1. A classical DEA outputs (Banker et al., 1984; Charnes et al., 1985, into outputs. This is also known as a Black Box Approach and ignores internal processes.

2. Most DEA models consider single stage or two stage SC, multi-stage SC are understudied.

3. Most DEA models in SCM only focus on economic or environmental objectives, while very few models consider all three aspects of sustainability simultaneously.

In many cases, there are some over-simplified assumptions, which might limit their reliability and applicability.

**Methodology**

1. Data Envelopment Analysis (DEA) is a mathematical programming method that evaluates the relative efficiencies of multiple DMUs based on multiple inputs and outputs (Banker et al., 1984; Charnes et al., 1985, 1979; Thanassoulis, 2003).

2. A classical DEA model which transforms inputs into outputs. This is also known as a Black Box Approach and ignores internal processes.

3. A network DEA model which associates relationships between the divisions within each DMU.

**Research Gap**

Most DEA models consider single stage or two stage SC, multi-stage SC are understudied.

Most DEA models in SCM only focus on economic or environmental objectives, while very few models consider all three aspects of sustainability simultaneously.

In many cases, there are some over-simplified assumptions, which might limit their reliability and applicability.

**Research Contribution**

1. Use dynamic network DEA to increase the accuracy of performance measurement.

1. Relax some assumptions and constraints to closely reflect real-life characteristics of SC.

Consider multi-stage SC including supplier, manufacturer and distributor.

Focus on all three sustainable aspects (economic, environment and social) together

**Managerial Insight**

The model can help managers when making strategic decisions about resource allocation and supply partnerships by identifying inefficient SC partner and suggesting which divisions causing the inefficiency.

**Results**

The overall efficiency for all years are < 1.

**Stage 1:** Supplier stage remained the least efficient stage (only 38.7% in average).

**Stage 2:** Shows the highest efficiency score. It takes into account the performance of Energy service department, leading to effective energy consumption.

**Stage 3:** Efficiencies are decreasing as the company believes the reason for low performance of their selling agents as shipping industry experiences tougher business situations than after global financial crisis.