Operations and Logistics: Measurement and Finance

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Logistic and Operations

• Logistic is the management of means to be applied to some end .....the operations underlying the manufacturing (upstream) and service (downstream) processes

• Logistics is subjugated to needs that underlie the flow of goods, transports, information and operations in general ..... 

• As a result, logistic is an essential and a strategic derivative tool of the operations management of enterprises.
Logistic and Operations

• Are worth a great deal of money but few have thought how to value them at their proper contribution
• It is hard to measure logistics’ contribution for example because it is always someone else who profits from it
• It has an option value to the user if we can measure appropriately its value when it is needed and the costs if it is not needed
• It is risk sensitive
• …..
• As a result, logistic and operations, just like finance are beset by uncertainty and risk
• In this process, measurements definition, collection, validation, and analysis and their use are a vital facet of operations and economic logistics
Traditionally ... logistic measurement and operations management problems are conceived as ....

Performance-Risk Substitution

Min Cost
Subject to:
Reliability $\geq \alpha$

Max Reliability
Subject to:
Costs $\leq$ Budget

Related Measurement Problems:
What are Costs
What is Risk and Reliability
What are constraints and their value effects

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Further, in practice ….

• The models we use are only a representation of reality.
• Strategic considerations usually dictate operations and logistics alternatives, infrastructure and programs.
• Operations and logistics are corporate strategy derivatives, led rather than leading the corporate strategy. It is changing … But this change depends on OM and LOG managers.
• Measurements are available but they are operationally sensitive rather than money and valuation sensitive which is needed for strategic decisions.
Techniques we commonly apply

- Qualitative Techniques (benchmarking and related approaches)
- Programming based and Shadow pricing techniques, ABC
- LRAC techniques
- Multi-criteria approaches
- DEA or efficiency techniques
- AHP or ordering
- ….
These techniques are often inappropriate in Logistic and Operations however

…..OM-LOG is usually

• long term based
• market (and supply chain) structure dependent
• involve both irreversible investments and service supply contracts
• involve a commitment to a logistic and operations infrastructure future
• Logistics is a “Mean to Means”, twice removed from the customer
• …..
A financial based measurement and valuation in operations and logistic is needed ….

- If we build a port or airport, who pays for it? How can we justify billions of dollars needed to build the port or airport?
- How much is a highway worth investing in? What are the relevant cash flow to apply in valuing these investments?
- What is the value of a Flexible Manufacturing System
- Who knows how much quality is worth? And worth investing in? At best, we know how much it costs when it costs!
- How much infrastructure investment is justified in building a supply chain? In setting an outsourcing strategy? Who pays for it and how are costs shared in the present and in the future?
- What is the value of a BOT contract? Can it be implemented without taking into consideration a potential for reneging current agreements?
- ……..
We need to be:

- Sensitive to external financial markets and the ability to price logistic investments and operations in a coherent manner with their value perceived (and appreciated) by markets
- Sensitive to local needs for operations and logistic infrastructure and to the risks that they sustain
- Sensitive to specific and comparative advantages on a regional and a global scale
- Sensitive to the present and the future, providing a set of clearly defined steps and side steps
- Based on economic tools and measurements that are understood by CFOs
Traditional Valuation techniques in Finance have also evolved

...well known,. well practiced .....I will not add to...
Except that they are needed and they are important!

• Replacement Value method
• Average Rate of Return
• Payback Method
• Internal Rate of Return
• Net Worth
• Discounted Cash Flow formulations
• ....
Market Sensitive Financial Valuation Techniques...however:

- can provide a mechanism for the valuation of operations and logistic investments by translating the investments and their future risk-returns into tradable goods and thereby provide a needed source of funds for such investments (e.g. securitization of infrastructure investments)

- Can provide sources of funds to projects that may then be financed by the market.
Some of the approaches …we may look at …. 

- Infrastructure adjusted CAPM for valuing projects risks 
- The Option valuation of operating and a logistic assets and services, logistic based agreements, real assets in logistics infrastructure and their likes. 
- Use risk analysis techniques such as VaR to construct a common language between Operations and Financial Managers 
- .....
Real Options: Unlike financial options which are traded, real options (which are not traded), are used on REAL ASSETS and can be used to value multiple logistic situations such as:

- The option to delay the investment in a port expansion (and wait for some of the uncertainty to be revealed)
- The option imbedded in sequential investment projects (or multi phases investment programs to meet uncertain contingent states)
- The option to increase or decrease the logistic prospective investment
- The option to stop the project against a certain payment or stop a contract
- The option to stop temporarily the investment project
- The option to change an input or an output
- Multiple options on multiple logistic projects
• More Examples:
  – Valuing a BOT with various clauses
  – Valuing supply options
  – Valuing quality dependent options
  – Etc....
• Valuation of FMS using CAPM
• Inventory and supply, option valuation (Tapiero, Ritchken 1986, *Operations Research*)
• Valuation of transport facilities based on options, sharing agreements etc. (that are dealing with uncertain demands)
• Valuation of maintenance projects and policies
• Reliability Design etc……
• VaR and Inventories (Tapiero, IJPR, 2000)
• **Determine a money sensitive approach to Operations and Logistics and a common risk language**
Conclusion and Discussion

• The Valuation of operations and logistics are essential and mostly neglected issues—obviously they are needed, but just how much!

• Financial techniques can be applied and should be applied both for justification and a better assessment of the needs to be applied.