

# Discovery

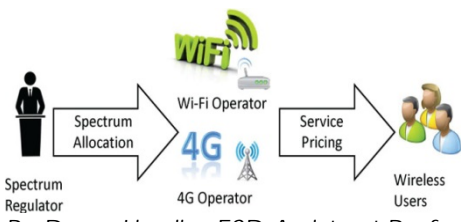
We SHARE to inspire and ignite ideas for Engineering Systems & Design (ESD) Pillar!

The titles featured here are to give you a peek into the wealth of resources we have. We hope, through this will encourage you to explore and read further. Share with us topics of importance to ESD and we can introduce relevant titles from some 400,000 eBooks we carry.

January 2016

## PUBLICATIONS BY ESD

### Balancing Income and User Utility in Spectrum Allocation



By Duan Lingjie, ESD Assistant Professor

To keep up with wireless users' rising traffic demands, the wireless spectrum allocator allocates the spectrum to maximize its income. However, this does not allow for optimal spectrum utilization by the users. So, the authors decided on a new spectrum allocation scheme which considers both the spectrum regulator's income and the users' utility. This proposed scheme significantly improved users' utility with limited loss of income for the spectrum regulator.

Source: [IEEE Transactions on Mobile Computing](#) (December 2015)

### Modeling and Analysis of Collaborative Consumption in Peer-to-Peer Car Sharing



By Costas Courcoubetis, ESD Professor and Saif Benjaafaar, ESD Founding Head of Pillar

With peer-to-peer car sharing becoming more popular these days, the authors have modelled and analysed the concept of collaborative consumption. The factors they have studied include the effect of car price on car ownership, the effect of car price on car usage and how rental price of cars influence their usage.

Source: [NetEcon](#) (2015)

## LIFE CYCLE ASSESSMENT

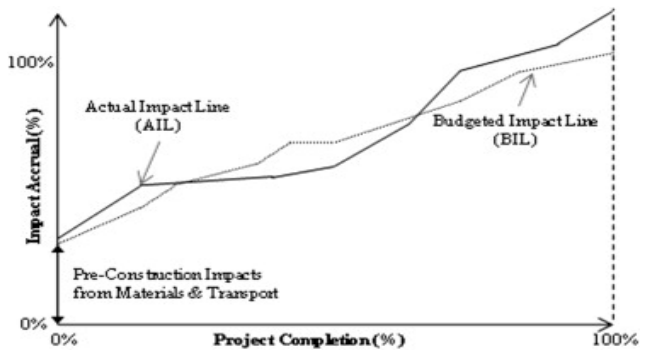
### Quantification of carbon emissions of the transport service sector in China by using streamlined life cycle assessment



By quantifying the carbon emissions of the transport service sector in China with a streamlined life cycle assessment (LCA) method, the author aims to provide an opportunity for further research and evaluate the available options for a sustainable transportation system planning in China. This method will be deemed important for future quantifications of carbon emissions by other sectors in China and beyond.

Source: [Journal of Cleaner Production](#)

### Cradle-to-gate sustainable target value design: integrating life cycle assessment and construction management for buildings

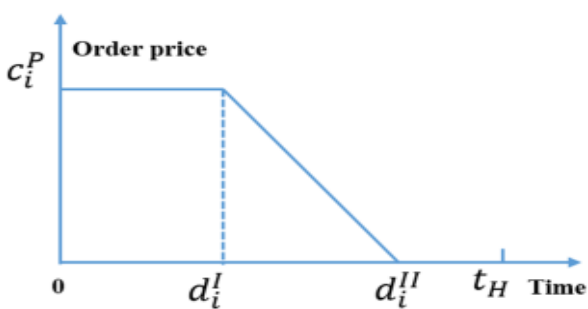


Quantifying the environmental impacts of buildings is a challenge as they can be identified during construction. The authors aimed to manage the cradle-to-gate life cycle of environmental impacts by linking environmental targets with modern construction management methods, to enable buildings to meet sustainable target values (STV). They developed a construction activity-based computational framework to help stakeholders make cradle-to-gate life cycle models capturing environmental impacts.

Source: [Journal of Cleaner Production](#)

## OPTIMIZATION

**A novel adaptive surrogate modeling-based algorithm for simultaneous optimization of sequential batch process scheduling and dynamic operations**



To remain competitive in the global marketplace, modern enterprises have placed greater importance on integrated optimization of decision making across multiple levels, which require reliable and efficient optimization strategies+++ and solution methods. An adaptive surrogate modeling-based algorithm attempts to solve the integrated optimization problem for sequential batch processes. The results show that the proposed algorithm leads to relatively high profits.

Source: [American Institute of Chemical Engineers](#)

**Supply chain network optimization considering assembly line balancing and demand uncertainty**

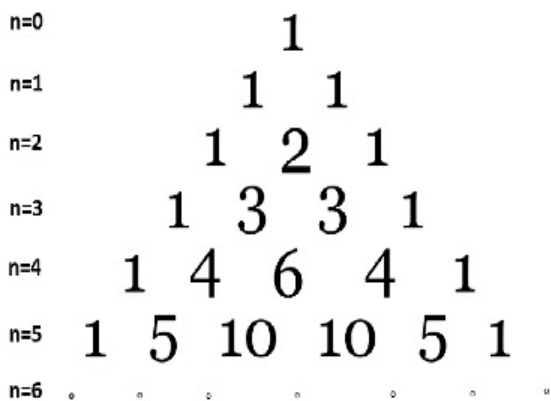


Long-term strategic decisions in supply chain optimisation problems include determining location, quantity and capacity of facilities. Tactical decisions, including assembly policy, inventory levels and scheduling are the tactical and operational decision levels. By optimising strategic and tactical decisions in the supply chain network design (SCND) under demand uncertainty, the authors have concluded that uncertainty would be a significant and fundamental element of an optimization model and improve the quality of solutions.

Source: [International Journal of Production Research](#)

## PROBABILITY APPLICATION

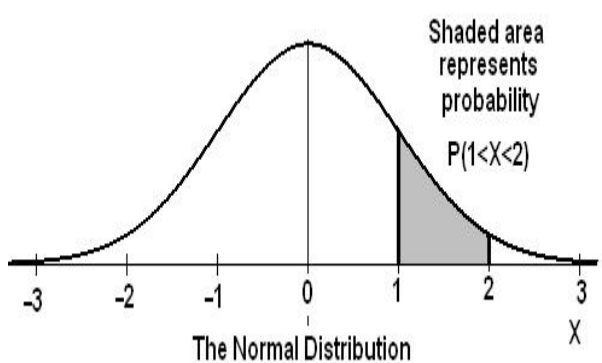
**A short history of probability theory and its applications**



Beginning with a history of probability theory and its applications, this paper shows Jacob Bernoulli's famous law of large numbers and theory of errors in observations or measurements is considered here. It also discusses Thomas Bayes' celebrated theorem of probability and evaluates the differences between the Bayesian and frequentism approaches to probability and statistics.

Source: [International Journal of Mathematical Education in Science and Technology](#)

**Generating discrete analogues of continuous probability distributions-A survey of methods and constructions**



Deriving discrete analogues (Discretization) of continuous distribution has been gaining attention from researchers. This paper presents a survey of the different methods of generating discrete probability distributions as analogues of continuous probability distributions. It also presents such applications in the making of new discrete distributions. Classification of the methods is on the basis of different criterion of discretization.

Source: [Journal of Statistical Distributions and Applications](#)