May 7th, 11:00 AM - 1:00 PM

An Assessment of the Decision Making Units’ Efficiency in Service Systems (The Case of Cellular Telecom)

Maoloud Dabab  
Portland State University

Timothy R. Anderson  
Portland State University

Let us know how access to this document benefits you.
Follow this and additional works at: https://pdxscholar.library.pdx.edu/studentsymposium

Part of the Systems and Communications Commons

https://pdxscholar.library.pdx.edu/studentsymposium/2019/Posters/12

This Event is brought to you for free and open access. It has been accepted for inclusion in Student Research Symposium by an authorized administrator of PDXScholar. For more information, please contact pdxscholar@pdx.edu.
Most tools and models on performance and quality of service management are generic and do not solve the complex technical systems, which the most critical component on the network and where these tools should be applied. The objective of this research is to assess the cellular performance and Base Transceiver Station (BTS) efficiency by proposing a robust model that is derived from multiple Key Performance Indicators (KPIs) based on technical and financial aspects. The novelty of this research provides a comprehensive multidimensional model for tuning the BTS parameters, which can lead to developing a standard global mobile network KPI. The model measures the efficiency of BTSs and offers a reference set for inefficient BTSs. This creates guidelines for the network optimization engineers to improve inefficient BTSs by comparing their configurations with efficient BTSs to achieve a high level of network optimization. Thus, the analysis will help the decision makers focus on the right area and identify the most critical BTSs based on best practices.

Introduction

- Service science is the study of service systems, which creates a basis for systematic service innovation.
- The goal of service science is to increase the productivity and efficiency of the service industry and creates greater tools for assessing the value of investments in service systems.
- Customer satisfaction is directly related to performance and services quality.
- It is very important to adopt a right tool to measure the productivity and efficiency of the new way of service delivery.

- Many daily life services are built on the availability and quality of telecommunication mobile service (Cylter and Minard 2016; Wu et al. 2011).
- The mobile telecom industry has become one of the fastest growing sectors, and developing countries have been trying to keep up with the pace of these changes (Charvati 2013; Casey 2014).
- Mobile operators should adopt assessment of service quality approaches to respond to an increasingly competitive environment of customer satisfaction (Husain et al. 2009; Orsoo and Duah 2018; Lee et al. 2016).

The BCG matrix was introduced in the late 1960s as a growth-share matrix to help corporations to analyze their business units, and then matrix to help corporations to analyze their business units. This research aims to address how to improve the productivity and efficiency of the new way of service delivery.

Telco Efficiency

- Most of the previous research was focused on individual factors in the BTS efficiency field.
- There is a lack of robust tools in the telecom mobile industry for prioritizing the efficiency of BTSs.
- Evaluating the cellular network performance is a complex process.

To provide a more complete recommendation, regression analysis is integrated as a third step in the model to:
- Explore the impact of the variables (inputs and outputs) which helps to clarify the driver KPIs in the model.
- Process data and determine the effectiveness of the BTS’s parameters and setting based on its efficiency.

Data Envelopment Analysis is a nonparametric method that measures the efficiency of a series of Decision-Making Units (DMUs) using linear programming models (Charnes, Cooper, and Rhodes 1978). The BCG matrix was introduced in the late 1960s as a growth-share matrix to help corporations to analyze their business units, and then matrix to help corporations to analyze their business units. This research aims to address how to improve the productivity and efficiency of the new way of service delivery.

- Due to the increase in competition, the importance of quality of service and performance evaluation to improve the provider's customer satisfaction should be taken into consideration more than ever.
- Mobile providers measure the BTS efficiency through a variety of KPIs, but the optimization and planning engineers are struggling to balance conflicting KPIs, to assess the priority of the BTSs.
- The nature of the problem in this research requires a method that considers a variety of factors, and builds the evaluating model using multiple inputs and outputs. Therefore, DEA is employed as the methodology because it meets this purpose and can be used to generate a composite of efficiency, productivity, performance, and benchmarking measures.

Research Contribution

- Create a better understanding of the dynamics surrounding mobile telecom infrastructure decision making in general and mobile base stations in particular.
- Suggest enhancements to increase cellular network efficiency by determining the inefficient BTSs based on related best practices BTSs.
- Provide guidance for the network optimization engineers who can improve the inefficient BTSs by comparing the configuration with peers to achieve a high level of network optimization.
- Assist decision makers to differentiate between the quality of equipment and vendors by defining BTS productivity and efficiency.
- Lead to developing an initial standard mobile network KPI that indicates a comprehensive BTS efficiency.