affect the transport sector for a long time to come, and this will include a lack of available public funding for improvements to infrastructure and services. A V-shaped recovery is far from a certainty.

The Impact of Public Policy:

Of fundamental importance will be the policy choices undertaken by governments in response to the challenges facing the system.

For example, any recourse to protectionism in response to the crisis will ultimately deepen the impacts. In many areas of transport, the application of market-based competition continues to be limited – such as limits on cabotage and foreign ownership, among others – and this will dampen growth and productivity.

Policy innovation in the past has had at least as profound an impact on transport as technological innovation. Indeed, in many instances the former has acted as a catalyst for the latter. One example cited the US legislation deregulating the freight rail sector, which led to increased productivity, providing companies with greater incentives to invest in the system and introduce further innovations themselves.

There is room for further such policy innovation in the transport sector. One example given was that the liberalisation of air service agreements could increase the degree of connectivity and lead to a more efficient use of resources.

Major changes in policy have sometimes resulted from exogenous shocks. In the past, for example, fiscal crises have led governments to commercialise transport assets and services. The pressures on transport demand cited above could – and indeed, in some instances, should – lead to major changes in public policy.

A key element in allowing private actors to innovate is a stable and predictable policy environment, including clear messages regarding how governments intend to deal with the major challenges ahead.

Climate Change and Energy Use:

A key question in transport for the foreseeable future will be its impact on climate change. Transport currently accounts for about 24% of global CO_2 emissions from fossil fuels and 14% of emissions from human activity, and it is growing as a source.

There are effectively three ways of mitigating this:

1. Transferring traffic onto less polluting modes of transport;
2. Decreasing the emissions in each of the modes through improved fuel economy or switching to less carbon-intensive fuels; and
3. Reducing the amount of transport.

However, current trends are, in many instances, moving us in the opposite direction. For example, where modal choice is concerned, there has been a global increase in the use of road and air transport, to the detriment of rail and inland waterways, and this is likely to continue.

Furthermore, modal shift in itself does not guarantee GHG-emission reductions. This depends on the source of the energy employed, among other factors. For example, electric trains are limited in their potential to reduce GHGs if the electricity is generated by fossil fuels and if load factors are low. Electricity generation in India is estimated to emit about 10 times as much CO_2 per kw/h than in France. High-speed rail uses more energy than conventional rail, so the question of load factors is particularly important.

Emissions of CO_2 and, especially, air pollutants have improved per unit of traffic, but the benefits have been negated in many instances by increases in traffic.

In addition, transport demand will continue to grow, particularly in those countries where there is considerable economic and population growth. In many developing countries there is both a very young population, as well as great unmet demand, particularly that of the poorest segments of the population, who have limited access to transport systems.

Predicting the future price of oil is enormously difficult, but indications are that it will rise, and it is quite likely that the high levels seen prior to the crisis could become the norm.

Congestion and Capacity:

Transport has been characterised by a high correlation between growth in demand and in GDP per capita.

This is partly because higher income leads us to place greater value on our time, and thus choose the travel options that provide higher speed to reduce our time costs of travel. At the same time, the wealthier we are, the further and faster we want to travel, and the shorter our stay is likely to be. Greater wealth is associated with more economic opportunities and interactions – both business and social – and thus more mobility.

However, these patterns cannot continue indefinitely. Systems – particularly roads in urban areas and key corridors – are reaching saturation points, meaning that the future may demand new thinking for both personal mobility and freight, if economies are going to continue to grow.

"What is the point of making aircraft faster if the process of getting onto and off of the plane is what is slowing down the overall journey?"

Looking at journeys from a "door-to-door" perspective, the terminal elements are increasingly an impediment to speed, due to such factors as congestion and security measures. This implies that the most important innovations in future may not be on the fastest parts of the journey, but rather on peripheral aspects, including non-transport elements like customs clearance.

Increasingly, capacity, reliability and cost effectiveness are being given higher priority over speed in transport systems.

Urbanisation and Demographic and Economic Change:

Globally, there will be substantial growth in urban areas and populations for the foreseeable future, particularly in developing countries, leading to a growing number of mega-cities, many of which have insufficient passenger rail systems. The predictable result is "catastrophic congestion", as well as great increases in transport-related CO_2 emissions. In general, the problems with urban transport – particularly congestion, pollution, safety, accessibility and system disruption – will likely grow more rapidly than populations.

