

Demand Modelling

The main reason why my associate Jon Lijnes and I set out to develop the *Claassens-Lijnes Demand Estimation Instrument* (www.claassens-lijnes.co.za) was to obtain a tool through which demand for (municipal) services could be accurately derived from our spatial development model. This also enables us to estimate demand for services from a zero base (i.e. it is not reliant on a measure of current demand) and to project our estimate into the future. A secondary requirement was to estimate ‘Demand Risk’ and to develop mechanisms through which *Demand Risk* can be adequately mitigated through engineering design and adequately priced through tariff policies.

Demand Risk

When sustainability of municipal operations and especially the financing of municipal infrastructure are considered, the issue of risk analysis and specifically *Demand Risk* is critical. *Demand Risk* is simply that risk that may lead to infrastructure being constructed at the wrong time, in the wrong place and/or of the wrong size or capacity. As such it is critical that *Demand Risk* must be well understood, quantified and adequately mitigated.

In practice, *Demand Risk* may manifest itself in one of two ways. In the first instance infrastructure is over-sized and demand never reaches the installed capacity. This is the classical “white elephant” scenario and the cost implication for the municipality is clear. In the second instance, infrastructure is under-sized, demand rapidly exceeds capacity and the infrastructure has to be extended. The cost implication under this scenario is not always clear – it may even be dressed-up as prudent management of (financial) resources. But, there is a cost and it is in the form of an opportunity cost. The lost opportunity is the benefit of economies-of-scale. Because of this opportunity

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cost, the installed infrastructure will ultimately cost significantly more than if *Demand Risk* was adequately quantified and mitigated. In both

instances, consumers of the service will ultimately end up paying more for the service than what the economic cost of the service should have been.

But the problem goes much further than the incorrect sizing of infrastructure. The lack of understanding of *Demand Risk* and the inability to adequately integrate functions impact on the way that municipalities price their services, manage credit control functions and conduct cost recovery. These factors impact directly on the financial well-being of every municipality and when flawed the consequences can be

dramatic.

Mitigating Demand Risk

Demand Risk is a key risk that needs to be adequately mitigated when planning new infrastructure. The demand scenarios generated through the *Claassens-Lijnes Demand Estimation Instrument* can be used to mitigate Demand Risk through engineering design as follows:

- Infrastructure is sized in order to meet demand under the High-scenario over a suitable time period
- Revenue forecasts over the same time period that are incorporated into the financial model are based on the Expected-scenario
- Tariffs for the relevant service are adjusted to yield adequate cash flow measures (such as debt service cover ratios or loan life cover ratios) over the time period
- The project is tested for financial robustness at the Low – and Very low scenarios

This strategy will adequately mitigate *Demand Risk*. It also illustrates the critical interaction between engineering design and design of the appropriate tariff structure to mitigate this key risk.

Insight into other risks and risk management

The *Claassens-Lijnes Demand Estimation Instrument* is not only utilised to mitigate *Demand Risk* but also provides valuable insight into and analysis of various other risks that impact directly on some of the secondary analysis that we often conduct. These risks are:

- **Development risk:** what is the likelihood that once the bulk infrastructure to service a development area is installed the area will be fully developed (and the infrastructure utilised) within a specified period of time? It is critical to consider (and price!) this risk when determining development levies or bulk services contributions.
- **Revenue risk:** what is the likely income that will be generated from the delivery of a specific service in a specific geographic focus area given the tariff structure? It is critical that revenue risk must be considered when the tariff policies of a municipality or utility are formulated.
- **Cost recovery risk:** what is the likelihood that a certain cost-recovery-rate

will be achieved in a given area? If the area consists of more than one Demand Zone, the different demographic – and development profiles of the Demand Zones will have a significant impact on this risk.