

Professional engineering- is the way ahead to be found in the past?

By ENG (PROF) AMAL S. KUMARAGE

Senior Professor of Civil Engineering, Department of Transport & Logistics Management, University of Moratuwa

Keynote Address at The Institution of Engineers, Sri Lanka 106th Annual Sessions on Oct. 19, 2012, at the BMICH

Continued from last week

Comparatively the development of transport since independence has been disappointing. In fact one can argue that the last 60 years has seen deterioration in all of these aspects. Preoccupation on issues of equity, welfare, affordability and poor governance has left the transport system hanging on to an outdated system developed first by the Dutch and then by the British. It is yet to be modernized to meet the new economic and mobility needs within the country let alone the emerging international connectivity required for developing international trade and transport. The canal system has all but disappeared and rendered non-functional. The railway has continuously lost market share and has become a commercial burden even though its economic potential remains. The road network is overcrowded, slow and unsafe. The bus network has not been reformed to suit the open-market conditions. Institutions charged with these functions have grown in size and in budgets they execute, but their services have continuously deteriorated. Western province and Colombo in particular, has attracted economic activities that contribute nearly 50% of the national GDP. However the transport systems remain not modernized to meet their requirements. On the other hand, the northern, eastern and uva provinces in particular still remain

poorly connected to the WP and as a result remain economically the most under developed areas.

Transport investment has constantly been hijacked for votes at election times with promises of rural roads, rural bus services, metalled and tarred roads. This continues today, with concrete and asphalt roads being the modern promises. There has been no serious effort to develop a national transport strategy or transport network. The Southern Highway, Katunayake Expressway, Port of Hambantota and Hambantota International Airport are not a part of any known overall strategic plan to develop the country's resources for trade or consumption. Most transport infrastructure projects are piece-meal investments. Today they are a plethora of unsolicited proposals. The calling of proposals as unsolicited itself is an admission of the lack of a government's planning or preparedness for transport sector investment. On the other hand the budgeted expenditure for 2013 for all modes of transport exceeds Rs 250 billion or nearly 4% of GDP. The question we all need to ask is whether they will bear fruit as much as the transport investments that were made in the 18th and 19th century.

Most of this expenditure will flow through engineers and engineering institutions both state and private. While such spending should be heralded as good news to the industry, it also brings with it the responsibility of spending such large sum of money wisely for the future well being of the country. I have considered that there are three areas of concern that engineers today should respond to in discharging their professional responsibility.

Firstly engineers should ensure that infrastructure we build serves the economy and society

Engineering developed as a profession and earned its place in society as a contributor to social well being and improved quality of life. The first professional institute of engineering, the Institute of Civil Engineers in UK, was formed in 1818 with very altruistic principles worthy of being recalled today.

For example the ICE Charter states that its objectives

are:

.....the general advancement of mechanical science, and more particularly for promoting the acquisition of that species of knowledge which constitutes the profession of a civil engineer; being the art of directing the great sources of power in nature for the use and convenience of man, as the means of production and of traffic in states, both for external and internal trade, as applied in the construction of roads, bridges, aqueducts, canals, river navigation, and docks..

This objective was established in the beginning of the 19th century at the end of the industrial age and the beginning of the railway age which had begun to replace water transport worldwide. This was also the thinking after the Renaissance of the 17th century where the inventions arising from the 'advancement of science' began to be applied to civil life and benefit as against military application. Engineering itself became more oriented towards being used for the 'convenience of man' as set out in the ICE charter.

Furthermore it is interesting to note that the objectives of civil engineering were defined as 'the production and transport (called traffic at that time) as represented in the construction of the required infrastructure for purpose of commerce and human settlements. This was the basis of engineering practice. In other words civil engineering was to direct the forces of nature for man's benefit through constructions that would improve production, transport and human settlement. This was the exact basis that secured the future of the economy of Sri Lanka where the transport networks of the 18th and 19th century were engineered. The professional nature of engineering of the transport infrastructure at that time reflected a move away from infrastructure being used primarily for military use and for strengthening of political power to using it for economic development and social upliftment. This principle of professionalism in engineering has extended to all branches of engineering where inventions such as the steam engine were used primarily for civil use. The more modern fields such as electrical engineering and com-

puting led to more consumer oriented goods with individual applications as against public infrastructure.

Since this beginning of professionalism in engineering, transport engineers have added value both globally and nationally, with extensive railway lines, canals, roads, ports and airports being planned, designed and constructed by famous engineers such as Thomas Telford the pioneer of the ICE and Isambard Kingdom Brunel considered as one of the greatest engineers of all times. The subsequent creation of the Suez Canal and the Panama Canal changed international trade patterns.

This is a practice that should be extended to all disciplines of engineering; we need to ensure we add more value to the world than what is taken out from it. Today engineers are blamed for taking out of the environment's increasingly scarce resources in large quantities than what is put back. We should be aware that transport activity is one of the biggest contributors to climate change. Minimizing resource use in transport infrastructure construction and infact minimizing travel itself should become an objective of transport engineering. Thus our plans to build more infrastructure must be balanced with attaining a reduction in trips, travel distances, travel times and the associated negative impacts on both the environment and society.

It is thus the duty of engineers who have the opportunity to plan, design, and construct transport infrastructure to ensure that their professional intent is to safeguard against the negative impacts and that all transport infrastructure is created for the common good and not for the mere creation of monuments for leaders or for the consolidation of political or military power.

Secondly engineers should ensure that engineering institutions are also built not just infrastructure

Unlike the work of a physician, teacher or lawyer, engineering is not a profession that can be practiced individually. It is work undertaken by a team for the community. Most engineering tasks require a planning, design, construction and operation or maintenance stage. Within these there are many specializations required, all of which need to come together. In an engineering organization, the people undertaking these activi-

ties are bound together by processes which are fundamental to the practice of sound engineering. If you take these processes away then even engineers will not be able to practice engineering.

In the field of transportation engineering there has to be a planning phase. This is built on systematic data gathering, analysis and forecasting of future requirements. The detailed design phase for a transport infrastructure project such as a new expressway or new port or airport cannot be attempted without the required data gathering, planning and study. The construction phase that follows cannot be implemented in keeping with the standards of engineering unless the design has been completed within reasonable cost, safety and performance levels. Of course maintenance becomes a nightmare if construction is not done properly. Such is the domino effect when even one process is subverted in building transport infrastructure. It is also true for other infrastructure.

It is necessary to understand that the processes that combine these activities are equally important. The feasibility study that communicates planning requirements to design stage cannot be done in haste. Even though engineering institutions are well established, only a small fraction of funds voted through the consolidated budget is spent after due diligence studies or feasibility of the intended investment. It is sadly only for foreign funded projects that feasibility studies are done. The rush for speed often compromises the project reaping the potential economic benefits and indeed ensuring the minimization of resources and costs.

Today these engineering processes that were initially instituted by our Colonial masters are being dismantled in full public view. While the purposes of these processes when first instituted could be questioned, they were useful to ensure organizations serve the task they were set up for. They are to ensure that transparency and accountability are built in to the core processes of each organization. Such processes be they for award of contracts or tenders, for recruitment or promotion or for engineering design or study or inquiry are built to honour, respect and protect the professional inputs that are the core competencies on which engineering organization should perform.

To be continued on Monday