While the objectives for urban transport policy are unlikely to change significantly, priorities probably will, with greater emphasis placed on climate change, resource depletion, health and system resilience. Policy instruments in response to urban transport challenges have evolved, as witnessed by the increased application of congestion charging and other demand management instruments in cities around the world, although the diffusion process has often been very slow.

Many of the above phenomena will be felt particularly sharply in emerging and developing countries, due to their rapid economic and population growth. For example, despite investments in infrastructure, rapid growth in some emerging-market countries will soon lead to situations where relatively wealthier people will be using relatively poor infrastructure. Many OECD countries are also facing infrastructure capacity problems due to past underinvestment in infrastructure.

With economic growth will come new demographic challenges in some emerging economies, including, in future, the need to address problems like an aging population and unemployment. For the foreseeable future, poverty and the need to integrate less privileged segments of society remain a major challenge in much of the world.

Particularly in OECD countries, the increasing average age of populations will decrease tax revenues, and augment social expenditures like health care. This will necessarily limit the availability of funding for such needs as infrastructure, which could mean greater reliance on private investment and user charging to cover the costs.

Accompanying urbanisation has been a decrease in population in some parts of the world, particularly remote and rural areas, raising questions about how to effectively provide transport.

Security:

The security threats that were revealed at the beginning of this decade have not disappeared, and terrorists and criminals are also innovating in their search for ways to attack transport systems or use them as means of carrying out attacks. There is thus a need to constantly evolve efforts to protect transport systems. The main challenge is to combine security improvements with efficiency benefits, especially for goods.

Road Safety:

Internationally, 1.3 million people continue to die as a result of road crashes annually, and many more are injured. In developed countries, road safety improvements are showing signs of slowing down, while the numbers threaten to grow greatly along with population and income increases in emerging markets and developing countries. Even if all countries achieved the same levels of road safety as the best-performing countries, the worldwide numbers of people killed would still be enormous.

Innovation in Transport:

Innovation means more than research and development. While R&D is important, innovation also includes the application of new ideas, policies and practices in ways that bring about improvements in overall processes.

Technology has an important role to play in improving transport. But “soft” innovations – such as changes to policy and practices – are equally important. In many instances, the most effective innovations involve putting in place policy options that have long been seen as best practices; examples include more direct charging of road users, innovative funding mechanisms, road safety measures, traffic management and parking policies, among others.

There are many past experiences that point to major changes in transport resulting from innovations in policy and practices, as opposed to sophisticated technology. The increases in productivity as a result of deregulation and commercialisation in various modes is one example. Containerisation is another.

Having said that, it is clear there are technological applications that can impact heavily on transport and its users, and these often complement or facilitate policy innovations. Examples of important new technologies include:

- Energy sources, fuels and materials that reduce energy consumption and GHG emissions;
- Information and communications technologies, which can improve modal integration, freight tracking, passenger information, electronic charging and safety margins; and
- Scanning systems for security.

The full potential of new technologies – particularly information and communications technology – to impact on transport demand remains to be understood.

Policy and technological innovations are often mutually reinforcing. For example, ITS have facilitated the implementation of road-user charging, passenger information systems, integrated fare systems, and bicycle sharing. Also, technologies can determine how services are delivered, and therefore can impact heavily on the public policies and regulation applied in the sector.

Barriers to Innovation in Transport:

There are impediments to innovation and to the dissemination of innovation in the transport sector, which reside in factors of funding, governance, acceptability, and regulation.

To begin with, R&D costs are great, and are often difficult to justify in transport, given low profit margins and the long life spans of assets, which mean that returns on investment take a long time to manifest themselves.

Furthermore, there is no clear connection between pricing mechanisms and the supply of infrastructure, which can lead to misaligned incentives and rent-seeking behaviour. Within the contracting process for services and infrastructure there is often a focus on lowest costs, as opposed to performance, which does not induce innovation either. Also, the economies of scale in many aspects of the sector, particularly given the high cost of infrastructure investment, lend themselves to a relatively high degree of monopolitistic behaviour.

In addition, there is a resistance to change, and vested interest in existing systems and practices. Individuals and companies are often unwilling to pay for innovations that will bring forward improvements, in some instances because the benefits are widely shared, but the costs must be borne by individuals and firms.

"Innovations that are good for society might be inopportune for individuals."

There is also a more emotional adherence to the status quo in some instances. For example, drivers do not want to see limitations on their control of vehicles, despite that fact that driver error is a major cause of crashes.

There is an aversion to assuming the risks inherent to innovation in transport, perhaps resulting from an inability to share or mitigate those risks.

In addition, the transport sector is plagued by a lack of available data that is comparable across modes, in such areas as the costs of transport use, benefits of investment, traffic and load factors, and congestion levels.

Furthermore, increasingly, a lack of skilled workers in the sector is impacting on the ability to apply innovations.

Effective Efforts to Foster Innovation:

To be effective, innovation cannot be seen as the activity of a small and technologically sophisticated elite. Rather, effective innovation – which provides the greatest benefit to society – involves the capacity of a large number of actors throughout companies, governments and societies to put in place new thinking, practices and applications. The user has a particularly important role to play in the process.

For this reason, it is important that basic research occur to create new ideas, practices and applications, and that efforts be made to allow for their diffusion. The latter includes ensuring that individuals and organisations are well prepared – in terms of education and access to such tools as broadband internet – to take up, integrate and further improve innovation.

"There is a common misconception that innovation is zero-sum game between countries; that it is some kind of Olympic Games."

A major challenge is in identifying the appropriate role for government – where governments should intervene and where they should let the private sector take the lead. Governments are poorly placed to "pick winners" where new technologies are concerned. Efforts to foster a lead role in the next great technology have often led to a waste of public resources, and public efforts to promote national competitiveness by way of investment in specific companies or technologies could have an adverse effect. The value captured by an individual innovator may be trivial compared to the value generated by the wider application of the innovation, including in other countries.

Governments could better employ scarce public resources by putting in place the conditions to allow companies and organisations to innovate, as well as providing the incentives for innovation that will meet the prevailing challenges. Fiscal incentives, like tax breaks, are probably more effective than subsidies, because they allow fewer opportunities for value capture.

Governments should not intervene to supply products or services that could be provided by markets, even in the name of supporting the introduction of new technologies. The example was given of service stations in the early days of the automobile, which ultimately were provided by private interests as car ownership grew. Governments should particularly focus their efforts on supporting applications that could not be provided at all by the market, such as appropriate rules and regulations.

"Governments play a key role, but it is indirect. Targeted support of R&D is probably a bad thing. But that doesn't imply a policy of laissez-faire."

There is also an important role for government in removing obstacles to the diffusion and transfer of innovation. This includes making sure that appropriate intellectual property rights regimes are in place, keeping in mind that the nature of intellectual property can change with new ideas and technologies. Governments could also assist in the diffusion of innovation – such as the dissemination of new policy ideas across jurisdictional boundaries – by creating networks for the exchange of best practices – including local and national governments, and international institutions – and by improving the quality and availability of data to support decision-making. Different approaches to regulation can have an important impact on the extent to which they encourage service providers to innovate.

Innovation can increase the legitimate role of the state in society. For example, the popularisation of the automobile created a need to build roads, develop and enforce safety regulations, and limit negative externalities, none of which would have been readily met by the market. But state involvement creates opportunities for rent-seeking behaviour, meaning that great efforts must be made to strike the right balance in government engagement. A major challenge is found in striking a balance between market-driven and policy-driven processes to foster innovation. This underscores the need for a solid political process to determine the right role for government.

Governments should begin with a clear sense of the objectives that are pursued by way of support for innovation, focusing on high-level policy objectives, such as the challenges noted above.

Is Transport Inherently (Un)Innovative?

A debate arose regarding the extent to which transport might have failed to live up to its potential to innovate, and is thus not serving society to the extent to which it could or should.

Some key transport innovations – containerisation, high-speed rail, low-cost air travel, etc. – have led to great increases in the amounts and speeds of both passenger and goods transport, with benefits to consumers and business. The transport sector has traditionally revealed itself to be adept at increasing speed and traffic volumes.

But these improvements have often come at excessive costs, in terms of increased energy use, GHGs and congestion, as well as costs related to public spending. Furthermore, there are areas

where transport has notably failed to make important improvements, including managing road space, improving the productivity of public transport, and increasing overall system efficiency, such as the integration of land-use and transport planning. Many fundamental challenges associated with transport remain, such as pollution, safety and congestion.

Generally, it was agreed that future innovation in transport will need to change to focus less on speed and volume and more on addressing the new challenges noted earlier, and that this change in focus will require clear policy signals.

Annex A: Participants

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